# HAWAIʻI DAIRY FARMS

## FINAL ENVIRONMENTAL IMPACT STATEMENT

## VOLUME 4
## FRIENDS OF MĀHĀʻULEPŪ COMMENT LETTER, APPENDICES, AND RESPONSES

This environmental document is prepared pursuant to Hawaiʻi Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

**SUBMITTED BY:**

Hawaiʻi Dairy Farms
MAHAʻULEPU, KAUAʻI

**JANUARY 2017**

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**SUBMITTED BY:**

Hawai'i Dairy Farms
MAHA'ULEPU, KAUA'I

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# FINAL ENVIRONMENTAL IMPACT STATEMENT
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# Comment Letter From Friends Of Māhāʻulepū

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July 25, 2016

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**RE: FRIENDS OF MĀHĀ'ULEPU'S COMMENTS ON HAWAI'I DAIRY FARM'S DRAFT ENVIRONMENTAL IMPACT STATEMENT**

Dear Ms. McIntyre, Mr. Overton, and Hawai'i Dairy Farms, LLC:

Friends of Māhā'ulepu ("Friends") is a grassroots, not-for-profit corporation dedicated to protecting and preserving the Māhā'ulepu Valley and Kaua'i. In furtherance of its mission, FOM has reviewed Hawai'i Dairy Farm's ("HDF") June 8, 2016 *Draft Environmental Impact Statement* ("DEIS") and supporting documents and hereby submits the following comments. Friends' comments expressly incorporate the reports and appendices attached to this letter and any materials cited herein. Friends' comments also expressly incorporate by reference its scoping comments on the Environmental Impact Statement Preparation Notice ("EISPN"), submitted to the Department of Health on February 20, 2015, as well as the scoping comments and DEIS comments submitted by Friends' members and Kawailoa Development, LLP, the Center for Food Safety, the Center for Biological Diversity, and Sean Sweeney. Additionally, Friends expressly incorporates by reference its correspondence with all local, state, and federal agencies concerning aspects of this proposed project; that correspondence enclosed herewith.

In sum, the DEIS reveals numerous, significant problems with HDF's proposed dairy project, and the likely impacts are such that the proposed project should not be permitted to



proceed as planned in the proposed location. Importantly, the DEIS does not include the previously touted description of a "zero-discharge" facility, and now acknowledges that discharges will, in fact, occur, and will reach downstream surface waters and the ocean. DEIS at 4-67. This impact alone justifies denial of the proposal. Additionally, several elements of the DEIS are incomplete, incorrect, or inadequate. Some specific, significant flaws in the DEIS include:

- Failure to define the proposed action: the DEIS is not clear on whether the proposed operation will contain 699 cows or 2,000 cows, and seems to suggest that it will "wait and see" if the land can sustain a higher number. A segmented approach is not appropriate, and the DEIS should fully evaluate the direct, indirect, and cumulative effects of the proposed dairy at its desired herd size.
- Failure to include a true "no-action alternative: the "no-action" alternative should describe the existing baseline conditions of the project site and surrounding area. This DEIS proposes a "no-action" alternative of adding up to 2,000 livestock to the site that are not currently there. In failing to describe a true "no-action" alternative, the DEIS deprives the public and the Department of Health of necessary context for comparing impacts from the proposed project against any alternatives.
- Flawed and incomplete mitigation measures: the DEIS repeatedly lists generic mitigation measures that are either not based on site-specific data, are not supported by an explanation of how those measures will be implemented at the site, or do not include complete analysis of the efficacy of the proposed measure.
- Discharges: backing away from prior claims of "zero-discharge," the DEIS acknowledges that the waste generated by hundreds or thousands of dairy cows will discharge into surface waters flowing through the dairy and downstream to the Pacific Ocean. The DEIS fails to properly quantify the amount of manure, urine, and any hormones, antibiotics, or pathogens that will be transported off-site.
- Impacts beyond the fence: the DEIS ignores the fact that its pregnant cows will lead to a rapid increase in the overall herd size. It specifically acknowledges that calves and dry cows will be managed off-site, yet fails to fully describe this process and the likely impacts that will be caused from, inter alia, constant transportation of cows to various ranches and nutrient loadings of its cows in those off-site areas.

After reviewing these comments, Friends believes that the Department of Health will recognize that the construction and operation of a dairy farm at either the "committed" herd size of 699 cows or the "contemplated" herd size of 2,000 cows will cause sizeable and irreparable environmental, cultural, and economic impacts. The harm that would be inflicted by these impacts far outweighs any of the purported benefits of a dairy of this size being operated on Kaua'i and especially at the proposed site. The Department of Health should, at minimum, require the preparation of a new DEIS that addresses the multiple shortcomings identified herein and by other entities. Given the many flaws and dangers already apparent in this incomplete DEIS, however, it is certain that a complete DEIS also will reveal that this proposed project should not go forward.

## 1. Introduction

In recognition of the unique character of Māhā'ulepu, in 2001, the Kaua'i County Council adopted Resolution No. 2001-25, entitled "Resolution Supporting Future Preservation of Māhā'ulepu."[1, 2] The Resolution provides that "Māhā'ulepu is a heritage landscape where it is possible to preserve and restore diverse significant natural, scenic, cultural, archaeological, historic, scientific, and recreational resources," and that "Māhā'ulepu is a living cultural landscape and a place sacred to many Native Hawaiians, particularly those of the Koloa area whose ancestral remains are buried at Māhā'ulepu." That same year, the Hawaii House and Senate likewise supported the preservation of Māhā'ulepu by passing similar resolutions.[3]

In 2006, Senator Daniel K. Inouye requested that the National Park Service conduct a reconnaissance study of Māhā'ulepu.[4] The study recognized that "[n]atural and cultural resources in this area [Māhā'ulepu] provide respite and recreation for residents and visitors[.]" The National Park Service determined that:

> The study area shoreline corridor, Hā'upu mountain range and Hulē'ia Stream are deemed nationally significant on the basis of natural and cultural resources including geologic landforms, rare species and habitats, and features central to stories of native Hawaiian and United States history. Collectively these areas comprise a relatively unspoiled and increasingly threatened coastal landscape that provides unique opportunities for public enjoyment, interpretation and scientific study.
> …
> Volcanic features of the study area represent a stage and range of geologic development of the Hawaiian high islands that is not featured at other Hawai'i parks. Landforms and fossils of the Māhā'ulepu coast illustrate the reality of global climate and sea level change, as well as the impacts of human settlement on native ecosystems. An extensive and undeveloped Hawai'i shoreline within easy reach of population centers, such as that found in the study area, is a rare and rapidly vanishing type of recreational resource prized by U.S. citizens and international visitors as well as Hawai'i residents. Protection and management of this resource type is currently inadequate at federal, state, and local levels.[5]

[1] County Council of Kaua'i, Resolution 2001-25.
[2] All footnotes that refer to documents reference documents that are either already in the record or documents listed in the Appendix; *see* Appendix Index for full citation; *see* Appendix for document.
[3] S.R. No 97, S.D. 1, Supporting the Future Preservation of Māhā'ulepu, Twenty-First Legislature, 2001; H.R. No. 91, H.D. 1, Supporting the Future Preservation of Māhā'ulepu, Twenty-First Legislature, 2001.
[4] U.S. Dept. of Interior, National Park Service, Reconnaissance Study (2006).
[5] *Id*. at 1-2.



It is clear that at the local, state, and federal levels, Māhā'ulepu is recognized as a unique and special place. The Department of Health now has the opportunity to give real meaning to these resolutions by denying approval of a proposed project that threatens to degrade this rare, heritage landscape.

## 2. HDF Has Not Been Truthful With the Public or with Agencies During the DEIS Process.

*"An EIS is meaningless without the conscientious application of the EIS process as a whole, and shall not be merely a self-serving recitation of benefits and a rationalization of the proposed action." HAR §11-200-14.*

From the very early rumblings of the proposed dairy project and throughout the entirety of the DEIS process, HDF has not been truthful with the public or with agencies.[6] Every time a concern has been raised or some aspect of the proposed project questioned, HDF has changed its story or pivoted in a new direction, resulting in short-term, face-saving spin while failing to actually address the underlying problem. For example, the EISPN announced that this project would be the first "zero-discharge, grass-fed dairy." EISPN at 2-2. The phrase "zero-discharge" is nowhere to be found in the DEIS, though, because HDF cannot escape, and now for the first time admits, the fact that some amount of discharge will occur. Rather than considering relocation or altering the parameters of the proposal to truly prevent discharges, HDF chose instead to merely change its marketing copy and discontinue using "zero-discharge." HDF's previous claim that this dairy would be the first "grass-fed" dairy is similarly misleading, as it implies that the dairy will be the first to use *only* grass. This claim is flatly contradicted by the acknowledgment in the DEIS that imported grain will be used for up to 30% of the cows' diet. A dairy should not be celebrated as "grass-fed" when nearly a third of the feed is not actually grass. Again, rather than adjusting its proposal to *actually* rely completely on local grass, HDF has simply backed away from the phrase "grass-fed" and now describes its goal of "grow[ing] local, quality grass as a *primary* feedstock[.]" DEIS at 2-7.

HDF had previously publicized the claim that it had an "NRCS-approved plan" and an "NRCS permit" for its dairy operations. NRCS does not actually approve plans or issue permits, though, and after being challenged on this claim, HDF now describes its plan as "NRCS reviewed." The NRCS "plan" described the soil type as "free draining volcanic soil" with "a rest period of as little as 6 hours before irrigation can take place." In fact, the soils underlying the dairy are primarily Ka'hili and Ka'ena clay soils, which are classified as poorly drained with low permeability.

The anticipated herd size of HDF's proposed dairy is in a constant state of flux, and is an obvious attempt to pursue the path of the least regulatory resistance while leaving open the

[6] Friends has corresponded with various state, local, and federal agencies about a number of disingenuous, incomplete, or incorrect submittals that have been produced by HDF. Friends encloses that correspondence with these comments and specifically incorporates them by reference.

option to increase animal density and, presumably, profits. From the early days of development of the project, it was apparent that HDF wanted to house approximately 2,000 milking cows. The EISPN stated that "[t]he HDF site in Māhā'ulepu…is projected to be capable of supporting up to 2,000 productive dairy cows at full-scale operations[.]"[7] But conversations with regulatory agencies led HDF to yet another re-branding, this time involving a distinction between the "committed" herd size of 699 cows and the "contemplated" herd size of 2,000. The change to 699 cows was an obvious attempt to fall one animal under the 700 cow large CAFO classification. With 699 pregnant cows ready to give birth within weeks of arrival, however, the animal units would almost immediately exceed 1000 when adding over 600 calves. This semantic parsing does little to assuage any concerns that HDF actually intends to stick to the "committed" herd size if the data were to indicate that no additional animals could be tolerated without degrading the environment.

A comparison of aerial imagery of the proposed dairy site from 2013 to the present reveals major, obvious changes.[8] This is because HDF actually began construction on the proposed dairy site without first securing the proper NPDES stormwater construction permit coverage as required by law. When the Department of Health repeatedly asked about whether HDF had undertaken any construction activities on the site, HDF simply ignored the questions. HDF has grubbed almost all of the property, has already installed part of its irrigation system and a functioning pivot, has installed approximately 160 concrete troughs to provide water to livestock and connected them to underground piping, and has begun excavating its manure storage pond area (among other activities).[9] It was not until after Friends initiated an enforcement action that HDF finally responded to the Department of Health's inquiries. In a startling display of cognitive dissonance, HDF represented to the Department of Health that "land disturbance associated with this project as listed in the NOI has not commenced," while simultaneously admitting that "[o]ne particular activity indicated in the NOI had been partially completed but has been halted[.]"[10] An activity has either commenced or it hasn't – but not both.

Shortly before filing its DEIS for publication, on May 25, HDF quietly submitted two dozen modifications to its 2014 Waste Management Plan to the Department of Health.[11] The public was given no notice of these changes, as the changes were not fully incorporated nor referenced in the DEIS that was released just two weeks later. These changes not only affect the evaluation of potential environmental impacts resulting from the proposed project, but also should have been properly noticed for public comment. HAR § 11-200-22(d) requires that "[a]n addendum document to a draft environmental impact statement shall reference the original draft environmental impact statement it attaches to and comply with all applicable filing, public review, and comment requirements set forth in subchapter 7." HDF failed to comply with HAR § 11-200-22(d): the Waste Management Plan updates *must* be published and the public must be

[7] EISPN at 2-2.
[8] Google Earth aerial imagery.
[9] Garmatz, James J., August 14, 2015 Letter to Jiaping Fouse.
[10] *Id.* at 1.
[11] Matsuda, Paul T., Group 70, May 25, 2016 Letter to Sina Pruder.



allowed time to fully review and comment on them as provided by law.[12] This is yet another example of HDF's attempts to evade the rules governing its proposed dairy.

Taken together, these issues raise a red flag as to HDF's credibility and competence on this project. Given this background, the Department of Health should apply the utmost scrutiny to the DEIS and HDF should be required to specifically address any ambiguities, inconsistencies, or errors in a revised and re-submitted DEIS that goes beyond merely updating its marketing shtick.

### 3. <u>The Proposed Dairy is Subject to the Hawaii Environmental Policy Act</u>.

Chapter 343, Hawaii Revised Statutes ("HRS"), establishes a system of environmental review at the state and county levels which shall ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations. One of the most obvious examples of HDF's confusing and inaccurate claims about this proposed project is the claim that the instant DEIS is being completed on a "voluntary" basis. In fact, the state-mandated environmental review process is *not* optional for HDF.

The Hawaii Environmental Policy Act[13] (the "Act" or "HEPA") is modeled after the federal National Environmental Policy Act,[14] which serves as the country's basic charter for meaningful evaluation of environmental impacts of proposed projects. Under HEPA, there are nine specific types of actions, or "triggers," that prompt environmental review of private applicant proposals.[15] One of those triggers requires review where a project

> [p]ropose[s] the use of state or county lands or the use of state or county funds, other than funds to be used for feasibility or planning studies for possible future programs or projects that the agency has not approved, adopted, or funded, or funds to be used for the acquisition of unimproved real property; provided that the agency shall consider environmental factors and available alternatives in its feasibility or planning studies[.][16]

Despite HDF's repeated claim that it is undertaking the instant DEIS as a "voluntary" gesture in response to community concerns, its proposed dairy operation is subject to the HEPA trigger above and HDF should be bound by the Act's requirements. In 2011, Māhā'ulepu Farm, LLC petitioned for and received from the State Land Use Commission a designation of

[12] Any of the required permits or plans that remain "in process," such as the Archaeological Inventory Survey, must also be finalized and made available for public review and comment. Friends therefore requests that a revised DEIS be submitted once all required plans and permits have been finalized.
[13] Hawaii Revised Statutes, §§ 343-1 through 343-8.
[14] 44 U.S.C. § 4321 *et seq.*
[15] HRS § 343-5, HAR § 11-200-6(b).
[16] HAR § 11-200-6(b)(2)(A).

"Important Agricultural Lands" ("IAL") for approximately 1,533 acres on Kaua'i.[17] Under Hawai'i law, certain incentives are available for owners of IAL, including a tax credit for qualified agricultural costs up to $7,500,000 annually.[18] Pierre Omidyar, the founder of Ulupono Initiative, submitted a request for an IAL tax credit for 2014 in the amount of $3,194,929.62.[19] That request was approved in full by the Department of Agriculture in March of 2015. These tax credits are state funds that are not exclusively for "feasibility or planning studies" or the "acquisition of unimproved real property," as the itemized inventory includes funds for such items as "irrigation materials" and "trough molds." They even received credits for legal advice and the completion of the DEIS itself. The approval of over $3M in tax credits from the State of Hawai'i is "the use of state…funds" sufficient to trigger the implementation of the HEPA process. The HEPA process is therefore mandatory.

HDF must meet every requirement of HEPA. The Department of Health, as the reviewing agency, has the obligation to undertake independent review of any DEIS or EIS, and has the authority to reject HDF's proposal if it determines that HEPA has not been satisfied.

**4. <u>Response to Purpose and Need Statement</u>**

While the DEIS describes the applicant's desire to reduce reliance on imported goods and retain Hawai'i's agricultural history, it is not clear that there is an unmet demand for fresh milk on Kaua'i. In considering potential fluid milk demand, the DEIS uses <u>state</u> population figures and <u>national</u> per capita consumption rates. DEIS 2-4. A more localized evaluation of island consumption rates would clarify the actual unmet demand for fresh milk (if any).[20] Thus, the need for this project is not apparent from the DEIS.

The stated project purpose is to "establish a sustainable, pastoral rotational-grazing dairy farm that will increase current local milk production, bolster Hawai'i's declining dairy industry, and reduce reliance on imported milk from the mainland United States." DEIS 2-7. This purpose has evolved since the EISPN, which noted that the method was designed to be "zero-point source discharge."[21]

The proposed project does not meet its own stated objectives and purpose, and does not satisfy its selected evaluation criteria. Sections 2.3.3 and 2.3.4. For example, Project Objective 2 is to "[a]pply proven, sustainable pasture-based rotational grazing system and state-of-the-art technology to reduce reliance on imported fertilizer and feed." DEIS 2-7. Section 2.4 states that

[17] State of Hawai'i, Land Use Commission, *Findings of Fact and Conclusions re: Petition for IAL*.
[18] Act 183, State of Hawai'i, 23rd Legislature 2005.
[19] Hawaii Dairy Farms Request for Cost Certification.
[20] On a national scale, per capita milk consumption has been on the decline, and younger generations are consuming less milk than their parents and grandparents. Bentley, 2014, Trends in U.S. Per Capita Consumption of Dairy Products, 1970-2012.
[21] EISPN at 2-2.



"New Zealand's grass-fed model was found to be the cleanest, most cost-effective method for sustainable dairy production in Hawai'i." DEIS 2-8.[22]

Utilization of the "New Zealand model" would not only fail to meet Project Objective 2, but would spell catastrophe for the Maha'uelpu Valley watershed and downstream coastline, just as it has in New Zealand. A 2015 report examining land use and nutrient pollution effects on water quality in New Zealand found that:

> [D]airy farming is the land use that has continued to expand rapidly, and so is largely the cause of increased nutrient stress on waterways...[t]he main source of nitrogen is animal urine. But it is not just how much urine animals produce that matters, but how they urinate. Sheep urinate in small amounts, so the grass is able to take up much of the nitrogen as fertilizer. Cows, on the other hand, gush litres of urine at a time, overwhelming the ability of the grass to absorb it. Because the nitrogen exists in highly soluble chemical forms, some of the surplus is washed off by rain, but most leaches through soil into groundwater.
> …
> Nitrogen concentrations in waterways have increased in regions where dairy farming has expanded. In many places water quality has declined as a result.[23]

Waterways in New Zealand are being overwhelmed with dairy facility pollution. This is clearly not a model that Kauai should emulate.

There are additional objectives that the proposed project clearly does not meet. Project Objective 6 is to "[o]ptimize dairy product shipping and marketing. DEIS 2-8. At the time of publication, one of two "unresolved issues" is the resolution of milk products processing. Section 4.28 at DEIS 4-110. The applicant admits that the "location for the milk processing activity has not been finalized." DEIS 4-110. It is therefore not possible to evaluate whether dairy product shipping and marketing has been "optimized" without knowing the location and scope of the milk processing. Currently, HDF plans to pasteurize milk on Kaua'i, then ship it in chilled containers to O'ahu for processing, which includes bottling, packaging, and potential creation of other dairy products such as yogurt and cheese. DEIS 1-11. The finished product would then be returned to Kaua'i – and possibly distributed to other customers throughout the State – for sale. This is hardly "optimal" dairy product shipping and marketing, and the issue of

[22] Inconsistently, HDF's May 25, 2016 Waste Management Plan updates, submitted to DOH but undisclosed to the public, note that the Nutrient Mass Balance Table has been updated with the "Cornell Model," even though HDF recognizes "the success of the Dairy New Zealand model for evaluation of nutrients[.]" A thorough description of the "Cornell Model" should be included in the DEIS.
[23] Parliamentary Commissioner for the Environment, *Update Report – Water quality in New Zealand*, at 19-20.

milk processing needs to be fully planned and considered before determining that the proposed project meets Objective 6.

Objective 8 also is not satisfied by the proposed project. Objective 8 is to "[p]rotect and enhance the area's natural, cultural, social, and economic environment through sound agricultural planning, preservation of open space and protection of sensitive resources, and development of economic benefit." DEIS at 2-8. As discussed *infra* in these comments and appendices, the proposed project is likely to result in irreparable and harmful impacts to the environment and local economy, including: pollution of surface and ground waters, damage to area ecosystems, including nearshore marine environments, destruction of critical habitat for endangered and threatened species, degradation of culturally-significant areas, disruption of current noise and traffic levels, introduction of pests, and negative impacts to property values. Objective 8 cannot be deemed to be satisfied by the project as currently proposed. Further, given the current conditions of the Wai'opili Stream and the sensitivity of the Makauwahi Cave System and endangered species that rely on it, it is doubtful that the Māhā'ulepu location is appropriate for a dairy farm of *any* size.

Finally, some objectives are vague and need more clarification. Objective 5 is to "[e]ffectively integrate dairy operations within the island community setting." How will HDF measure whether integration has been "effective?" This objective is not clear as stated. Objective 7 is to "[p]rovide local farming employment and build the agricultural economy." It is not clear how HDF will measure the "build[ing]" of the agricultural economy. Additional clarity and defined terminology will enable proper evaluation of the proposed project's ability to satisfy the stated Objectives.

**5. <u>Response to *Description of Action*</u>**

The planned dairy operation, as described in the DEIS, raises many questions that need to be examined and answered in greater detail. Logistics of many aspects of the planned operations have either not been fully evaluated or are still being planned by the applicant (for example, offsite milk processing). Without final decisions on these operational aspects, the resultant impacts of those operations cannot be properly assessed. The description of the proposed action and the efficacy of mitigation measures are therefore incomplete, and should be further considered in a revised DEIS.

a. <u>Conservation Practices</u>

HDF plans to utilize a suite of Natural Resources Conservation Service ("NRCS") practice standards. DEIS 3-7. One of the standards that HDF intends to use is NRCS Practice Standard 313: Waste Storage Facility. Citing to Department of Health requirements, NRCS Practice Standard 313 includes the specific requirement that waste facilities must "be located a buffer distance of 1,000 feet from public drinking water resources and 50 feet from surface water



resources."[24] Code No. 313 further states that "[w]aste storage facilities **shall not be located in wetlands**."[25]

The location of the proposed dairy facility conflicts with Practice Standard 313 and Department of Health siting requirements as proposed in the DEIS. Appendix G to the DEIS, the *May 2016 Draft Archaeological Inventory Survey Report for Māhā'ulepu Ahupua'a*, Koloa District, ("AIS") identifies five broad zones in the landscape of the proposed project area; it identifies Zone III as "marsh" and states that Zone III consists of "wet marshland."[26] Additionally, numerous ditches traverse the property and are capable of carrying storm and surface water to the convergence point at the Wai'opili Stream.[27] The risks posed by siting a waste storage pond so close to surface water resources and "wet marshland" are great, and the DEIS fails to account for these risks even as it notes intent to comply with Code No. 313. The DEIS should fully evaluate whether its waste storage pond is located in a wetland or otherwise conflicts with NRCS Standard 313.

Historically, most the site was a wetland.[28] Only through ditching of the property has it been drained to allow some agricultural operations.[29] During the AIS process, HDF's contractor dug a series of stratigraphic trenches, but encountered difficulties with the marshy conditions in some areas and discontinued some trenches.[30] This is characteristic of a wetland area, and the DEIS should more thoroughly consider whether siting its proposed dairy in this location is appropriate and safe.

Additionally, HDF's past failure to timely seek guidance from agencies about best management practices ("BMPs") and its failure to implement BMPs in connection with its construction activities do not instill confidence as to whether HDF has fully explored and plans to fully implement BMPs during the remaining construction and development phases of the project. Appendix K provides brief summaries of the NRCS practice standards that HDF intends to implement, but does not thoroughly explain how these practices will effectively mitigate or prevent pollution. The DEIS should explain in greater detail the BMPs that HDF intends to implement, and discuss how HDF plans to monitor and evaluate the efficacy of those BMPs.

b. <u>Dairy Site Requirements and Layout</u>

The DEIS describes the "developed area" (buildings, yards, sheds, roads, and ponds) as both less than 0.1 percent of the total farm area (DEIS at 1-7) and less than two percent of the total farm area (DEIS at 3-9). OTHERS? This inconsistency is yet another example of inaccuracies and misrepresentations, and highlights the fact that specifics surrounding this

[24] NRCS Conservation Practice Standard Code No. 313, "Waste Storage Facility," at p. 1.
[25] *Id*. (emphasis added).
[26] DEIS Appendix G at pp. 46-47.
[27] See, e.g., DEIS Appendix D at p. 9, Fig. 4.
[28] *See* Comments of David J. Erickson (attached hereto, hereinafter "Erickson Comments"), describing old map at 8, 18.
[29] Erickson Comments at 2.
[30] DEIS Appendix G, Appendix A at A-2 through A-15.

proposal continue to be in a state of flux. Impacts of certain aspects of the proposed project cannot be evaluated when those aspects themselves remain undetermined.

The logistics around rotating cows in and out of the milking parlor are unclear, and thus the impacts have not been fully considered and evaluated. A significant issue presented by the site layout and design is the likelihood for hoof compaction to affect the underlying soils. Additionally, the plans for the lined waste water pond use and construction present a problem.[31]

The groundwater is very shallow in the area excavated for a storage pond, and maintaining the integrity of a pond liner if the stored waste level is below the ground water table is impossible.[32] The pressure differential causes the liner to bubble and move, ultimately resulting in holes that fully defeat the purpose of lining the pond in the first place. The depth to ground water is as shallow as 2 feet on the site, and the photographs of stratigraphic trenches dug for the Archaeological Inventory Survey show direct evidence of the shallow ground water table. Even with these conditions, HDF apparently has no plans to relocate its waste storage ponds.[33]

c. Herd Size, Herd Management and Offsite Herd Management

The issue of herd size remains unresolved and prevents meaningful evaluation of the entire proposed project. While HDF asserts that its 699-head proposal is the one to which it has "committed," and the 2000-head proposal is merely "contemplated," early discussions of the project and its evolution over the past two years reveal a different story.[34] HDF decided to scale back its proposal after learning about the different regulatory requirements that apply to dairies with 699 or fewer mature dairy cows versus those housing 700 cows or more. Differences between the two herd sizes result in differences in, at minimum, quantity of milk produced needing to be transported off-site, quantity of animal waste generated and nutrient loadings to the environment, quantity of forage and supplemental grain needed for the herd, quantity of water needed to meet livestock consumption needs, amount of time spent milking the herd (which affects operational efficiency, movement through the system, and cattle congregation/hoof compaction in high-frequency areas), and a general increase in number of cows managed off-site, among others. Rather than allowing some phases of this proposal to proceed under the guise of housing 699 cows, the Department of Health should require HDF to resubmit a new DEIS based *entirely* on its intended plan of housing 2,000 milking cows.

Regardless of which herd size is proposed, the resultant nutrient loadings from dairy cow waste will be substantial and will overwhelm the site. The U.S. Environmental Protection Agency estimates that a facility with 2500 dairy cattle creates a similar waste load as a city of

[31] Erickson Comments at 4-5.
[32] Erickson Comments at 4.
[33] Excerpts from the Deposition of James J. Garmatz at 109.
[34] 699 is not an arbitrary number; rather, it represents an intentional effort to avoid classification as a "large" Concentrated Animal Feeding Operation ("CAFO") under federal law. 40 C.FR. 122.23(b)(4). A large CAFO is one that, *inter alia*, houses 700 mature dairy cows on site.



411,000 people.[35] At its contemplated size of 2,000 milking cows, HDF's dairy will generate about the same amount of waste as a human population of 328,800. This is approximately five times greater than the entire human population of Kaua'i[36] on an area of less than 600 acres. Unlike human waste, however, which must be treated, the waste generated by HDF's herd will be deposited directly onto to its grazing land, where it will be readily available to be washed into nearby drains and ditches and carried downstream to the Wai'opili Stream and Pacific Ocean. Finalization of the herd size is therefore essential before the environmental impacts may be adequately considered; the DEIS requires revision in this critical aspect.

The DEIS notes that antibiotics may be prescribed, but provides no additional information about the specific antibiotics to be used, nor does it disclose any hormones or other feed additives to be used on the herd. Accordingly, the DEIS fails to include an evaluation of potential impacts from the use of any antibiotics, hormones, or other additives, and as the use of these pharmaceuticals is a foreseeable and probable part of this dairy operation, such an evaluation must take place. Given the high potential for surface runoff on the proposed dairy site, these pharmaceuticals are likely to wash down the ditch system to the Wai'opili Stream, and eventually discharge at the Pacific Ocean. The introduction of antibiotics, hormones, and other feed additives to the coastal marine environment will wreak havoc on the many sensitive species that rely on the Māhā'ulepu coastline, and will expose people who recreate in that area to health risks. These impacts were not—but should have been—examined in the DEIS.

The description of animal mortality management in the DEIS is inadequate. The DEIS and supporting documentation suggest that it is uncertain whether HDF will need to handle deceased animals. The DEIS includes a perfunctory statement that "*[s]hould* animals die at the site," they will be buried at a "designated area" as specified in the Waste Management Plan "reviewed by DOH." DEIS 3-18. The July 23, 2014 Waste Management Plan notes that "*[i]f* on-farm storage or handling of animal mortality is done," HDF will follow NRCS Standard 316.[37] HDF should assume that it will need to address animal mortality early in its operations, and the DEIS should fully describe this process and how the selected location for the animal cemetery will not result in any significant environmental impacts. At present, the cemetery is sited in Paddock 163, which is over poorly-drained soils but near a strip of well-drained soils. Appendix D (Nutrient Balance Analysis at Figures 5, 6). The depth to water table in this area is 24 to 60 inches, but the Waste Management Plan states that burial pits will never go deeper than 8 feet. Given the depth to water at this site, the maximum depth of the burial pits should be adjusted to protect ground water quality. If the depth cannot be adjusted in a way that also maintains protection of surface water quality, an alternative location for the animal cemetery

[35] EPA, Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington, EPA Region 10, March 2013 at iii and pp. 31, *available at* <https://www3.epa.gov/region10/pdf/sites/yakimagw/nitrate_in_water_wells_study_march2013.pdf> and listed under other documents at <https://yosemite.epa.gov/r10/water.nsf/gwpu/lyakimagw>.
[36] United States Census Bureau, Kaua'i County Population.
[37] As discussed *infra* Section 5 (g), HDF recently updated its Waste Management Plan, but did not notify the public of those revisions.

should be selected. The DEIS must be revised to include a thorough evaluation of mortality management and potential for impacts.

The DEIS notes that offsite ranches will be used for storage of calves and dry cows, but fails to fully disclose and consider the impacts that may result from taking advantage of these offsite locations to increase its own herd size. The DEIS states that the number of animals to be managed offsite ranges from approximately 600 to 1,100 (at the "committed" size of 699-head) up to 900 to 2,000 (at the "contemplated" size of 2,000-head). This presents a large increase in the number of livestock on the island in just a short amount of time.

Any resulting impacts of transporting and housing the calves and dry cows are a necessary consequence of HDF's dairy operation. Whether HDF considers these to be direct, indirect, or secondary effects, it must disclose and consider these impacts. HDF fails to disclose or consider the impacts caused by the doubling of the herd. For instance, how will the addition of a few hundred to a few thousand cows at just a couple of other island ranches affect the cultural resources, archeological resources, surface and groundwater, noise, odors, traffic, insects, and property values elsewhere on the island? How will these additional calves and dry cows affect the overall greenhouse gas emissions of the project? Whether the calves are immediately slaughtered or allowed to mature, HDF must disclose and consider the extent of these impacts on the environment. Because HDF must evaluate the environmental impacts resulting from offsite herd management, it must also include a baseline analysis of conditions at these locations, reasonable alternatives to the offsite management locations, and cumulative impacts; the cumulative impacts to be evaluated are not limited by the boundaries of HDF's property.

Finally, the DEIS mentions that the dairy cows will consume a mixture of local forage and imported feed, but fails to discuss any specific details about which grain or grains will comprise the supplemental feed.[38] Imported grain presents a number of risks and potential impacts that remain unaddressed in the DEIS, including, but not limited to: attraction of birds, insects, rodents, and other pests to the grain storage and feeding areas, which may, in turn, serve as vectors for pathogens and disease; introduction of antibiotics, pesticides, and other chemicals used to grow the grain to the dairy site; impacts of chemical released from fermentation such as methanol and other volatile and semi-volatile compounds; the effect of high winds, humidity, heavy rain, or other extreme weather events on grain areas; introduction of non-native or genetically engineered seed varieties to the proposed dairy site; and the impacts on traffic and related carbon emission levels associated with regular feed shipments.[39] Since imported grain will account for a substantial percentage of the cows' diet, the DEIS must fully disclose and consider the impacts that are likely to result from the reliance on imported grain for nearly a third of the cows' food supply.

d. <u>Pasture Management</u>

[38] HDF had previously touted the proposed dairy as a "closed-loop" model, where the food source would be grown on site and waste product returned as fertilizer. Reliance on imported grain for 30% of the cows' feed, however, undercuts this claim.
[39] *See* Comments of Center for Food Safety, section on Grain Feed.



The DEIS fails to fully discuss the numerous impacts that will likely result from the proposed pasture management. At the outset, Friends notes that much of the initial construction and pasture development work has been done without proper permitting and before this project has been fully approved. For example, the DEIS states that "a minimum of two concrete above-ground water troughs will be installed in each paddock for livestock drinking water," without bothering to mention that approximately 160 such troughs *have already been constructed* on the property.[40] At least 40 of these troughs have been connected to underground pipelines; additionally, the irrigation system has been partially installed and one functioning pivot established, and an area in the future location of the effluent pond has been partially excavated.[41]

The DEIS claims that 35-foot vegetated buffer areas will be established on each side of the ditches that flow through the proposed dairy site. During Friends' visit to the proposed dairy site in March, however, continuous 35-foot buffers were not observed.[42] A site-specific analysis should be completed to determine the buffer width, if any, that can effectively protect area surface waters from nutrients, erosion, and other surface runoff. The efficacy of the 35-foot buffer standard has been questioned and challenged as inadequate to protect water quality; accordingly, even if HDF were to install complete, continuous buffer strips, it must first determine the necessary buffer width. The DEIS also fails to disclose and consider that the Important Agricultural Lands in the Māhā'ulepu Valley are especially prone to erosion.[43] It is likely that, given the high potential for erosion and surface runoff on this particular site, 35 feet will not be adequate. Reduction in area from the cows will also mean more manure and urine and smaller areas than accounted for. The DEIS should include a full analysis of this mitigation measure, and consider unique and site-specific environmental conditions. The DEIS must disclose and consider whether the buffers will require specific plantings to help mitigate runoff and erosion. The DEIS must also consider how the buffers will be maintained throughout the operation of the dairy, given that the irrigation pivots will pass through the buffers. The DEIS must address any conflict between maintaining effective mitigation and the operation of the pivots.

The interaction of fenced paddock areas with a rotating irrigation pivot are not clearly described (making it difficult to fully evaluate any resultant impacts from this aspect of the operation). The DEIS indicates that paddocks will be fenced; how then will the mechanical pivot arm rotate through fenced areas? Will dairy personnel have to open and close fencing each time the pivot rotates through different paddock areas? Further, the irrigation pivot wheels will roll directly through the grazing areas and may pick up deposited animal waste in the paddocks. As the wheels roll across the metal ramps over the ditches, the animal waste is likely to be transferred directly to the ramps. When irrigation or storm water hits the ramps, the manure will be washed directly into the underlying ditches and carried downstream. The use of buffers is rather meaningless when the pivot wheels will be continually catching and tracking animal waste

[40] Excerpts from the Deposition of James J. Garmatz at 84.
[41] *Id.*
[42] Erickson Comments at 4.
[43] South Kaua'i Community Plan, 4-32, 4.5.1.2

into the "buffered" area. The DEIS fails to fully consider the environmental impacts of this aspect of the operation.

The dominant soils on the proposed dairy site are Ka'ena clay and Kahili clay soils, both of which are classified as poorly drained. These soils are not ideal for crop growth, as many references indicate that kikuyu grass performs well in at least moderately well drained soils.[44] The assumed yield of about 16 tons per acre was based on a few sample plots using high fertilization and without the presence of cattle (who will impact the soil – see discussion, *infra*). The DEIS has likely overestimated the crop yield and ability of kikuyu to thrive, and should include a complete evaluation that factors in impact of the presence of cows and realistic site conditions.

The recommended animal density as proposed in the DEIS is not achievable or sustainable without serious environmental impacts.[45] The carrying capacity of kikuyu pastures is approximately 1.5 to 3 head per hectare when high fertilization is used; a 2,000-head dairy at this site would result in approximately 10.5 animals per hectare. Even under the 699-head proposal, the density would be approximately 3.67 animals per hectare—still above the carrying capacity.

Hoof compaction on poorly drained soils also presents a problem. The effect of 699 or 2,000 cows compacting the soils is likely to make them more susceptible to runoff.[46] The effect of compaction is likely to be more pronounced in areas where the cows congregate for extended periods, such as near the watering troughs or in holding areas as they wait to enter the milking parlor. These higher-use areas are also likely to receive more buildup of manure and to have little to no vegetation, creating a significant risk for surface runoff.[47] The DEIS recognizes compaction, but its effects and impacts are not adequately discussed.

The DEIS fails to identify with specificity and thus evaluate the impacts of any anticipated pesticides, herbicides, fungicides, or rodenticides on the proposed dairy site. Although it acknowledges that some "herbicide or pesticide" may be used to control pests, it does not identify with specificity which herbicides or pesticides may be used. DEIS at 4-42. Like the animal waste and veterinary pharmaceuticals, applied pesticides, herbicides, fungicides, or rodenticides pose a high risk for surface runoff on the poorly-drained soils. The DEIS should fully disclose and consider the pest-management chemicals that it anticipates using on the proposed dairy site, and should evaluate the significance of resultant environmental impacts. Introduction of pesticides and other chemicals to the downstream system and ocean coastline could expose people, plants, and animals to harmful chemicals that may severely affect their health. This exposure risk is not adequately discussed in the DEIS.

Some of the soils on the edges of the site have better drainage classifications and could lead to groundwater contamination, especially under the planned high fertilization rates. High

[44] See discussion and references in Comments of Dr. Byron H. Shaw (attached hereto, hereinafter "Shaw Comments").
[45] Shaw Comments at 1, 3.
[46] *Id*. at 1.
[47] *Id*. at 1-2.



levels of precipitation makes leaching and runoff highly probable, and this probability increases with irrigation levels that are set to maximize crop yields (meaning that the soils would be kept near field capacity, allowing very little additional water before leaching or runoff would occur). Groundwater monitoring is an essential component of field management, but the DEIS does not include an adequate plan for groundwater monitoring. The list of monitoring parameters for both groundwater (and soil) should include the specific forms of nitrogen--at minimum, ammonium, nitrate and kjeldahl nitrogen--and available and total phosphorus.[48]

There are inconsistencies in the DEIS with respect to the planned irrigation.[49] The DEIS states that irrigation pivots are 1000 feet in diameter, DEIS at 3-25, yet figures show approximately 2400-foot diameter. Aerial photographs suggest about a 1600-foot radius. These discrepancies directly affect the irrigation water and effluent application calculations; likely impacts from irrigation and effluent application cannot be accurately predicted when the underlying figures contain these inconsistencies.

e. Offsite milk processing

The fact that the milk processing operations remain unresolved, DEIS at 4-110, is a major flaw. It is impossible to fully evaluate the impacts of this essential aspect of the proposed project when it is not even clear whether the processing will take place on or off-island. Impacts to traffic and noise related to milk transport, environmental impacts related to possible retrofitting or updating of an existing facility, and economic impacts of either proposal remain uncertain and have not been adequately disclosed and evaluated. Milk processing is an absolute necessity of any proposed dairy, and therefore the proposed project cannot be fully evaluated without thorough study and consideration of this necessary component. The DEIS must be revised to include complete analysis of the impacts resulting from milk processing.

f. Projected Costs

The DEIS includes "project development costs" of an estimated $9.5M to $11.5M. DEIS at 3-36. These costs apparently include "projected construction needs as well as related equipment expenses to fully develop the project." *Id*. These estimates appear to be low, especially considering that in 2013, Ulupono Initiative, proponent of the project, had already committed $17.5M to the project.[50] Excluded from the projected costs is an estimate of environmental remediation costs, either those to be absorbed by HDF to address foreseeable surface runoff pollution or those externalized to third parties who involuntarily experience pollution from HDF's dairy. These costs are foreseeable since HDF now recognizes that its proposed dairy may cause discharges of nutrient-laden groundwater to ditches or surface water runoff to downstream waters. Also excluded from the projected costs is any estimate of any civil penalties or other required payments resulting from environmental enforcement actions by a state or federal agency or through citizen enforcement. Because this proposed project has such a high

[48] *Id*. at 3.
[49] Erickson Comments at 4.
[50] Ulupono Initiatve Portfolio, from website (App. 25).

potential to pollute, costs to address pollution are foreseeable and should be evaluated as part of the EIS process.

g. Implementation and Permit Schedule

Table 3.10-1 in the DEIS is misleading and does not contain complete information. The Table states that a Waste Management Plan for "Phase 1 (699 Cows)," was "Reviewed" by the Department of Health in October of 2014. DEIS at 3-37. Notably absent, however, is any mention of the fact that on May 25, shortly before publishing the DEIS, HDF submitted a letter to the Department of Health which listed two dozen "updates" to the Waste Management Plan." Friends fortuitously learned that these "updates" had been submitted; the public was given no notice and many individuals may still not realize that these changes have been made.[51] The recent updates should be included in the Table or the status of the Waste Management Plan should be changed to "In Progress."

The timeline provided for securing the NPDES General Permit for Construction Activities and subsequent construction activities is also inaccurate and misleading. The NPDES General Permit for Construction Activities is listed as "In Progress" with a date of December, 2016. DEIS at 3-37. The Table then lists timetables of 2017-2018 for the completion of various aspects of the construction, including the "Milking Parlor, Sheds, Holding Yard, Ponds," "Roads, Wells & Pumps, Piping, Power, Fencing, Crossings," and "Paddocks and Pasture (Grass Establishment)." The forward-looking timetable ignores the fact that construction of many of these features has already been initiated, even though a NPDES General Permit for Construction Activities has not been granted.[52] The Table should include a more accurate description of the construction timeline; pasture development on the proposed dairy site actually began back in 2013.[53]

Finally, in addition to the NPDES General Permit for Construction Activities, and the recent Waste Management Plan updates, the May 2016 Draft Archaeological Inventory Survey (Appendix G to the DEIS) and the Conservation Plan Update remain "In Progress." DEIS at 3-37. Because these plans and permits are required, the DEIS should not include simple draft versions that are subject to further revision. The Conservation Plan and NPDES Permit, at least, include operational plans or processes that are necessary elements of the proposed dairy project.[54] The environmental impacts of any aspects of these plans or permits, or the ability of any mitigation measures proposed by these plans or permits should be fully considered during the DEIS review phase. The Department of Health should not conduct review of the DEIS until the required preliminary permits and plans have been completed.

[51] Friends identified these "updates" as one of many justifications for extending the public comment period on the instant DEIS in its June 21, 2016 letter to the Department of Health.
[52] HDF actually first applied for a permit for its construction activities in September of 2014, but has not yet secured coverage.
[53] Excerpts from the Deposition of James J. Garmatz at 5, 43, 65, 66.
[54] For example, the NPDES Permit includes a "Stormwater Pollution Prevention Plan" that is required to be in place during construction.



**6. Response to *Environmental Setting, Potential Impacts, and Mitigation Measures***

Regardless of which herd size is used, the proposed project is likely to result in significant, irreparable impacts to the environment. In many instances, the effectiveness of mitigation measures has been overestimated and the degree of impacts has been underestimated, improperly limited to a narrow geographic area, or ignored entirely. Whether viewed independently or as a collection of cumulative impacts, the overarching effect of this proposed project is to irreparably degrade the Māhā'ulepu Valley watershed and downstream waters, such that the project should not proceed as planned. At minimum, a revised DEIS must be completed that thoroughly discloses and considers all potential impacts discussed herein and in those comments incorporated by reference.

a. Climate

The baseline data used to describe the current climate conditions at the proposed dairy site are incomplete and outdated. The DEIS fails to use the most current and complete rainfall data. Table 4.1-1 shows average monthly rainfall data from the period 1904-1983; it ignores over 30 years of recent, relevant data. DEIS at 4-4. The next table then shows data from 1984 to 2013, but only depicts days of consecutive rainfall and multiday precipitation totals. Table 4.1-2. Baseline rainfall conditions should include recent average daily rainfall, not just 30-year-old average monthly rainfall with more recent measurements of consecutive rainfall. Recent climate data is especially important given the impacts on current baseline conditions from climate change. Impacts to the climate itself (and impacts that depend on accurate inputs of rainfall, such as surface water runoff) cannot be fully evaluated if the baseline data is stale or incomplete.

The DEIS also underestimates the strength of winds that blow across the Māhā'ulepu Valley.[55] The plethora of paleowind measurements on the lithified sand dunes of the Māhā'ulepu Formation indicate that strong winds have persisted in this area for over 435,000 years.[56] The DEIS notes that winds in the Po'ipu area generally range from 5 to 15 miles per hour (DEIS at 4-3); elsewhere the DEIS simplifies this figure to state that the average wind speed is 10 miles per hour.[57] DEIS at 4-74. Using this average range as a baseline for evaluating impacts from, inter alia, odors and air pollution, ignores the fact that during periods of higher wind intensity, which are frequent, the impacts are likely to extend greater distances.[58] Again, it is not possible to fully evaluate environmental impacts that rely on accurate wind data (such as air quality and odor) when the existing baseline data assumes averages that ignore instances of higher-frequency and intensity winds.

Finally, the DEIS fails to disclose and consider the effects that climate change will have on both baseline conditions and any resultant environmental impacts. The State of Hawai'i, Office of Environmental Quality Control has stated that "[a]s it is critical to incorporate an

[55] *See* Comments of Charles T. Blay, Ph.D. (attached hereto, hereinafter "Blay Comments") at 3.
[56] Blay Comments at 3.
[57] The windrose in Figure 4.1-1 of the DEIS appears to be an inverted version of Figure 2 of Appendix I to the DEIS.
[58] See discussion of impacts related to air quality and odor, *infra* Section 6.

imminent rise in sea level and other climate change effects into plans for future development, these impacts should also be considered when drafting an EIS."[59] Sadly, many island and coastal cities are experiencing drastic changes due to climate change and sea level rise – some are even losing their homes and must relocate their entire communities out of harm's way.[60] Climate change impacts to an island like Kaua'i are foreseeable and should be factored in to any evaluation of baseline data and examination of environmental impacts.

b. Topography and Soils

As discussed above in Sections 5.c and 5.d, and in the comments by Dr. Byron H. Shaw, attached hereto, the soils underlying the proposed dairy site are largely poorly drained, with high susceptibility to hoof compaction, leading to high probability of surface runoff.[61] HDF already has failed to implement best management practices to prevent or minimize soil erosion during the initial construction activities on the site.[62] Its claim, then, that soil loss will be mitigated through the use of best management practices is, at best, dubious. Further, HDF's claim that the long-term soil impacts are anticipated to improve the soil condition due, in part, to the introduction of additional organic matter is unlikely to be realized when the manure to be used and deposited on the site will be only surface applied with no tillage to incorporate it into the soils.[63] Organic matter will only increase in the soil with the growth of root material or through incorporation via soil organisms; un-tilled, surface-applied manure and fertilizers will lead to high nutrient concentrations at or near the soil surface.[64] HDF provides no literature to support its claim of improved soil health from this type of operational scheme.[65] Thus, the alleged positive long-term impacts to soil are unlikely, and the DEIS fails to fully consider and analyze these impacts to soils.

c. Land Use and Agricultural Setting

The DEIS considers only short-term impacts and mitigation measures with respect to land use, and concludes that no mitigation is needed because it does not plan to request a change in land use designation and intends to fully comply with its current land use designation. DEIS at 4-16. It fails entirely to consider long-term impacts to land use, which could include environmental devastation to such a degree that the site is not suitable for any type of agricultural use as the soils and ground- and surface water resources are no longer viable. It also fails to consider long-term impacts that the proposed project may have on other land use designations that are likely to be impacted by HDF's dairy operation, including critical habitat designations, residential and tourism areas, and the land use designations of and near areas that HDF intends to use for off-site herd management. Possible long-term impacts to land use and the agricultural

[59] OEQC, Hawai'i Environmental Policy Act Citizen's Guide, October 2014 (available at www.hawaii.gov/health/environment/oeqc/index.htm).
[60] Quinault Indian Nation, Taholoah Village Relocation.
[61] Shaw Comments at 1.
[62] Erickson Comments at 4.
[63] Shaw Comments at 2.
[64] *Id*. at 2.
[65] *Id*. at 2.



setting for all areas that may be affected by the operation should be fully disclosed and considered in this section.

d. Visual and aesthetic resources

Once again, the DEIS confines its consideration of possible impacts to those immediately present on the proposed dairy site. It claims that no public or scenic views will be affected by construction of the dairy, and focuses on building height and presences of structures. DEIS at 4-19. This conclusion ignores the fact that the presence of hundreds or thousands of dairy cows themselves, along with the visible changes to the pasture areas, will affect the existing natural vistas. It also ignores the fact that in grubbing nearly the entire site of previously existing vegetation and cutting down many large shrubs and trees, the visual landscape has already been altered.[66]

Further, the DEIS fails to disclose the visible impacts from the dairy operations that will extend beyond the property boundary of the dairy site. The high probability of surface runoff means that the Māhā'ulepu Beach and cliff areas, enjoyed by community members and tourists for their visual appeal, are likely to be polluted with manure-laden water from the HDF site. Many tourists enjoy helicopter tours over the Māhā'ulepu area because the lush, green scenery holds such visual appeal. These scenic views will be dramatically diminished by the infusion of cow manure and any secondary effects from the presence of manure (for example, the visual changes that may occur if the current makeup of area plants and trees changes due to a large infusion of nitrogen and phosphorus). The DEIS fails to disclose and consider these long-term impacts to visual and aesthetic resources.

e. Natural hazards

The discussion of impacts related to natural hazards such as flooding, tsunamis, hurricanes, and seismic activity ignores the effects of climate change on the frequency and intensity of these events. Even if the DEIS were to use current baseline weather data, which is does not, it must factor in the foreseeable impacts that climate change will have to baseline weather conditions. The average monthly rainfall data provided in Table 4.1-1 only goes through 1983; it ignores three decades worth of rainfall data and trends. Recently collected data directly from the weather monitor on the proposed dairy site shows between 12/1/13 and 6/8/2016, three 25-year, 24-hour storm events were recorded.[67] These data indicate that actual 24-hour precipitation data totals at the site routinely exceed the storm events that HDF intends to use for storm water infrastructure design.[68] Additionally, the data that HDF uses does not take into account the effect that climate change may have on the intensity or frequency of significant storm events. Designing its infrastructure, including the effluent pond capacity, based on past recorded rainfall alone, without adequately forecasting how rainfall levels will change due to climate change, does not allow for safe and appropriate impact and mitigation analysis.

[66] Excerpts from the Deposition of James J. Garmatz at 65-66.
[67] Erickson Comments at 11, 13.
[68] *Id*. at 13.

Given the poorly-drained soils and the fact that much of the manure deposited throughout the site will remain at or near the soil surface, any flash flooding or major storm event will swiftly flush the animal waste—along with any pesticides, antibiotics, or hormones present—into downstream waters and the Pacific Ocean. The DEIS also provides no authority to support the explicit decision not to evacuate the herd during a natural disaster.

f. Archaeological and Historic Resources

The Archaeological Inventory Survey ("AIS") remains in progress. DEIS at 3-37 and Appendix G, labeled "Draft." Thus, until this required evaluation is finalized, the resultant impacts to archaeological and historic resources cannot be fully considered. The Cultural Impact Assessment, as part of the AIS, also remains in draft form, and thus is incomplete. The DEIS should be resubmitted once the AIS, and any other required elements that remain in progress, are fully completed – only then may the impacts and proposed mitigation measures be properly evaluated.

The AIS has undergone several revisions, yet it continues to be plagued with problems. The AIS does not adequately address how any burial sites will be respected or protected. Native Hawaiians feel a sense of responsibility for the *malama* (care, protection) of their deceased ancestors, and the cultural connection between Hawaiians and the land containing their ancestors *iwi* (bones) remains especially meaningful.

The AIS recognizes that there are several Land Commission Awards ("LCAs") in Māhā'ulepu that are "tightly clustered within the 'ili of Kawailoa" and that there is a cluster "east of Māhā'ulepu Ditch near the center of the Valley."[69] The AIS estimates that the population in the upper Māhā'ulepu Valley between 1848 and 1855 would have been between approximately 108 to 1138 persons, and acknowledges that those figures "represent[] a fairly sizeable population for this upper valley at that time, all likely associated with the LCAs."[70] Given this estimated population, it is a near certainty that the area within or adjacent to the proposed dairy site was used as burial ground.[71]

Traditionally, Native Hawaiians would bury the remains of their loved ones near their home. The State Historic Preservation Division acknowledges that unmarked Hawaiian burial sites can be encountered almost anywhere, and that the locations of burial sites marked with stones were sometimes lost as surface areas were graded, cleared, or excavated.[72] Inadvertent discovery of human burial sites is commonplace in Hawaii and in the vicinity of the project area.[73] Further, burial locations were frequently a secretive cultural tradition and not easily

[69] Appendix G to the DEIS at p. 27.
[70] *Id*. at pp. 27-28.
[71] *See* Comments of Deirdre Encarnación, (attached hereto, hereinafter "Encarnación Comments").
[72] State of Hawaii, Historic Preservation Division, History and Culture page, available at http://dlnr.hawaii.gov/shpd/about/branches/ibc/.
[73] Encarnación Comments at 2.



revealed to outsiders.[74] Therefore, the locations of *iwi kāpuna* within the Proposed Dairy site may not be obvious and may not be discovered until further construction or operations are undertaken. The AIS does not include a plan to address how subsequently discovered burial sites will be treated if discovered during dairy operations. The AIS and DEIS must include a commitment to treating any subsequently-discovered burial sites with respect.

The DEIS recognizes that previous archaeological studies along the Māhā'ulepu coast have identified a number of sites "including petroglyphs, human burials, fossils, cultural artifacts, and several heiau." DEIS at 4-26. The NPS Reconnaissance Study, in particular, identified the presence of petroglpyhs at Māhā'ulepu Beach, and discusses the paleoecological importance of the Makauwahi Cave.[75] The consideration of possible short-term and long-term impacts, however, is confined to analyzing only those impacts that may occur to archaeological and historic resources on the proposed dairy site. The DEIS should consider to what extent the petroglyphs at Māhā'ulepu Beach, the Makauwahi Cave, or other identified historic sites along the coastline are likely to be harmed by, *inter alia*, polluted surface water runoff from the HDF site, and should include a discussion of mitigation measures, if any, that may protect these historic resources.

g. Cultural Practices and Resources

The Cultural Impact Assessment, Appendix H, erroneously concludes that the exercise of native Hawaiian rights relating to traditional cultural practices will not be adversely impacted. This conclusion appears to be based on the fact that "the project itself is not being utilized for these activities," but this conclusion ignores Native Hawaiians' constitutionally-protected right of access. Article XII § 7 of the Hawai'i State Constitution provides that the state shall "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua'a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Island prior to 1778, subject to the right of the State to regulate such rights."[76]

There is no doubt that the operation of the proposed dairy will obstruct, limit, condition, or restrict the ability of Native Hawaiians to freely access the Māhā'ulepu Ahupua'a in order to gather plants or water or conduct traditional ceremonies. Indeed, HDF admits that the dairy property is "secured by farm gates" and that "access into the valley is limited." DEIS at 4-19, 4-20. Anecdotally, some Native Hawaiians have already been prevented from fully exercising their constitutionally-protected right of access due to requirements by the landowner that the cultural practitioner provide proof of liability insurance, sign a liability waiver, and/or exercise the access right only on certain days or times in the presence of a landowner escort. The DEIS should disclose whether these requirements will be imposed and evaluate the extent to which they are allowable under applicable laws and regulations, as these restrictions are clear impacts to the protected exercise of cultural practices.

[74] State of Hawaii, Historic Preservation Division, History and Culture page, available at http://dlnr.hawaii.gov/shpd/about/branches/ibc/.
[75] U.S. Department of the Interior, National Park Service at 38-39.
[76] Article XII § 7 of the Hawai'i State Constitution.

The DEIS also ignores the fact that in traditional Hawaiian culture, natural and cultural resources are considered one and the same. Elements of the natural environment, such as mountains, coastlines and ocean, or groves of trees, are often considered to be the embodiment of deities and regarded as collective cultural properties of Hawaiian people. Kāne, the highest of the major Hawaiian deities, is associated with natural forces such as sunlight and fresh water. It is Kāne's relationship with other gods that brings for life. For example, together with Lono, god of agriculture, Kāne ensures healthy and abundant crops, and with Kanaloa, god of the sea, Kāne provides plentiful fish and sea creatures. Kāne's most important *kinolau*, or form, is fresh, life-sustaining water.

Any pollution that occurs to surface and ground water at and under the proposed dairy site is, in essence, an affront to the cultural and spiritual significance that Native Hawaiians place on water. Polluted water may, in turn, affect the health of traditional plants or medicinal herbs that are gathered by Native Hawaiians. It may result in diminished or unhealthy populations of limu (seaweed) or opihi (limpet) that Native Hawaiians gather along the Māhā'ulepu coastline. Because of the hydrological connection that exists between various waters in the Maha'uelpu Valley, polluted water may affect the Makauwahi Cave, a unique site that chronicles many thousands of years of Hawaiian history. The DEIS fails to consider that the pollution it creates may impact cultural resources outside of the property boundary of the proposed dairy project, and should be revised to account for this issue.

h. Flora and Fauna

The DEIS fails to fully consider the impacts that HDF's proposed dairy project will have on area flora and fauna. First, it erroneously focuses on potential impacts to species that may occur on the proposed dairy site. Consistent with HDF's theme of ignoring the fact that the pollution it creates will not be confined to its property, it concludes that no long-term impacts to endangered or threatened plant species will occur as a result of the dairy. DEIS at 4-34. However, the DEIS recognizes that the entire Māhā'ulepu shoreline has been designated as Critical Habitat for the endangered native plant, 'ohai (*Sesbania tomentosa*). DEIS 4-34. HDF also acknowledges that discharge from its dairy will occur, yet fails to disclose and consider the fact that the Critical Habitat for 'ohai may be impaired by the influx of polluted runoff. Buffer strips, since they are already not properly utilized, are not likely to be an effective mitigation measure.

Similarly, the DEIS fails to consider the impacts that the proposed dairy project likely will have on two endangered arthropod species. The Kauai cave wolf spider (*Adelocosa anops*) and the Kauai cave amphipod (*Spelaeorchestia koloana*) are found only on the island of Kauai in the Koloa area in just a few caves, including the Makauwahi Cave.[77] The DEIS incorrectly claims that there is "no reported connection [between the cave and] the dairy farm site[,]" so the arthropods will not be affected by the dairy farm. DEIS at 4-42. However, the proposed dairy site *is* hydrologically connected to a sensitive cave habitat.[78] The DEIS fails to consider whether

[77] U.S. Department of the Interior, National Park Service at 49.
[78] *See, e.g.*, *id*. at 25.



polluted surface runoff, which is certain to occur, and potential groundwater contamination are likely to impact the Critical Habitat of these two arthropods.

The DEIS fails to consider the impacts of its proposed dairy on other large marine vertebrates, notably the endangered Hawaiian monk seal, known in Hawaiian as 'īlio holo i ka uaua (*Monachus schauinslandi*); the endangered humpback whale or kohala (*Megaptera novaeangliae*); and the threatened green sea turtle or honu (*Chelonia mydas*). During the NPS Reconnaissance Study, all three of these species were sighted in the Māhā'ulepu area.[79] The monk seal is one of only two mammals endemic to Hawai'i, and the most endangered marine mammal unique to U.S. waters.[80] Kaua'i is considered a "hot spot" for seals in the main islands.[81] Green sea turtles have been spotted nesting on beaches in the Māhā'ulepu watershed area, and the Māhā'ulepu coast is one of Kaua'i's best locations for whale watching.[82] Surface water pollution from HDF's proposed dairy could severely affect the water quality and food sources for these animals, yet the DEIS failed to even mention these animals. The DEIS should fully disclose and consider the impacts that HDF's operation may have on these animals, and others that use the Māhā'ulepu coast for feeding, nesting, and giving birth.

The Hawaiian hoary bat roosts in exotic and native woody vegetation, and often leave their young unattended in "nursery" trees and shrubs while they forage.[83] The US Fish and Wildlife Service ("USFWS") has recommended that "[t]o minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15)…[s]ite clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.[84] The DEIS states that "there are very few mature trees on the dairy farm site, which is the habitat preferred by hoary bats as roosting locations." It fails to mention that one of the reasons few trees exist is that HDF has already cleared the property and cut down many shrubs and trees over 15 feet in height.[85] The DEIS conveniently concludes that because there are almost no suitable roost trees within the dairy site, no effect to the bats is expected. It fails to acknowledge that harm to the bats *has already taken place* with HDF's removal of trees and shrubs. This pattern of flouting rules and recommendations does not instill confidence that HDF will actually follow any suggested mitigation strategies with respect to animal species.

The DEIS identified certain species of endangered and threatened birds, but did not adequately consider the potential risks to those species, nor were the proposed mitigation measures sufficient. Newell's Shearwaters continue to nest on Ha'upu ridge.[86] Siting the proposed dairy immediately below the ridge poses a hazard for adult and fledgling shearwaters;

[79] *Id*. at 23-24.
[80] *Id*. at 24.
[81] *Id*.
[82] *Id*. at 25.
[83] U.S. Department of the Interior, Fish and Wildlife Service at 3.
[84] *Id*. at 3.
[85] Excerpts from the Deposition of James J. Garmatz at 65-66.
[86] Comments submitted by Center for Biological Diversity at 3.

if a bird is downed on the dairy property is will likely die from exhaustion or predation.[87] Additionally, the DEIS ignores the recommendations of USFWS by continuing to contemplate night-time construction at the dairy. USFWS recommended that lights be positioned "low to the ground, be motion triggered, and be shielded and/or full cut-off."[88] The DEIS states that lighting will be shielded, but does not include USFWS's other recommendations. The DEIS also ignores USFWS's recommendation to locate utility and power lines underground as much as possible. Both seabirds and the hoary bat may suffer collisions with power lines, and this risk should be fully considered in the DEIS.

i. Invertebrate Species and Pest Insects

The DEIS recognizes that pests may be attracted to food waste leftover from construction workers or dairy employees, DEIS at 4-41, 4-42, but ignores entirely the fact that pests are likely to be attracted to the grain that HDF plans to import as cattle feed. Insects, rodents, and birds all may attempt to access the milking parlor or grain storage areas, and serve as a vector for disease. Decomposing, moldy, or fermenting feed exacerbates the risk of insect pests. The constant rotation of cows off- and on-site during calving and "dry" periods also creates a risk for introduction of pathogens, flies or other pests. HDF states, without supporting detail, that it will "minimize populations of any pest insects such as flies." DEIS 4-42. This unsupported statement is not an adequate description of a mitigation measure. The DEIS states that insecticides and herbicides may be used "when needed," but fails to identify the specific chemicals to be used or any adequate mitigation against spray drift or accumulation of these chemicals in soils or surface water.

The use of dung beetles, a non-native species, to serve as the primary fly-breeding management strategy is not an appropriate mitigation measure. The number of dung beetles needed to break down manure in the manner that HDF has described is not discussed. Even setting aside the fact that they are invasive, dung beetles may not provide effective mitigation under the conditions at this site. Dung beetles tend to prefer sandy soils, not clay, and their activity levels vary seasonally.[89] It will also be difficult for them to break down the manure and transport it into the soil if the soils will be maintained at or above field capacity (which appears to be the case in order to promote plant growth), because they do not perform as well in saturated conditions.[90] Additionally, the DEIS provides that the use of dung beetles is at the discretion of HDF and other rangers "if manure-related flies become a problem." DEIS at 4-42. It is not clear what the "problem" threshold is, and the process by which this determination will be made needs to be fully disclosed and discussed in the DEIS. The DEIS also ignores the fact that the dung beetle may attract predators to the dairy site. Several species of area birds, including the cattle egret, may feed on dung beetles and thus may be attracted to the site in greater numbers than at present.[91] The DEIS should consider impacts that may result from the introduction of dung beetles as a potential food source for area birds.

[87] *Id*. at 3.
[88] U.S. Dept. of Interior, Fish and Wildlife Service at 4.
[89] Appendix C to Comments from Kawailoa Development, LLP, at 24, 32.
[90] *Id*. at 24.
[91] *See generally* Appendix C to Comments from Kawailoa Development, LLP.



The range that manure-related flies may be able to travel is significant, and has not been properly addressed in the DEIS. HDF asserts that it will be able to control fly populations, but also acknowledges that flies may become a "problem." DEIS 4-42. Therefore, it should fully disclose the range that these flies are likely able to travel and any associated impacts that may result from proliferating fly populations. Other entomologists who have considered the range that flies may travel from the project site have concluded that flies may travel a much farther range, including in multiple directions.[92] The DEIS also fails to consider the proliferation of insects and pests that may occur at its offsite herd management locations, and the potential for mosquito populations to develop due to the water in ponds, ditches, and pasture divots. These impacts should be evaluated in a revised DEIS.

j. Noise and Light

The DEIS focuses primarily on noise associated with construction and operations (such as the milking parlor and tractors in the field. DEIS at 4-43, 4-44. Yet again, the DEIS ignores noise impacts that may occur secondarily outside the boundaries of its proposed dairy site. It does not consider the noise associated with any of the offsite herd management locations, nor does it consider noise associated with its contributions to increased traffic near the harbor or on roadways entering and exiting the proposed dairy site, nor does it consider noise associated with animals that may be attracted to polluted surface waters (for example, insect buzzing). The DEIS must fully disclose and consider any secondary noise impacts and discuss any available mitigation measures for these impacts. Additionally, the DEIS fails to fully consider any lighting-related impacts. It continues to contemplate night-time construction, and fails to fully analyze and consider the impacts that night-time lighting may have on endangered and threatened species or on people who travel over or near the proposed dairy site.

k. Public Services

The DEIS summarily concludes that no short-term or long-term impacts to public services, like libraries, schools, police and fire departments will occur. DEIS at 4-46. It fails to account for the connection that exists between the local economy, property values, and the provision of public services. If property values decline and the local tourism industry suffers (see discussion, *infra*), there will be diminished revenue flowing into the county budget that provides funding for essential public services. If a drastic decrease in revenue takes place, the ability of the county to fund critical public services may be affected. The DEIS erroneously concluded that property values are not likely to be affected and therefore also erroneously failed to fully evaluate whether the proposed dairy project will impact the continued provision of public services.

l. Demographic and Economic Conditions

The DEIS fails to fully disclose and consider the negative impacts to the local economy, public funds, and property values. The addition of 699 to 2,000 cows will result in negative

[92] White, Carlos, *Letter to Mayor Carvahlo*, October 13, 2014.

impacts to the island's economy, the county government's finances, and the tourism industry.[93] There is ample scholarly and professional research which documents the negative impacts that industrial dairy operations have on the communities in which they are located.[94] The negative impacts of an industrial dairy are be comparable to those generated by industrial waste, solid waste, and septic waste facilities.[95] Diminished marketability, loss of use and enjoyment, and loss of exclusivity can result in a diminishment of property value that can range from 50% to nearly 90% of otherwise unimpaired home values adjacent to industrial dairy facilities.[96] Thus, the presence of foul odors, dust, and flies affect not only an industrial dairy neighbor's quality of life, but their property value as well.

The tourism industry is essential for Kauai's economy. In 2015, the Koloa and Poipu region accounted for $213M in lodging revenue, or about 31% of the entire island.[97] Tourism accounts for about 2,600 jobs in this area of Kaua'i, and about 8.7% of the island's total workforce. As soon as one sees photographs of the island or visits Kaua'i, it is apparent why tourism is such an important part of the island's economy—Kauai's natural beauty is unparalleled, and it has been recognized as one of the most beautiful places in the world.[98] The residential, vacation rental, and hotel and resort collectively account for about $23.5M in property taxes, or about 20% of the county's total property tax revenue.[99]

The area directly affected by HDF's proposed dairy constitutes about 17.8% of the county value, but generates nearly 24.1% of the county tax revenues.[100] Thus, the economic impacts from HDF's proposed operation extend beyond negative consequences to individual homeowners and vacation properties, but to the county itself. If residences, tourist rentals, and up-scale lodging were to face reduced property values of 50%, the county may face a 10% budgetary shortfall.[101] The county may be further strained if the loss of tourism revenue results in a reduction of jobs in that sector, as unemployed workers may need to seek county assistance for essential services.[102] The DEIS failed to disclose and consider the extent to which the economy would be negatively impacted by placing hundreds or thousands of dairy cattle just upwind of a desirable tourist destination. A revised DEIS should fully analyze these impacts.

m. Groundwater Resources

HDF's proposed dairy will likely have negative impacts on both groundwater quantities and quality. Further, the supporting studies in the DEIS are flawed and do not provide adequate

[93] Comments of John A. Kilpatrick, Ph.D. (attached hereto, hereinafter "Kilpatrick Comments").
[94] Kilpatrick Comments at 13-20.
[95] *Id*. at 13.
[96] *Id*. at 20.
[97] *Id*.at 20.
[98] *Id*.at 22.
[99] *Id*.at 21.
[100] *Id*.at 20.
[101] *Id*.at 21.
[102] *Id*.at 22.



data to enable complete consideration of impacts. These issues are discussed in the comments of David J. Erickson, attached hereto, and summarized below.

Appendix E to the DEIS shows examples of a rapid and immediate response of groundwater to precipitation events.[103] Figures 6 and 7 show a rapid and significant recharge of ground water after a 5.5 inch precipitation event on 11/21/15, followed by several smaller precipitation events that caused additional recharge.[104] Once cows are introduced to the property, this infiltration will carry a constant load of nutrients, bacteria, and other introduced chemicals. The nutrient levels are likely to be higher and in more mobile forms than are currently present. Because the soils will be maintained at or above field capacity in order to promote crop growth, the conditions for infiltration, mobilization, and transport of contaminants through the ground water system will be present.[105]

Appendix E states that the aquifer tests in the deeper well do not show a connection to the shallow groundwater table, but the data do not support this conclusion.[106] The shallow groundwater drains to the manmade wetland drainage ditches and moves down to the deeper aquifer. When the shallow aquifer becomes contaminated by animal waste, it would also result in contamination of both surface water and of the deeper aquifer.

n. Surface Water Resources & Nearshore Marine Environment

It is baffling that the DEIS concludes that "[l]ong-term impacts will improve surface water quality in agricultural ditches and the downstream Waiopili Ditch." Impacts to surface water both on and off the proposed dairy site are likely to be significant. The dominant soils on the proposed dairy site are Ka'ena clay and Kahili clay soils, both of which are classified as poorly drained, meaning that the risk of surface runoff is higher than over soils of different drainage classifications.[107] The clay soils are likely to be affected by hoof compaction, especially in higher-use areas.[108] These areas are also likely to receive more buildup of manure and to have little to no vegetation, creating a significant risk for surface runoff.[109]

The DEIS includes incorrect information regarding the use of the Wai'opili Stream and the classification of surface waters. First, the DEIS ignores publicly-available evidence contradicting its claim that the Wai'opili Stream is "not an inviting recreational body of water utilized by people." DEIS at 4-62. Friends notified the Department of Health of its concern about the condition of the Wai'opili Stream, which is severely degraded with high levels of *enterococcus* and *Clostridium perfringens*.[110] With its letter, Friends included photographs

[103] Erickson Comments at 9.
[104] *Id*. at 10.
[105] *Id*. at 9-10.
[106] *Id*. at.10.
[107] Shaw Comments at 1.
[108] *Id*. at 2.
[109] *Id*.
[110] Friends of Māhā'ulepu, *Petition for § 303(d) Listing of Wai'opili Stream.*

showing people walking near and wading in the stream.[111] The DEIS should be corrected with respect to its description of the uses of the Wai'opili. In its response to Friends' comments on the EISPN, Group 70 stated that there are no Class 1 or Class 2 inland waters in or near the HDF property, yet the Stormwater Pollution Prevention Plan (also created by Group 70) identifies discharge points "1a" and "1b" as Class 2 waters. This inconsistency should be addressed.

Significantly, the DEIS no longer describes the project as "zero-discharge," and acknowledges that "[m]anure particles that do not settle out in to the buffer area could be carried into ditch waters and downstream with stormwater flows. During runoff events, ditch waters will also contain substantial organic debris, suspended sediment and nutrients from natural and other man-made sources in the watershed." DEIS at 4-67. The proposed mitigation measures include buffers, surface water quality monitoring, and ocean water quality monitoring. DEIS at 4-67. The ability of buffers to serve as an effective mitigation measure is questionable, especially when they have not been fully implemented during initial phases of dairy development. Further, it is unclear how the integrity of the buffer will be maintained if the irrigation pivot arm will be traveling across ditches and drains – it may flatten and destroy areas of buffer vegetation, and the wheels may introduce animal waste directly into the buffer area. The DEIS includes no discussion of whether buffers will be mowed. Surface water quality monitoring and ocean water quality monitoring are important management tools, but by the time any impacts are detected, the detected pollution would have already spread throughout the site.[112]

The DEIS claims that nutrient release from the dairy site would not occur as chronic daily release, but would be limited to periods of major rainfall and storm water events. This fails to account for the fact that irrigation water that is not fully absorbed or that is deposited onto compacted roadways or directly into ditches would contribute to runoff events. Irrigation water will move over the roadways, and through small rills and channels in the fields.[113]

In addition, land-based nutrient loadings exacerbate acidification of local marine waters and add to the larger problem of ocean acidification. While the uptake of atmospheric carbon dioxide is the primary driver of open-ocean acidification, secondary contributions, such as nutrient pollution, also are known to exacerbate the acidification effects in marine areas. For example, "coastal regions that receive large volumes of freshwater, especially when the freshwater contains high levels of dissolved nutrients or organic material" are especially susceptible to the effects of acidification.[114] Through a process called eutrophication, algal blooms are amplified by anthropogenic nutrient pollution. Nutrient pollution impacts areas already most at risk, and not only causes localized acidification but can "enhance" the impact of atmospheric acidification by reducing natural buffering capacity.[115] Carbonate ions necessary for the formation of aragonite and calcite (both shell-forming minerals) absorb free hydrogen

[111] *Id*. at Attachment E.
[112] Erickson Comments at 8.
[113] *Id*. at 13-15.
[114] California Ocean Science Trust, *Ocean Acidification in the Pacific Northwest* (May 2014).
[115] Wei-Jun Cai et al., *Acidification of subsurface coastal waters enhanced by eutrophication*, 4 Nature Geoscience, 766 (2011) (Appendix 26).



ions produced when carbon dioxide reacts with water. While seawater is generally supersaturated with carbonate, as carbon dioxide increases, waters may approach carbonate undersaturation.[116] At this point, a slight increase in carbon dioxide will cause a drastically nonlinear decrease in pH, increasing the speed and intensity at which acidification would otherwise take place.[117] The DEIS failed to consider the effects that HDF's nutrient loadings would have on marine waters via ocean acidification, and these impacts must be considered in any revised DEIS.

o. Roadways and Traffic

Under either herd size, the DEIS concludes that there will be no change to traffic patterns or public roads. The estimates of either 12 or 23 additional vehicle trips per day are unrealistically low. The DEIS does not include adequate description of the employee shifts and schedules, and it is unclear whether the stated number of vehicle trips is likely to correspond to actual operational needs. Further, HDF fails to account for factors like timing, weight loads, driving speeds that may affect traffic impacts.[118] The DEIS also completely ignores the vehicle impacts from other professionals who are likely to visit the facility, including industry or agency inspectors, equipment maintenance personnel, or veterinary personnel. The impacts of these additional vehicle trips should be considered in a revised DEIS.

p. Air Quality, Odor, and Greenhouse Gases

HDF's proposed dairy presents multiple air quality concerns that were not adequately addressed in the DEIS. Stored manure emits major pollutants, including hydrogen sulfide, ammonia, airborne pathogens, and particulate matter. Exposure to ammonia can irritate the eyes, skin, and respiratory system, causing bronchiolar swelling or even tracheal/nasopharyngeal burns.[119] Exposure to hydrogen sulfide causes skin and eye irritation, and exposure in high levels may lead to even more severe health effects such as seizures, comas, and death. Releases of hydrogen sulfide are thus also required to be disclosed under EPCRA.

In addition to harmful air pollutants, the handling and disposal of manure and production of animal feed at industrial dairies creates airborne particles and dust, which may cause or exacerbate respiratory conditions such as asthma and bronchitis. The DEIS acknowledges that fugitive dust may occur, but concludes, without support, that fugitive dust from the 699-head herd size would be negligible. This basis for this conclusion should be explained.

The air modeling and odor evaluation in the DEIS underestimate the likely distance that odors may travel. The evaluation of odor seems to be based on the prevailing wind; however, these conditions alone are not likely the only, or even the primary, source of potential odor

[116] *Id*.
[117] *Id*. at 768–69.
[118] Appendix F to Comments from Kawailoa Development, LLP, at 12.
[119] If a dairy releases more than 100 lbs. of ammonia into the air on a daily basis, then it is required to report its releases under the federal Emergency Planning and Community-Right-to-Know Act ("EPCRA"), 42 U.S.C. § 11001 *et seq*.

problems. The DEIS should consider the effect that calmer breezes, slowly and steadily transporting odors over a broad area, are likely to have on odor impacts.[120]

Harmful air pollution may also result from the carbon emissions generated by HDF's operational vehicles. The transportation of thousands of gallons of milk (either to other Hawaiian islands or to the contiguous United States) for processing on a regular basis is certain to contribute to an increase in emissions of volatile organic compounds (VOCs) and other toxic pollutants resulting from frequent truck and tanker trips to and from the dairy. In addition to the health risks posed by the inhalation of polluted air, toxic air pollutants can be deposited onto soil and water, where they may bioaccumulate in plants or animals that are later consumed by humans as food. The DEIS fails to account for air pollution that results from the transportation of milk and the constant transportation of calves and dry cows to offsite herd management areas. The DEIS should be revised to fully consider air pollution impacts from these activities.

**7. Response to *Consistency with Government Plans and Policies***

Land use law in Hawai'i consists of many layers of requirements and designations, from the Constitution, to the State Plan, to the County General Plan and Zoning Ordinances. The DEIS does not explain the relationship to the project of these many layered and overlapping requirements and designations. The tables provided in Section 5 and its subsections leave the public to guess why HDF marks "support" for one subject area of a law or land use plan and "N/A" for another, or how exactly the project "supports" a law that contains broadly applicable planning goals directed at government entities responsible for land use planning. HRS § 226. For example, despite listing provision after provision of HRS § 226, Section 5 fails to explain the relationship between HRS § 226 and the project. In other words, Section 5 fails to provide the public with relevant and salient information that explains the relationship of specific aspects of the proposed project to the relevant and applicable portions of federal, state, and local land use controls.

Bullet points or lists are inadequate for the purpose of disclosing, considering, or explaining the impacts of a project on the human environment. The same holds true for explaining the relationship of the project to land use laws pursuant to HAR 11-200-17. HEPA, like NEPA, requires substance over form, quality of analysis over quantity. Although Section 5 of the DEIS takes up considerable space within the DEIS, its contents are largely a waste of ink. The information contained within Section 5 is for the most part inscrutable or incomplete. The DEIS treats the analysis required by HAR 11-200-17(h) like a "paper tiger"—an excuse bury the reader in lists and check marks, instead of providing the concise, direct, targeted and easy to understand substantive analysis that HEPA requires.

A checkmark under the category "support" does not meet the requirement to provide "[d]iscussion of how the proposed action may conform or conflict with objectives and specific terms of approved or proposed land use plans, policies, and controls…." HAR 11-200-17(h). Section 5 of the DEIS and all of its subsections fail to note "where a conflict or inconsistency exists" and "describe the extent to which the… applicant has reconciled its proposed action with

[120] Erickson Comments at 7.



the plan, policy, or control." *Id.* The simple category of "support" fails to disclose or consider the many instances in which the project falls far short of supporting a particular policy. Section 5 also fails to provide "the reasons why the… applicant has decided to proceed [with the project] notwithstanding the absence of full reconciliation." *Id.*

a. Coastal Zone Management Act

Section 5.1 on the Coastal Zone Management Act ("CZMA") fails to explain whether or how the project meets the requirements of the law or even which provisions of the law, its implementing regulations, or guidelines apply. Instead, the DEIS provides an unsupported conclusion, "[t]he project improvements are designed to conform to the goals, policies, and objectives of Hawai'i's CZM Program," and refers the reader to Sections 3 and 4 of the DEIS, which supposedly show the project's "consistency with CZMA programs and policies." DEIS at 5-2. Neither Section 3, nor Section 4 appear to cite to, or include, any provisions or requirements of Hawai'i law that implement the CZMA that would show consistency with the CZMA. This is just one example of how Section 5 of the DEIS fails to support or explain its conclusions and is therefore inadequate.

There are many state programs, policies, and guidelines that come under the umbrella of the CZMA and its implementation. The DEIS fails to fully disclose or consider these provisions, or otherwise adequately explain their relationship to the project and components thereof. DEIS 5-12. For example, states are required to develop a Coastal Nonpoint Pollution Control Program.[121] The CNPCP contains various management measures ("MMs") that apply to livestock operations and construction. The MMs require implementation of NRCS standards. Another example includes a guidance for stormwater impact assessments.[122]

Section 5.9 lists policies and objectives of the CZMP but does not explain the role of the CZMP, its relevance or relationship to the project, the relationship of the specific provisions of the CZMP to the project, or what aspects of the project "support" those provisions and why. For example, Table 5-6 appears to imply the that project "promotes water quantity and quality planning and management practices… through the implementation of point and nonpoint source water pollution control measures," but the project does not "promote" any "planning and management practices." The project is not the policy. Quoting policy objectives from HRS 205A-2 and adding a checkmark next to certain policies fails to provide an adequate explanation of the project's relationship to and compliance with applicable provisions of the law. To the extent that the DEIS at 5-31 addresses the project's compliance with CZMA protections for cultural and archeological resources, the DEIS fails to describe with sufficient detail the relationship of specific provisions to the project, or disclose or consider the extent to which the surveys conducted by HDF complied with those provisions. Again, the DEIS fails to provide the

[121] 16 U.S.C. § 1455b. Hawai'i's Updated Management Measures for its CNPCP are available at <http://planning.hawaii.gov/czm/initiatives/coastal-nonpoint-pollution-control-program/>.
[122] This management measure is available at <http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf>

public with adequate information to evaluate HDF's compliance with specific provisions of the law.

Even though the project occurs outside the CZMA special management area, the DEIS fails to disclose or consider the extent to which water pollution from the dairy will conflict with the management and conservation goals of the Special Management Area ("SMA") as explained in state and local land use controls, policies, and guidelines. The runoff and pollution generated by the proposed industrial dairy operation conflicts with many of the policies and goals of the SMA and CZMA. By failing to disclose these goals, the DEIS fails to disclose any conflict or inconsistency or whether HDF can modify the project to avoid or resolve those conflicts.

Any revised DEIS and any final EIS must remedy the foregoing failures of the DEIS to explain the relationship of CZMA's land use controls to the project and its mitigation measures. Otherwise, the EIS will undermine the public's ability to ensure that the project complies with federal and state laws that implement the CZMA.

**County of Kaua'i General Plan and the 2050 Sustainability Plan**

Section 5.10 of the DEIS makes many unsupported claims that the project supports cultural preservation or traditions. Again the list and checkmark method proves completely inadequate as a means of either: (1) disclosing and considering impacts, or (2) demonstrating the relationship of the General Plan to specific components of the project. Table 5-7 contains unsubstantiated and unsupported claims, which are entirely improper for the analysis, disclosure, and consideration required in an EIS. Rather than support many of the statements quoted from the General Plan, the dairy would undermine the General Plan.

The proposed dairy threatens the environment that supports the tourism and recreation economy by polluting freshwater that runs to shore and near coastal areas where people recreate. The dairy threatens the cultural practices and the preservation of traditions (that Table 5-7 claims that the dairy supports) because the operation would restrict access to areas of cultural significance, and would make other areas less likely to be utilized because of odor and water pollution. The DEIS ignores that the proposal has already negatively impacted the practice and perpetuation of native Hawaiian culture. Grove Farm has already denied access. The situation will only become worse when 699 to 2000 cows are added to the land.

The hubris involved in running so many cows on such little land, without adequate consideration for the amount of waste the cows produce, belies any claim that the proposal represents "balanced economic growth… without sacrificing our environment and quality of life." DEIS at 5-32. The desire to establish such a large industrial diary operation, without consideration of a more sustainable alternative, in no way "mirrors the Native Hawai'ian land use principles and practices…" or demonstrates "recog[nition of] the integral connection among land-based, stream-based, and ocean-based resources and activities." DEIS at 5-35. The dairy would not "protect the places, features, and sacred spaces that give Hawai'i its unique character and cultural significance." DEIS at 5-27, Table 5-3 (2050 Sustainability Plan). Instead, the dairy directly threatens these culturally significant resources (as HDF admits that manure



discharges to surface water are a "probable" impact) and the DEIS fails to disclose or consider the extent of those impacts.

An industrial-sized dairy does not conform to the goal of "protect[ing]… unique natural beauty, rural lifestyle, [or] outdoor recreation and parks," especially not when such a large operation could thwart plans for the designation of a National Park. DEIS at 5-32. Nor does an industrial dairy operation contribute to or promote Kaua'i's rural character, especially because the proposal pushes the land beyond its capacity to safely accommodate such a large dairy herd. DEIS 5-33. Table 5-7 also ignores the extent to which the dairy is not a small farm operation and will detract from local food production by processing milk off-island. DEIS 5-33.

In general, the DEIS does not consider the extent to which its plan to create a large industrial dairy within a short distance of beaches and areas of great economic and cultural importance does not comport with the goal to create a more sustainable and self-sufficient island community. See DEIS at 5-24 (Hawai'i 2050 Sustainability Plan). The amount of pollution and soil contamination likely to be created by the dairy undermines the DEIS's conclusion that the dairy will "set the precedent for more sustainable dairy methods in Hawai'i" or that "100 percent of the cow's manure [will] remain[] on the farm the enrich the land as fertilizer." The manure will not remain on the farm. It will enrich a lot of other things besides soil, like groundwater and surface water.

The DEIS simply ignores the conflicts between the impacts caused by the dairy, and the goals of the 2050 Sustainability Plan. The dairy will "compromise the ability [of] future generations to meet their own needs," by polluting the soils and waters upon which those generations will depend. DEIS at 5-24. The DEIS fails to consider the extent to which the impacts of the dairy could be reduced by decreasing the number of cows in the diary's herd.

The Kaua'i County General Plan, Section 3.3, describes the importance of cultural and historic places to the people of Kaua'i and the visitor economy. The DEIS fails to disclose or consider the extent to which the size and impacts of the proposed dairy conflicts with the Kaua'i sense of place, the goals of the General Plan, and the rights of native Hawai'ians to preserve their culture and ability to engage in subsistence activities. The Plan describes the importance of buffer areas between archaeological and historic sites and adjacent uses. General Plan at 3.3.2.1. The Plan also cites to "laws concerning land titles, kuleana properties, water rights, access rights and other rights in land and water that are unique to Hawai'i." *Id.* at 3.3.2.3; 3.6 The DEIS, Section 5, ignores these other laws, and in general fails to disclose or consider the laws that protect access rights and other cultural rights or any conflicts between these laws and the dairy operation.

The DEIS fails to consider the extent to which the operation of a large industrial dairy operation interferes with the people's "right to drinking water, and running water, and the right of way," and that "[t]he springs of water, running water, and roads shall be free to all, on all lands granted in fee simple. …." HRS § 7-1. The DEIS ignores and fails to disclose or consider the relationship of the project to Article XII, § 7 of the Hawai'i Constitution, or the extent to which the project implicates the public trust obligation in Article XI, § I of the Constitution, which provides, "all public natural resources are held in trust by the State of the benefit of the

people." The public trust protects water, cultural, and recreational resources, which can be considered one and the same. Pollution from the dairy threatens not only to impair these trust resources, but also alienate them, to the extent that the pollution stops people from recreating or engaging in cultural practices. The DEIS consistently highlights aspects of the law and land use provisions when they are seemingly favorable to the project (e.g. Article XI, § 3, which recognizes agricultural lands) but fails to even disclose provisions of the law that would require the DEIS to provide a full and frank disclosure of the project's impacts. The failure to explain the relationship between provisions of the Hawaii state constitution, other than Article XI, § 3, is but one example.

By ignoring the larger framework of legal protections for cultural and natural resources, the DEIS fails to consider the body of laws referenced in the General Plan, section 3.3.2.3, that protect cultural rights. The DEIS fails to disclose or consider the extent to which impacts of the dairy will interfere with "the reasonable exercise of customarily and traditionally exercised rights of Hawaiians." *Ka Pa'akai O Ka'aina v. Land Use Comm'n*, 94 Haw. 31 (2000). And, the DEIS fails to adequately disclose or consider the extent to which the effects of a large industrial dairy in the Māhā'ulepu valley conflict with "Hawaiian traditions and practices." *Id.*

The DEIS fails to disclose or consider the elements of the three-prong test created by the court in *Ka Pa'akai O Ka'aina*. The DEIS does not make any findings regarding "the identity and scope of cultural, historical, and natural resources in the affected area, including the extent to which traditional and customary rights and practices are exercised." *Id.* The affected area includes the proposed dairy site, the surrounding land, lands down gradient of the dairy, as well as the coast. The DEIS fails to consider or make findings regarding "the extent to which those resources, rights, and practices will be affected by the proposed action," and the DEIS also fails to disclose any actions to protect Native Hawaiian rights and practices. *Id.* These and similar considerations are also a requirement of HEPA § 343-2 (requiring adequate disclosure and consideration of "cultural practices of the community and State.").

Despite the overlap between the pollution that the project will cause, and the goals of the General Plan, the DEIS fails to explain the relationship between the project and the implementing actions of section 3.4.3 that address water quality. The DEIS also fails to explain the extent to which pollution from the dairy will conflict with other goals of Kaua'i County General Plan to promote and maintain tourism. In section 5, the DEIS fails to explain the extent to which the County's drainage standards, overlay regulations for streams and wetlands, or grading ordinance will apply to the project or the extent to which these measures are sufficient to control point source and non-point source pollution from a large industrial dairy operation, located just a short distance from the coast, areas of cultural importance, important economic resources, a reef, and a special management area that under CZMA receives heightened land use protections and scrutiny.

Notably, in New Zealand, which also practices pasture grazing for its dairies, studies have shown that traditional mitigation measures like stream buffers are not sufficient to control



nutrient pollution from nitrogen. A 2014 study[123] by Scarsbrook and Melland explains that dairy farming in New Zealand "has become increasingly intensive over the last three decades," that nitrogen loads have "nearly doubled," and that despite improvements in management—like fencing waterways—New Zealand still shows "a range of degrade water quality state indicators." Despite the relatively recent increases in New Zealand heard size, the average dairy herd size of 402 cows per farm, is still far smaller than the 699 to 2000 cows proposed by HDF.[124] The density of cows in New Zealand, even where densities "exceed 30 cow/km$^2$" and "the highest density [is] 164 cows/km$^2$," is far lower than the proposed density of the HDF dairy, where 699 cows per 557 acres translates to 310 cows/km$^2$ (557 acres = 2.2541 km$^2$) and 2000 cows per 557 acres is 887 cows/km$^2$.[125] The Scarsbrook and Melland paper explains that "studies in concentrated dairy catchments… dominated by dairy production in south-west Victoria, Australia, found that increases in stream nitrogen and phosphorus concentrations between 1990 and 2011 were associated with concomitant increase in the intensity of dairy farming."[126]

Because the DEIS fails to disclose or consider the point source and non-point source impacts of the dairy, the DEIS fails to adequately disclose and consider not only the relationship of the provisions of the Kaua'i County General Plan to the project, but also the extent to which those provisions will fail likely to prevent impacts from so many cows on so little land. Once again, the checkmark provisions of section 5 of the DEIS fail disclose inconsistencies with the broader goals of the Kaua'i County General Plan, reconcile those conflicts, or explain why the project should proceed "notwithstanding the absence of full reconciliation." HAR 11-200-17(h).

**County of Kaua'i - South Kaua'i Community Plan**

The DEIS fails to adequately explain the relationship of the project to the Kaua'i South Community Plan. The DEIS lists subjects covered by the Kaua'i Community Plan, but fails to explain, using words (instead of checkmarks), their significance or relationship to the project. For example, the DEIS lists "Watershed Management" as a subject covered by the Community Plan but fails to explain specifically, how the project "supports" this subject area or its relevance. The DEIS does the same for "Cultural Stewardship and Interpretation."

Subsection 5.13, like the others, in this section, fails to explain the significance or non-significance of the designation "supportive" or "not supportive" or why or how a particular subject listed within the table relates to the project. Although the DEIS states that the project "supports" "Watershed Management," the DEIS fails to explain why or how its author's reach that conclusion. A quick review of the Kaua'i Community Plan executive summary discloses instances in which the project does not support or comply with the Watershed Planning and Management envisioned by the Kaua'i Community Plan.

[123] Scarsbrook, M.R. and A.R. Melland, *Dairying and water quality issues in Australia and New Zealand*, Proceedings of the 5th Australasian Dairy Science Symposium 2014.
[124] *Id.* at 107, Table 1.
[125] *Id.* at 112.
[126] *Id.*

For example, the Plan envisions "managing the watershed mauka to makai in recognition of the ecosystem services and interrelatedness of nature." Under section 4.5.1.2 "Runoff and Erosion Prevention" of the Executive Summary, the Plan lists policies and guidelines, which include "[m]anage … earth-moving activities from the standpoint of the entire watershed, *considering*… historic sites, native endangered or threatened species of plants and animals, and other special resources," and "[f]ilter and manage stormwater and rainwater runoff prior to entering streams and the ocean during construction as well as ongoing maintenance."[127]

Already, the proposed dairy has failed to live up to these management guidelines. The project has initiated construction without an NPDES permit to limit stormwater discharges, which demonstrates a failure to "manage stormwater and rainwater runoff." The project has failed to adequately consider historic or archeological sites within its boundaries. The project has excavated in wetlands and failed to disclose this dredging activity to the U.S. Army Corps of Engineers, an entity with which the Community Plan sets a policy of collaboration.[128] The project has failed to adequately consider the impact of the proposed dairy operations on threatened and endangered species.[129]

The Kaua'i Community Plan contains over one hundred pages. The DEIS does a disservice to the public, the decision-maker, and the requirements of HEPA by failing to direct the reader to relevant sections of the Community Plan. The DEIS fails to explain the significance, relevance, or relationship of the Plan to the project and the projects' many components. The EIS must explain the relationship between specific provisions of the Community Plan and the project.

The DEIS ignores relevant sections of the Kaua'i Community Plan. For example, Chapter 4 of the Community Plan explains that the National Park Service is considering a proposal to "locate a potential national park in the coastal area from Māhā'ulepu to 'Alekoko Fishpond in Lihu'e.[130] The coastal and mountain areas in the Māhā'ulepu "have qualities of national significance."[131] Although a National Park "would allow the private agricultural activities… to continue," the DEIS Section 5.13 and its table of checkmarks fails to consider the relationship between these plans for National Park status as noted in the Community Plan and HDF's proposal to establish a 699 to 2000 cow dairy in the middle of the Māhā'ulepu watershed.

The DEIS fails to consider that not all agricultural uses have the same impacts. The stench created by the dairy and the pollution to groundwater and surface water are certain to influence the extent to which the National Park Service considers the surrounding forests, mountains, and coast to "have qualities of national significance." Even the Grand Canyon, despite vastness and stunning beauty, would be less appealing and considerably diminished if marred by a 2,000 cow dairy its concomitant odor and nutrient pollution. No one can deny that the experience would not be the same. This is just one more example of how the DEIS's slap-

[127] South Kaua'i Community Plan, Executive Summary at 36.
[128] *Id*. at 36, 4.5.1.1.
[129] *Id*.
[130] *Id*. at 4-6.
[131] *Id*. at 4-7.



dash approach to HEPA analysis in section 5 undermines its unsupported conclusion that the project "supports" the Kaua'i Community Plan.

**State of Hawaii Water Policies**

The proposed dairy fails to demonstrate compliance with the anti-degradation policy of HAR § 11-54-1.1 and the requirements of 11-54-3. DEIS at 5-28. The DEIS fails to adequately disclose the relationship between the different classifications of waters and the project or its impacts. Without an adequate disclosure of the dairy's impacts, the DEIS fails to explain the extent to which "a conflict or inconsistency exists," and fails to "reconcil[e]" any conflicts with these standards.

**8. <u>The Alternatives Analysis Does Not Comply with HEPA.</u>**

The alternatives analysis is the heart of the HEPA process. HAR § 11-200-17(f) requires that:

> The draft EIS shall describe in a separate and distinct section alternatives which could attain the objectives of the action, regardless of cost, in sufficient detail to explain why they were rejected. The section shall include a rigorous exploration and objective evaluation of the environmental impacts of all such alternative actions. Particular attention shall be given to alternatives that might enhance environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs, and risks. Examples of alternatives include:
> (1) The alternative of no action;
> (2) Alternatives requiring actions of a significantly different nature which would provide similar benefits with different environmental impacts;
> (3) Alternatives related to different designs or details of the proposed actions which would present different environmental impacts;
> (4) The alternative of postponing action pending further study; and,
> (5) Alternative locations for the proposed project.[132]

In evaluating various alternatives, the reviewing agency engages in a comparison of the current, baseline conditions in an area – and likely impacts if those baseline conditions were to continue – with the expected impacts that will result from the analyzed alternatives, including the proposed project. It is this comparison that allows the agency to determine whether impacts from the proposed project are likely to be "significant" and whether the project is acceptable to proceed. The inclusion of baseline conditions also is necessary for an evaluation of other alternatives, including the alternative of "no action." In the instant DEIS, the alternatives analysis is woefully inadequate and must be revised.

[132] HAR § 11-200-17(f).

A "no action" alternative should answer a straightforward question: what impacts would result, if any, if the existing uses of and impacts from the land at baseline conditions continued on, unchanged? Astonishingly, the "no action" alternative described in this DEIS includes the "[u]se of these lands [for] cattle and/or sheep grazing on the 500+ acre pasture area…[a]t the stocking rate of two to four animals per acre." DEIS at 6-8. As stated, the "no action" alternative actually conceives of "up to 2,000" cattle and sheep grazing on the proposed project area. DEIS at 6-8. This is the same number of animals in HDF's larger, "contemplated" herd size for its proposed dairy project. The "no-action" alternative is essentially just a repackaging of the proposed project but without the meager mitigation efforts that HDF's project includes. According to the DEIS, the likely nutrient loadings, pollution risks, and environmental impacts are more severe under the alternative of "no action" than they are under HDF's proposal. This explanation defies logic – "no action" simply does not mean the same project an applicant proposes but without the environmental controls.

The DEIS must include a true "no action" alternative that reflects the perpetuation of baseline conditions and the existing use of the land *in its present state*. Some options might be a conservation proposal, or an agricultural use that does not involve livestock, such as crop growing.[133] A true "no-action" alternative that examines the status quo should be fully considered in a revised DEIS.

The alternatives analysis is further flawed because its consideration of an alternative location was not even a realistic option at the time the DEIS was published. The DEIS notes that the land that was being considered as an alternative location "has been contracted for sale to another landowner who is not planning to develop a pasture-based dairy." DEIS at 6-15. This third-party sale does not obviate the need to properly consider an alternative location for the project. HDF must revise its DEIS to include an alternative location that remains a feasible option. The alternatives analysis in a revised DEIS must also include the alternative of postponing the action pending further study, as that alternative was omitted.

The decision around which alternatives to give further consideration and which to shelve as non-viable appears to be motivated more by a self-serving interest in meeting the narrow objective of producing milk than on any rigorous consideration of environmental impacts. Had the impact and footprint of the project been given greater weight, the conventional feedlot alternative would have been set aside while the conservation condemnation, agricultural park and processing center, and agricultural subdivision were given further consideration. The Department of Health should give serious consideration to whether the applicant's self-serving Purpose and Need statement can justify the refusal to consider other agricultural or conservation options that do not involve a dairy.

[133] The DEIS acknowledges these alternatives, but dismissed them either as non-viable (conservation condemnation) or concluded that they did not meet the purpose and need of the proposed action because, *inter alia*, an agricultural park does not provide a critical source of protein. Protein is mentioned nowhere in HDF's Purpose and Need statement, but can be found in legumes and certain grains and vegetables.



The alternative for milk products processing is strange, because it is an element of whatever the larger dairy operation may be and cannot stand on its own as an alternative without the proposed—or some other—dairy project. Nevertheless, because the milk processing location remains an unresolved issue, the option to pasteurize raw milk on Kaua'i should be considered in greater detail. The DEIS states that under this alternative, traffic associated with processing would add worker trips to the facility and harbors, would increase noise slightly, and would result in additional vehicle emissions. These effects are all likely to result under the other proposal, though; if the raw milk is sold to a processor/packager, it will still need to be transported. In any event, this analysis is incomplete as there is no specific comparison of the foreseeable impacts resulting from the two options.

The alternatives analysis must be fully revised and resubmitted to the Department of Health in a supplemental DEIS.

**9. <u>Agencies and Parties Consulted</u>**

HAR § 11-200-15(a) requires consultation prior to filing a draft environmental impact statement. This consultation process is supposed to be "full and complete," and the applicant is not supposed to rely solely on the review process to expose environmental concerns.[134] HDF failed to engage in meaningful provide a detailed and adequate response to Friends' scoping comments and other scoping comments submitted on the EISPN. As discussed *supra*, the "consultation" that occurred tended to result more in marketing changes than in substantive ones.

Of note is the sheer number of individuals and community groups who submitted scoping comments in response to the EISPN. Over 200 separate individuals and groups—not counting any agencies who were required to be consulted—submitted comments on the EISPN. DEIS at 7-4 to 7-12. This project has aroused a level of community concern that is unprecedented on the island. The Department of Health should be aware of the degree of public concern that has been expressed as it evaluates this or any revised DEIS.

**10. <u>Conclusion</u>**

The DEIS contains numerous flaws and inconsistencies, and omits essential information and considerations. At minimum, HDF must submit a supplemental DEIS that corrects these errors and includes all plans and required studies in final form; these errors are too numerous and extensive to simply attempt to cure in the final EIS.

After the Department of Health takes a hard look at all of the negative consequences of HDF's proposed dairy, Friends believes that it will reject this ill-advised project. Kaua'i in general, and the Māhā'ulepu Valley in particular, are extremely poor locations for intensive, industrial dairy farming. This high probability of polluted surface water runoff leaving the boundaries of the dairy site spells huge risks for downstream water quality, and area animal and plant species. As the Kaua'i County Council stated: "Māhā'ulepu is a heritage landscape where it is possible to preserve and restore diverse significant natural, scenic, cultural, archaeological,

[134] HAR § 11-200-15(a).

historic, scientific, and recreational resources[.]" It *is* possible to preserve these resources, but only where agencies like the Department of Health are not afraid to act.

Put simply, this project is not worth the risk.

Sincerely,

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Friends of Māhā'ulepu *Correspondence*

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July 3, 2015 letter to West Kaua'i Soil & Water Conservation Dist.
July 9, 2015 letter re: 303(d) listing of Wai'opili Stream
June 21, 2016 letter re: public comment extension request to Dept. of Health
July 7, 2016 letter to the Department of Health

# Appendix 1

United States Department of Agriculture

Economic Research Service

# Trends in U.S. Per Capita Consumption of Dairy Products, 1970-2012

by Jeanine Bentley

Dairy products make important contributions to the American diet. They provide high-quality protein and are good sources of vitamins A, D, and B-12, as well as riboflavin, phosphorus, magnesium, potassium, zinc, and calcium. The 2010 *Dietary Guidelines for Americans* and the supporting MyPlate Food Guidance System recommend that Americans consume 2-3 cups of dairy products daily, depending on their age, gender, and level of physical activity. Despite these recommendations, per capita consumption of dairy products totaled 1.9 cups per day in 2012. While consumption of some dairy products—cheese, yogurt, and sour cream—has risen since the 1970s, declining milk consumption has caused total pounds of dairy products available to eat or drink annually to fall from 339.2 pounds per person in 1970 to 275.9 pounds in 2012.





**Dairy availability has steadily declined since the mid-1980s**

| | 1970 | 1980 | 1990 | 2000 | 2012 |
|---|---|---|---|---|---|
| | *Per capita availability (pounds)* | | | | |
| Fluid milk and cream | 273.8 | 245.0 | 232.8 | 209.9 | 198.8 |
| Butter | 5.4 | 4.5 | 4.4 | 4.5 | 5.6 |
| Cheese and cottage cheese | 16.4 | 21.9 | 27.9 | 32.5 | 36.0 |
| Frozen dairy products | 25.8 | 23.9 | 26.1 | 28.1 | 23.9 |
| Evaporated and condensed milk and dry dairy products | 17.7 | 10.5 | 11.6 | 9.0 | 11.6 |
| Total | 339.2 | 305.8 | 302.8 | 283.9 | 275.9 |

Source: USDA, Economic Research Service, Food Availability (Per Capita) Data System.

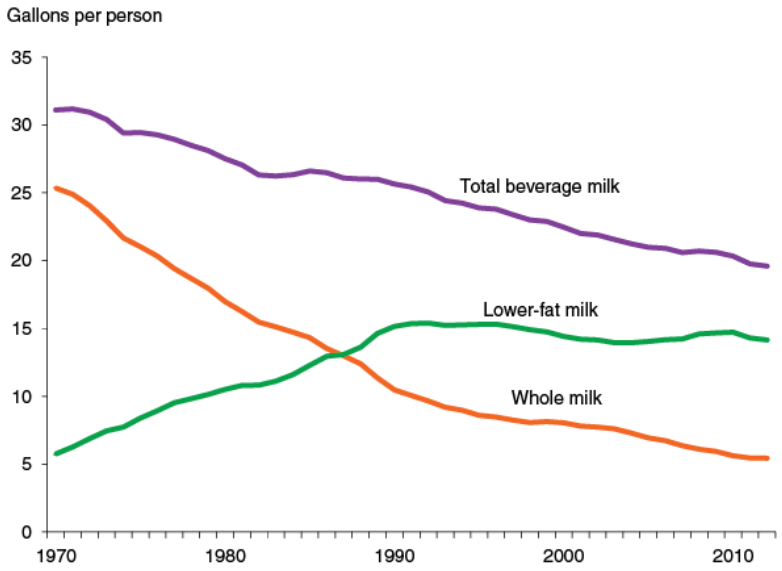
ERS's food availability data calculate the annual supply of a commodity available for humans to eat by subtracting measurable nonfood use (farm inputs, exports, and ending stocks) from the sum of domestic supply (production, imports, and beginning stocks). Per capita estimates are determined by dividing the total annual supply of the commodity by the U.S. population for that year. Although these estimates do not directly measure actual quantities ingested, they serve as a proxy for Americans' food consumption over time.

## Whole Milk Consumption Falling, Low-Fat Milk Consumption Steady

The bulk of the 63-pound decline in U.S. dairy availability between 1970 and 2012 stems from the decrease in fluid milk and cream availability, which decreased 75.1 pounds per person (9.2 gallons per person). Since fluid milk availability peaked at 42.3 gallons per person in 1945, availability has steadily fallen, reaching a record low of 19.6 gallons per person in 2012. Whole milk availability dropped to 5.4 gallons per person in 2012, almost a quarter of 1970's 25.3 gallons. In addition, lower fat milk availability has leveled off to an average of 14 gallons per person since 1998.

A 2013 ERS study found that while Americans continue to drink about 8 ounces of fluid milk when they drink milk, they are consuming it less frequently than in the past. Americans are especially less apt to drink milk at lunchtime and with dinner. National food consumption surveys reveal that Americans born in the early 1960s drank milk 1.5 times a day as teenagers, 0.7 times a day as young adults, and 0.6 times a day in middle age. In contrast, Americans born in the early 1980s entered their teenage years drinking milk just 1.2 times a day and were drinking milk 0.5 times a day as young adults. Competition from other beverages—especially carbonated soft drinks, fruit juices, and bottled water—is likely contributing to the changes in frequency of fluid milk consumption. In addition, substitutes for cow's milk (including nut milks, coconut milk, and soy milk) have provided alternatives for consumers.

**Milk availability down 37 percent since 1970**




Source: USDA, Economic Research Service, Food Availability (Per Capita) Data System.

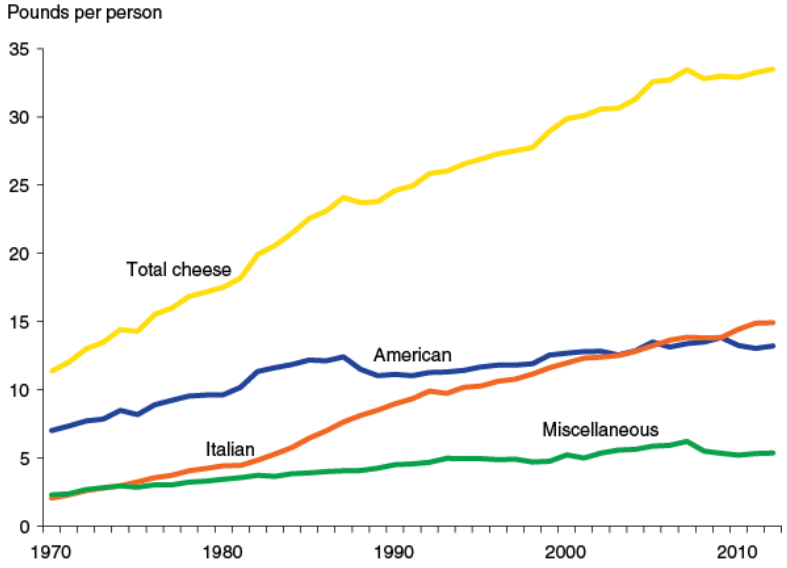
## Americans Eating More Cheese and Fewer Frozen Desserts

Over the last four decades, Americans have increased their consumption of cheese, especially Italian varieties such as mozzarella, parmesan, and provolone. In 2012, cheese availability was 33.5 pounds per person, almost triple the amount in 1970 at 11.4 pounds. Availability of Italian cheeses increased to 14.9 pounds per person from 2.1 pounds in 1970. Since 2005, availability of American cheese has remained around 13 pounds per person. The inclusion of cheese in time-saving convenience foods and in commercially manufactured and prepared foods such as frozen pizza, macaroni and cheese, and pre-packaged cheese slices has increased consumption. The popularity of cheese-rich Italian and Tex-Mex cuisines has also contributed to increased cheese consumption.





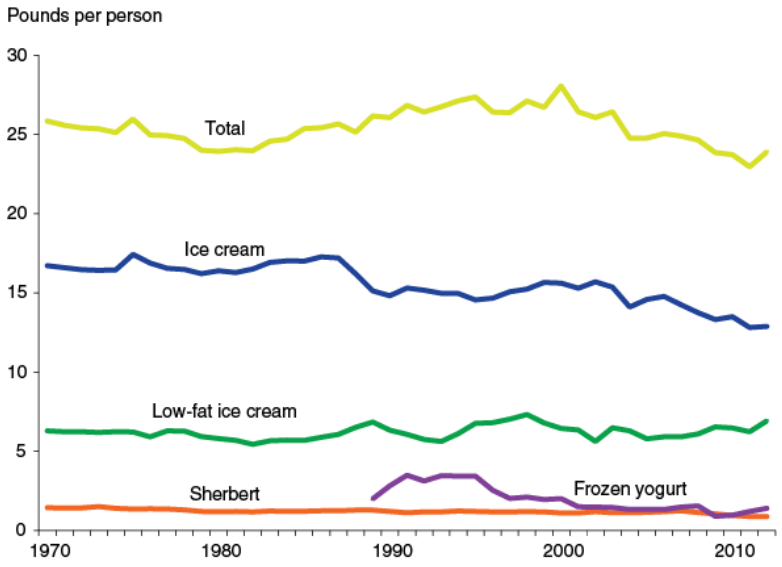
**Consumption of Italian cheeses continues to rise**




Source: USDA, Economic Research Service, Food Availability (Per Capita) Data System.

U.S. availability of ice cream has declined since its peak of 22.7 pounds in 1946. Despite the multitude of offerings in the ice cream aisle, ice cream availability has fallen to 12.9 pounds per person in 2012, down from 16.7 pounds in 1970. Availability of low-fat ice cream (formerly known as ice milk) has remained relatively constant from the late 1960s, fluctuating between 5 and 7 pounds per person. Frozen yogurt availability is down from an average of 3.4 pounds in the late 1990s to 1.4 pounds in 2012.

**Availability of frozen dairy products stood at 23.9 pounds per person in 2012**




Source: USDA, Economic Research Service, Food Availability (Per Capita) Data System.

## This article is drawn from...

Food Availability (Per Capita) Data System, by Jeanine Bentley and Linda Kantor, USDA, Economic Research Service, November 2015

Why Are Americans Consuming Less Fluid Milk? A Look at Generational Differences in Intake Frequency, by Hayden Stewart, Diansheng Dong, and Andrea Carlson, USDA, Economic Research Service, May 2013

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# Appendix 2

# Comments on Hawai'i Dairy Farms Draft Environmental Impact Statement

Charles T. Blay, Ph.D
TEOK (The Edge of Kauai) Investigations

July 25, 2016

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Hawaii Dairy Farms LLC
PO Box 1690
Koloa, HI 96756

Subject: Hawaii Dairy Farms
Draft Environmental Impact Statement
Mahaulepu, Kauai, Hawaii

To All Concerned:

I am a practicing geologist, residing on the Kauai, with over 20 years of experience as an educator, researcher and consultant dealing with a wide variety of geological aspects of the geology of Hawaii, most specifically the island of Kauai and the Ahupua`a of Mahaulepu. My curriculum vita, and publications referred to in this submittal, accompany this letter.

Having reviewed the May 2016 HDF DEIS, I would like to comment on major elements missing from Section 4 (Environmental Setting). There is relatively little mention of the geologic setting and the unparalleled continuum of time represented by the rock formations of Mahaulepu. Mahaulepu Valley and surrounding terrain provides the longest and most comprehensive documented record of geologic history of any site in the entire State of Hawaii. Based on this characteristic alone, the wild, scenic, undeveloped, and relatively unregulated setting of Mahaulepu ranks as a one of Kauai's natural treasures, comparable with

equally spectacular Na Pali and Waimea Canyon. Such uniqueness needs to be protected from unnecessary and avoidable harm.

Geologic formations of Mahaulepu range from some of the oldest lava rocks exposed in the eight, main high islands of the Hawaiian volcanic mountain chain to the very young lithified coastal carbonate sand dune deposits (Macdonald, Davis and Cox, 2960; Blay and Siemers, 2013). The shield stage lavas of the Na Pali Member of the Waimea Canyon Basalt that comprise the spine of the Haupu Ridge range in age from 4 to as much as 5 million years (McDougall, 1979). The upper portion of Haupu Mountain itself is composed of post-shield lavas most likely laid down 3 to 4 million years ago. Throughout the low-lying terrain of Mahaulepu, rejuvenated stage lavas of the Koloa Volcanics were laid out between 2 million and 150 thousand years ago (Garcia, et al, 2010). Along the coast, the lithified eolianites (wind-deposited sand dunes) that form the limestone ridges of the Mahaulepu Formation were deposited in several sea level fluctuating episodes ranging in age from four hundred and thirty-five thousand to less than four thousand years (Blay and Longman, 2001). Today, modern sand dunes are in the process of forming in the same manner as those of the Mahaulepu Formation. These significant rock formations not only make the locality special, from a naturalist point of view, they provide important clues as to its environmental character. Briefly, it's all about the water and the wind.

The lava rock formations of the geologically young Koloa Volcanics, which underlie the thin surficial alluvium and relatively impermeable clayey soils of Mahaulepu Valley, and the area immediately down slope of the valley, are characterized by their highly porous and permeable nature, in addition to the presence of lava tubes – some well known, many others undiscovered but unquestionably present. The down slope transmissivity of groundwater fluids within and below the surficial alluvium, and even in deeper aquifers of Mahaulepu Valley must be factored in when contemplating installation of an operation such as an upslope large scale dairy farm. Groundwater, and everything in it, will find its way out of the valley and eventually down to the coast. The 50 inches of rainfall that falls annually directly in the valley, will be enhanced by the much greater level of rain falling on the adjacent upland of Haupu ridge.

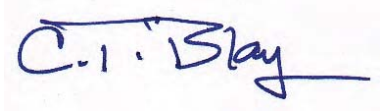
When contemplating the placement of a dairy farm in Mahaulepu Valley, perhaps the most significant feature of concern is that indicated by the extensive modern shore-parallel coastal sand dunes of Mahaulepu and the ancient lithified sand dunes of the coastal Mahaulepu Formation – wind. The iconic prevailing Trade Winds of Hawaii blow from northeast to southwest year round. They define



the islands of Hawaii in terms of their wet "windward" and dry "leeward" sides. The 10-12-mile long southeastern coastline of Kauai between Nawiliwili Bay and Makahuena Point, the island's southernmost point, is oriented in a direction nearly parallel to the average direction of the "Trades." This is where "Kauai takes her breath." The winds blowing across Mahaulepu Valley and along the coastal zone of Mahaulepu are some of Hawaii's most persistent and intense. Sand from Haupu Beach is blown up and out of the confined little bay and transported over three-fourths of a mile southwest along the lava rock ridge that extends all the way along Mahaulepu Valley to prominent Puu Keke. Hundreds of paleowind measurements made on windward-inclined layers of the lithified sand dunes of the Mahaulepu Formation indicate that such strong winds have been persistent for over four hundred and thirty-five thousand years (Blay and Longman, 2001). They are fundamental to Mahaulepu. Wind velocity measurements reported in the HDF DEIS to average 10 miles per hour lack relevance. Such a baseline number ignores the much greater significance of the portion of time when the winds are more intense. Of greater importance is the considerable period of time that the winds blow at velocities greater than 25, or even 20 mph. Such are the winds that would provide evidence of a large-scale Mahaulepu Valley dairy farm for the downwind resorts and residences of Poipu.

Down slope transmission of effluent within the groundwater zone of the subsurface, porous and permeable lava rocks of the Koloa Volcanics and the frequent strong, persistent trade winds blowing along the coast to nearby visitor destinations in Poipu, make placement of a large-scale dairy farm in Mahaulepu Valley a high risk endeavor.

Sincerely,



Charles T. Blay, Ph.D.
Geologist

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Blay, C.T., and Siemers, R.J., 2013, Kauai's Geologic History: A Simplified Overview: Koloa, HI, TEOK Investigations, 161 p.

Garcia, M.O., Swinnard, L., Weis, D., Greene, A.R., Tagami, T., Sano, H., and Gandy, C.E., 2011, Petrology, geochemistry and geochronology of Kauai lavas over 4.5 myr: Implication for the origin of rejuvenated volcanism and evolution of the Hawaiian plume: Jour. Petrology, v. 51, no. 7, p. 1507-1540.

McDougall, I., 1979, Age of shield-building volcanism of Kauai and linear migration of volcanism in the Hawaiian Island chain: Earth and Planetary Science Letters, v. 46, p. 31-42.

Macdonald, G.A, Davis, D.A., and Cox, D.C., 1960, Geology and ground-water resources of the island of Kauai, Hawaii: Hawaii Div. Hydrology Bull 13, 212 p. color geologic map.




# Curriculum vitae

**(prepared August 2015)**


## Charles T. Blay, Ph.D.

**Geologist/Naturalist/Educator**
**Kauai, Hawaii; USA**


**MAILING ADDRESS:**


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Tel/Fax No. (808) 742-8305; e-mail - teok@aloha.net; cell phone (808) 639-6436


**PERSONAL DATA:**

Age - 70; Date of Birth - 30 Aug. 1944; Place of Birth - Lodi, California, USA.; Height - 5'7"; Weight - 162 lbs; Health - excellent; Marital Status – Married to Jana Rothenberg; two children (ages 44 and 42).

**EDUCATION:**

B.S., Geology; Oregon St. Univ., Corvallis, OR; USA - June 1966
A.M., Geology; Indiana Univ., Bloomington, IN; USA -- June 1968
Ph.D., Geology; Indiana Univ., Bloomington, IN; USA - June 1971

**EXPERIENCE:**

06/05 – present: Affiliate Prof., Univ. Hawaii-Manoa, Honolulu, HI
06/99 – present: Owner/Operator/Guide; Kauai Nature Tours, Poipu, Kauai, HI
12/95 - present: Principal Investigator; TEOK Investigations, Poipu, Kauai, HI; USA
08/93 - 06/95: Consultant, Quito, Ecuador.
02/89 - 08/93: Head, Sedimentology Division, P.T. Geoservices, Jakarta; Indonesia.
04/82 - 12/90: President and Chief Scientist, Sedimentology, Inc., Boulder, CO; USA.
02/88 - 12/89: Chief Scientist, RPI, Int'l., Inc., Boulder, CO; USA.
05/83 - 03/85: President, Alaska Research Assoc, Inc., Anchorage, AK; USA.
09/80 - 12/81: Professor of Geology, Univ. Wyoming, Laramie, WY; USA.
08/75 - 09/80: Senior Research Geologist, Cities Service Oil Co., Tulsa, OK; USA.
08/71 - 08/75: Asst. Professor of Geology, Univ. New Mexico, Albuquerque, NM; USA.
06/71 - 08/71: Asst. Professor of Geology, Indiana Univ. Field Station, Cardwell, MT.
08/70 - 06/71: Asst. Professor of Geology, Indiana Univ., Northwest Campus, Gary, IN.

**TEACHING BACKGROUND:**

**A. University** (Indiana Univ., Univ. New Mexico and Univ. Wyoming):

Undergraduate - Physical and Historical Geology, Stratigraphy and Sedimentation, Invertebrate Paleontology, Paleoecology, Field Geology and Reports, Advanced Field Geology, Oceanography.
Graduate - Sedimentology; Sedimentary Petrology (Clastics and Carbonates); Basin Analysis; Shallow-Water Carbonate Environments (Florida Keys); Marine Geology of Gulf of California;

Environments of Coal-Bearing Sequences; numerous graduate seminars on various aspects of clastic and carbonate sedimentary geology.
Field - Shallow-Water Carbonate Environments (Florida Keys) 6-weeks; Marine Geology of Gulf of California, Mexico (2-weeks).

**B. Professional** (Short Courses-- Abbreviated List):

1. Modern and Ancient Clastic Depositional Systems: A Field Seminar: 2-week field/lecture/ core-workshop course in Texas and Louisiana Gulf Coast and northern New Mexico -- through American Association of Petroleum Geologists (AAPG) and for private industry groups.
2. Applied Clastic Sedimentology Explorationists and Engineers: 5-day lecture/core workshop on the process approach to sedimentary geology.
3. Sedimentological Analysis of Full-Diameter Cores; A Work-shop Course; 2- to 3-day lecture/core-workshop course on the geological analysis of cores and their use in subsurface exploration and development programs
4. Deep-Water Clastic Sediments: A Core Workshop; 1- to 2-day lecture/core workshop course.
5. Coal-Bearing Sequences: Modern Geological Concepts for Exploration and Development: 6-day lecture/field/core-workshop course.
6. West Java Clastic Sedimentology Field Seminar; A Seven-Day Lecture/Field Exercise/Core Workshop Course for Indonesian Explorationists and Engineers.
7. Carbonate Sedimentology Seminar; A Seven-Day Lecture/Field/Core Workshop Course for Indonesian Explorationists and Engineers; including modern carbonate sediments of the Pulau Seribu area, Miocene-Pliocene carbonate sequences of Central Java and subsurface carbonate core sequences from Indonesia.
8. Clastic Sedimentology Seminar; Mahakam Delta/East Kalimantan Outcrops/Core Workshop; A Seven-Day Lecture/Field/Core Workshop Course for Explorationists (Geologists, Geophysicist, Engineers); now sponsored as an international field seminar by the American Association of Petroleum Geologists (beginning November 1993).
9. Science of Ecosystems: A Professional Development Summer Training Seminar for Science Educators: Conducted on Island of Kauai, Hawaii by TEOK Investigations, Poipu, HI.
10. Geoscience on the Big Island: A Professional Development Summer Training Seminar for Science Educators: Conducted on Hawaii Island, Hawaii by TEOK Investigations, Poipu, HI.
11. The Natural History and Cultural Past of Molokai, Hawaii by TEOK Investigations; a Professional Development Summer Training Seminar for Science Educators.
12. Sediments of a Mid-Plate Volcanic Island Complex; A Field Investigative Trip on the Islands of Hawaii and Kauai: Pacific Section SEPM (Society for Sedimentary Geology), August 2-8, 2015.

**C. Visiting Professorship:**

Visiting Professorship: Wuhan College of Geology, Wuhan and Beijing, People's Republic of China; Sept.-Dec., 1986; comprehensive two-month course in sedimentary geology for post-graduate and graduate Chinese students with emphasis on applications to the coal and petroleum industries.



**D. Invited Lectureship:**

Indonesian Petroleum Association Invited Lecturer; one-day lecture, field trip, core workshop for Indonesian university lecturers and graduate students; Sept. 1990, Institute of Technology, Bandung; Sept. 1991, Trisatki University, Jakarta

**NON-PUBLISHED INDUSTRY STUDIES:**

**A. Major Studies in Indonesia:** (partial list)

1989, Sedimentologic and petrologic analysis of uppermost part of lower Keutapang Formation represented by Core 1 of the ABY-1 exploration well, North Sumatra, Indonesia: P.T. Geos. rept. for JOB Pertamina-Japex North Sumatra, 18 p., ills.

1989, Sedimentological analysis of full-diameter cores from the Talang Akar Formation, ARCO Indonesia, Inc. AVA-9 well, NW Java Sea, Indonesia: P.T. Geos. rept. 27 p., 7 figs., 28 pls.

1989, Sedimentologic and petrographic analysis of the Lower Platform Carbonate in cores 1 and 2 of the Union Texas - Tolo No. 1 well, Tomori PSC, Sulawesi, Indonesia: P.T. Geos. rept. for Union Texas (SE Asia), Inc., 27 p., 9 figs., 1 tab., 43 pls.

1990, Lithology and petrology of Lower Platform Limestone sequence (Lower Miocene), cores 1-9, Union Texas Tiaka-4 well, Tomori PSC, Sulawesi, Indonesia: P.T. Geos. rept., 4 vols., 26 pgs. text, core photos, 2 panels, appendices, 175 pls.

1990, Sedimentological analysis of full-diameter core sequences of the Talang Akar Formation from eight Asamera, South Sumatra wells (Bentayan 13-20) in the Bentayan Field area, South Sumatra basin, Sumatra, Indonesia: P.T. Geos. rept., 3 vols., 30 text pgs., 9 figs., 11 tabs., 8 panels, core photos.

1990, Sedimentological analysis of full-diameter core sequences of the Talang Akar Formation from the Asamera, South Sumatra Bertak No. 3, Bertak No. 4, Kubu No. 2 and Bulian No. 2 wells, South Sumatra Basin, Sumatra, Indonesia: P.T. Geos. rept., 19 text pgs., appendices, core photos, 4 panels.
1990, Lithology and petrology of the Ngimbang Carbonate sequence represented by full-diameter cores of the ARCO Bali North, Inc., West Kangean No. 2 well, East Java Sea, Indonesia: P.T. Geos. rept., 4 vols., 39 text pgs., 2 panels, core photos, 150 pls.

1990, Scanning electron microscope examination of selected samples of the Ngimbang Carbonate sequence from cores 1-5 of the ARCO Bali North, Inc., West Kangean No. 2 well, East Java Sea, Indonesia: P.T. Geos. rept., 7 text pgs., 20 pls.

1990, Analysis of fractures in full-diameter cores of the Ngimbang Carbonate, ARBNI W. Kangean No. 2 well, East Java Sea, Indonesia (w/J.A. Deckelman): P.T. Geos. rept., 22 text pgs., 9 figs., 2 tabs., 11 pls., 2 panels.

1990, Lithology and Petrology of the Ngimbang Carbonate sequence represented by full-diameter core 1 of the ARCO Bali North, Inc., Sepanjang Island No. 1 well, East Java Sea, Indonesia (w/C.A. Stomps): P.T. Geos. rept., 2 vols., 36 test pgs., 1 panel, core photos, appendices, 62 pls.

1990, Analysis of fractures in full-diameter core of the Ngimbang Carbonate, ARBNI Sepanjang Island No. 1 well, East Java Sea, Indonesia (w/J.A. Deckelman): 20 text pgs., 8 figs., 13 pls., 2 panels.

1990 Sedimentological, Petrological and petrophysical analysis of the Talang Akar Formation as represented by cores 1-3 of the Maxus - Widuri A-1 well, offshore Southeast Sumatra, Indonesia: P.T. Geos. rept., 16 text pgs., 3 tabs., 19 pls. core photos, 1 panel.

1990, Sedimentological analysis of full-diameter core from the Talang Akar formation of the Maxus, SE Sumatra, Inc., Widuri B-8 well, offshore Southeast Sumatra, Indonesia: P.T. Geos. rpt., 20 text pgs., 1 panel, core photos.

1991, Petrologic analysis of subsurface reservoir Sandstone units of the Talang Akar Formation, Bentayan Field area, South Sumatra, Indonesia: P.T. Geos. rpt., 35 text pgs., 52 figs., 25 tables, 126 pls.

1991, Sedimentology, petrology and petrophysical analyses of the Ngimbang and Pre-Ngimbang clastic sequences represented in cores 1-5 of the ARBNI East Sakala No. 1 well, East Java Sea, Indonesia: P.T. Geos. rpt., 23 pgs. text, 1 panel, 80 pls.

1991, Sedimentology, petrography and reservoir potential of the Middle to Lower Mio-cene, Alur Siwah carbonate buildup, North Sumatra basin, Indonesia: P.T. Geos. rpt., 4 vols., 32 pgs text, 69 pls., panel diagrams.

1991, Sedimentology and petrology of the Early Miocene Upper Batu Raja lithostrati-graphic sequence, southeast carbonate platform area, Sunda Basin, West Java Sea, Indonesia: P.T. Geos. rpt., 3 vols., 19 pgs text, 7 tbls., 125 pls., core photos, 6 panel diagrams.

1992, Petrology of Pre-Zelda carbonate unit represented by full-diameter core from the Maxus Ambar No. 2 well, Northern Sunda Basin, Offshore SE Sumatra, Indonesia: P.T. Geos. rpt., 6 pgs. text, 20 pls., core photo.

1992, Sedimentology and petrology of the Baturaja Limestone as represented by cores from Air Serdang Field and nearby wells, Ogan Komering Block, South Sumatra: P.T. Geos. rpt., vols. 1-3, 29 pgs. text, 19 figs., 14 tbls., 8 panel diagrams, 150 pls. (w/M.W. Longman).

1992, Sedimentology and petrology of full-diameter cores, Unocal Serang No. 3RD2 and No. 5 wells, Offshore East Kalimantan, Indonesia: P.T. Geos. rpt., Vols. 1-5, 31 pgs. text, 21 pgs. app., 25 figs, 2 tbls., 6 panel diagrams, 212 pls.

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1992, Petrography of sidewall core samples from the Pre-Zelda (Pre-Tertiary?) Carbon-ate section of the Maxus Ambar-3 well, Northern Sunda Basin, Offshore Southeast Sumatra, Indonesia: P.T. Geos. rept., 5 pgs. text, 1 tbl., 35 pls.



1993, Petrography and sedimentology of full-diameter cores from ten Asamera wells in the North Sumatra Basin, Indonesia: P.T. Geos. repts. 10 volumes, 43 pgs text, core photos, 235 pls. 15 panel diagrams.

1993, Petrography of outcrop samples from the Tangsaran and Jerneh areas of the North Sumatra Basin: P.T. Geos. repts., 4 vols., 5 pgs text, 243 pls.

1993, Sedimentological description of full-diameter cores from the Maxus Retno-3 well, Offshore Southeast Sumatra, Indonesia: P.T. Geos. rept., 6 pgs text, 1 fig., 1 panel .

1993, Sedimentological description of full-diameter cores from the Maxus Banuwati-3 well, Offshore Southeast Sumatra, Indonesia: P.T. Geos. rept., 7 pgs text, 2 figs., 2 pnls.

1993, Sedimentologic and petrologic description of full-diameter cores 1-7, Maxus Indri A-6 well, Offshore Southeast Sumatra, Indonesia: P.T. Geos. Rept., 3 pgs. text, 12 pgs app., 6 tables, 1 fig., 1 panel.
1993, Sedimentology and paleocurrent analysis of oriented, full-diameter cores, Asa-mera Gelam no. 2 and no. 3 wells, South Sumatra Basin, Indonesia: 3 pgs. text, 9 pgs app., 9 tables, 4 panel diagrams.

1993, Sedimentological description of slimhole cores: Siapo-1, Nikam-1, Pandai-1 and Laut-2 wells, South Sumatra, Indonesia: 10 pgs. text, 2 figs., 1 table, core photo-graphs, 4 panel diagrams.

1994, Petrologic analysis of selected sandstone core samples from Badak, Nilam, Semberah and Mutiara Fields, East Kalimantan, Indonesia: 5 vols., 46 txt pgs., 142 pls.

1996, Sedimentological analysis of selected outcrops, Middle Miocene, Mutiara Field and surrounding area, East Kalimantan, Indonesia: summary of initial field investigation and recommendations: 23 pgs.

1997, Character and origin of porosity in reservoir sandstone units, Mutiara Field, East Kalimantan, Indonesia: 5 vols., 53 txt pgs., 48 figs., 176 pls.

**B. <u>Other Major Reports</u>:**

1981, Surface outcrop and subsurface core analysis of Upper Cretaceous and Tertiary sedimentary sequences, Middle Magdalena Valley, Columbia, South America: an anal-ysis of petroleum geology while associated with Cities Service Oil Co. Research Center.

1980-81, Subsurface core and wireline log analysis of Barrancas Formation (Cretac-eous) of the Mendoza Province, western Argentina, South America: an analysis of petroleum geology while associated with Cities Service Oil Co. Research Center and later with Sedimentology, Inc.

1980-81, Sedimentology and reservoir potential of Brent Sand (Jurassic), North Sea area, northwestern Europe: sedimentological core analysis conducted while assoc-iated with Cities Service Oil Co. Research Center.

1983, Regional Frontier Formation Study; 2-volume report on the upper Cretaceous Frontier Formation of the northern Rocky Mountains of the USA; Sedimentology, Inc., and RPI, Colorado.

1983, Sedimentological analysis of whole-diameter cores, National Petroleum Reserve - Alaska (NPRA), North Slope, Alaska, USA; 5 volume report on over 5,500 feet of core material from 273 cores in 27 wells; Sedimentology, Inc. rept., 250 text pgs., core photos; 84 figs.

1984, Petrography, sedimentology and petroleum geology of the Arctic National Wildlife Refuge, Alaska; Comprehensive subsurface study; 4 volume comprehensive report on all aspects of subsurface geology in the northeastern portion of Alaska, USA; Alaska Res. Assoc. rept.

1984-1985, Lithologic, Petrologic and Sedimentologic analysis of Upper Paleozoic Lisburne Group Carbonate sequence, north Slope, Alaska; examination and analysis of over 7500 feet of carbonate core conducted for Sohio Petroleum Co. (B.P.); 10 volumes; Sedimentology, Inc. repts.

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# Appendix 3

**Comments on Hawaii Dairy Farms' Draft Environmental Impact Statement**

I have worked in the hydrogeology field for almost 30 years with experience in all aspects of ground water and contamination. Over the past 8 years, I have worked on multiple Animal Feeding Operations with respect to contamination pathways, odors, application of waste water and remediation of or corrective measures for the resulting impacts. In addition, I have lived and operated a working cattle ranch in Montana almost all my life.

## I. INTRODUCTION AND SUMMARY

In order to evaluate the accuracy and conclusions and recommendations of this document, we have to define the goals and objectives of the Environmental Impact Statement ("EIS"). Information is available on how to complete an EIS, what information should be used to complete an EIS and how to address potential impacts when they are defined in the EIS process. A synopsis of the required content of an EIS in Hawaii is provided below.

> *"The environmental impact statement shall contain an explanation of the environmental consequences of the proposed action…shall fully declare the environmental implications of the proposed action and shall discuss all relevant and feasible consequences of the action." Hawai'i Administrative Rules Title 11, Chapter 200-16. The draft EIS, at minimum, shall contain the following:*
>
> 1. *a brief description of the action, including its benefits and impacts;*
> 2. *a statement of purpose and need for the proposed action;*
> 3. *a project description, including a detailed map, a statement of objectives, a description of the environmental, technical, economic, and social characteristics and areas to be affected; use of public lands or funds; phasing and timing; technical data; and historic perspective;*
> 4. *a description of the environmental setting and an analysis of all environmental impacts related to the action, including any irreversible and irretrievable commitments of resources involved;*
> 5. *a description of all mitigation measures considered;*
> 6. *an analysis of reasonable alternatives to the action;*
> 7. *a statement of the relationship of the proposed action to applicable land use plans, policies, and controls;*
> 8. *a summary of unresolved issues; and*
> 9. *agencies, organizations, and individuals consulted and any comments and responses made during the consultation process.*
>
> (Hawaii Administrative Rules Title 11, Chapter 200-17)



In my review of the DEIS and Appendices, I identified numerous problems with the proposals for HDF's dairy operation ("Dairy").

The Introduction of the Appendices written by Group 70 was written in a manner that sounds like marketing literature for rest rotation dairy farming in Hawaii, not a technical document to discuss environmental impacts from the facility. The purpose of the analysis in an EIS is to analyze the technical issues associated with the proposed project and discuss the advantages, disadvantages and impacts to the environment, whether positive or negative. If the opening sections are biased in support of the project, the technical analysis provides a biased look at the project and impacts of the proposal.

Need & Benefit

Group 70 documented the need and benefit section with marketing language describing the rest-rotation grazing scenario as if it is a new concept in Dairy Management. Historically, the small family dairy was operated on a rest-rotation, milk twice-a-day basis. The concept worked very well for a 20-50 herd dairy operated with minimal manpower. However, 699-2000 cow dairies have difficulty operating this way, for reasons described herein and raised elsewhere in Friends of Maha'ulepu's comments.

Environmental Setting

Existing environmental conditions are documented. The main issue with existing conditions is directly related to the contaminated stream downgradient of the proposed Dairy and the conditions of soil, ground water and surface water on the HDF property. The soil type, shallow ground water and mass of manure generated by the Dairy will only exacerbate the bacteria contamination issue, introduce new contaminants into the system and impact the area for years to come even if the Dairy ceases operation in a few years due to poor planning and a poor interpretation of site conditions.

Environmental Impacts

Locating the Dairy in the Maha'ulepu Valley will lead directly to contamination of the shallow ground water, which is drained to surface water through a series of drainage ditches and waterways. The contamination will be a result of the sheer mass and volume of manure and liquid waste generated by the dairy operation and uneven and over-application of manure and chemical fertilizers.

Surface water will be contaminated by runoff in contact with the manure and liquid waste deposited on the ground surface. Each runoff-producing event will result in a flushing of dairy waste from the property, down the Wai'opili stream into the ocean.

Manure will be deposited in the stream sediments, along the banks of the stream and along the beach.

Reasonable Alternatives

There were only 3 alternatives discussed in the document; no action, feed-lot based dairy, and an alternate location. Of the three alternatives, each received a 3 to 4 paragraph discussion on the reason they were not viable. This is insufficient data to accurately analyze these alternatives and many more alternatives exist that were not considered.

Additionally, the no action alternative contemplated up to 2,000 livestock grazing on the site; this is not an activity that is presently happening under baseline conditions. By considering the no action alternative to have 2,000 beef cattle grazing on the property completely bias's this alternative. The no action alternative is to continue to operate as the site operated prior to all the construction activity that has taken place in advance of the Dairy. And, as discussed below, the lack of reliable baseline data makes it difficult to compare the relative impacts of other possible alternatives.

Avoiding Adverse Impacts

Based on Group 70's analysis, they agree that Water Quality (ground water and surface water), Insects, Odor, and Air Quality will be adversely impacted by the development of the dairy. One overriding issue is that once the magnitude of the impact is realized, it will require decades to rectify these problems. As an example, once the fertilizer and manure contaminate ground water beneath the facility, the contaminated ground water will seep and drain into the on-site ditches that were designed specifically for that purpose. The contaminated ground water will supply a constant load of nutrients and other contaminants to the surface water. These contaminants will result in changes to the surface water quality, changes in the vegetation in the area and changes to the organisms living in the stream. The ground water will continue to leach contaminants from the soil and transport them to the stream for many decades, even if the dairy is closed.

Additionally, once manure and dairy waste are deposited on the surface and mixed with the soil, every storm event will mobilize organic matter, nutrients and other waste contaminants from the surface and transport it down the stream to the ocean, depositing this material in the stream sediments and along the beach. Once it is detected, there will be hundreds of millions of pounds of waste spread on the surface of the property and each storm for decades to come will transport the waste down the watershed, again, even after the dairy is closed.

With respect to the other issues, cows in large populations and cow manure causes adverse odors. Even with extensive studies and analysis, they will still cause



and odor that is averse to the area population. The manure storage ponds, sprayed effluent, waste deposited across the fields and where the cows tend to congregate may all be odor sources that are difficult to mitigate.

Areas where cow manure is present create the perfect habitat for fly breeding. A dairy project I studied in the Mojave Desert had fly issues that impacted the residents over 2 miles from the dairy. The fly population and the impact on the nearby residents was terrible and the only corrective measure that alleviated the fly issue was the closing of the dairy. Pesticides or biological solutions failed.

## II. DISCREPANCIES AND INCONSISTENCIES IN THE DEIS

Throughout the document, several items do not agree between the text and the Appendices. First, the document alternates between a 35' and a 50' setback between ditches and waterways and areas where the cows are active (pens and raceways). No technical justification for either setback is provided. It appears that the analysis in the appendices was completed using one set of numbers, then the text was changed to reflect a second set of criteria. Based on our on-site observation, setbacks and other best management practices to prevent stormwater runoff issues are not being practiced during construction, so I am not convinced they will be put into use in the future. It is also unclear whether the "buffered" area will be mowed or irrigated, or how the integrity of this supposedly fenced area will be maintained if a pivot arm must regularly pass through.

Second, the text of the document states that the irrigation pivots are 1000' in diameter (pg. 3-25); however, all figures show approximately 2400' diameter and direct measurement from air photos show about 1600' radius. Obviously, this discrepancy directly effects irrigation water and dairy wastewater application calculations.

Third, the DEIS states that of all the nitrogen and phosphorous that the Dairy waste will contain, only "2% of the nitrogen and 1% of the Phosphorous will be discharged to surface water" (TNRWE pg. 43). This is referred to as a "first order approximation" and there is no technical justification for the statement. It does not appear to be based on any actual or empirical data and, most like represents a gross underestimate of what will be discharged from the Dairy given the inadequate storm water design information and a misrepresentation of ground water conditions at the site.

Fourth, a great level of detail is provided on the lined waste water pond use and construction. Unfortunately, ground water is very shallow in the area excavated for the storage pond and it is impossible to maintain the integrity of a liner if the wastewater level is below the ground water table. The pressure differential causes the liner to bubble and move, ultimately wearing holes in the liner and decreasing the effective life of the liner. Depth to ground water is as shallow as 2 feet on the site and the ground

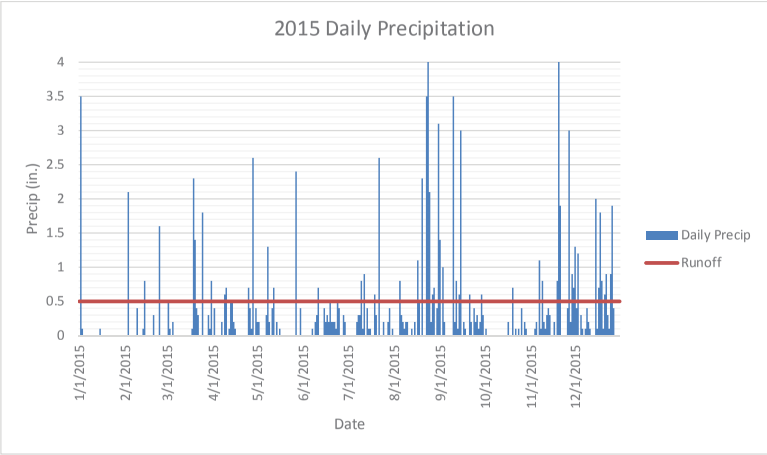
water data and photos of test trenches in the Archeological Impact Survey show direct evidence of the shallow ground water table.

Perhaps, most importantly, Group 70 completed the Nutrient Balance based on precipitation probability stating that "having more than a week of consecutive rain is very unusual for the Maha'ulepu Valley with this only occurring 5 times in the last 30 years" (Appendix B Pg. 11). In this same Document, 2 Appendices further, Mr. Nance summarizes in graphical form the effect of precipitation on ground water elevations, Figure 6 and Figure 7. The graphed data ranges from 11/17/15 to 1/1/16, showing the presence and magnitude of precipitation events during that time period. Coincidentally, during the monitoring period there were two 3-day events, one 11-day event and one 7-day event. This directly conflicts with Group 70's statement and statistic of only 5 seven day events in the last 35 years. As a matter of fact, there were 32 days of rain during a 45-day monitoring period. The facts presented by Mr. Nance cause me to question the analysis by Group 70.

The following graph provides a depiction of the recorded precipitation at the site in 2015. HDF has collected precipitation data since 2012 on the site. These data provide significantly different precipitation characteristics that provided by Group 70, Each year since 2012, the site has had an event that approached or exceeded to 25-year design storm: 12/4/2012 = 9.2", 1/27/13 = 9.1", 12/1/13 = 11.3", 8/23/14 = 16.1", and 11/20/15 = 14". These event represent a storm that would wash manure directly down the creek to the beaches.

In addition, the 2015 graph shows multiple 5 to 11 - day rain events that would produce runoff, limit irrigation and cause significant recharge of ground water.






## III. THE ANALYSIS IN THE DEIS AND ITS APPENDICES IS FLAWED, AND REVEALS MANY PROBLEMS WITH THE PROPOSAL.

Two items indicate that an expert on dairy operations and management has not participated in the design or operation of this facility:

1. If the soil and crop growth is managed with additional irrigation water, cattle grazing and routine cattle movement will become a problem with the clay type soils present on all the Dairy property. If the soil is kept at field capacity or above through precipitation with additional irrigation, it will quickly turn to deep mud with cattle walking through the gates to be milked twice a day. This will result in both damage to the grass crop and impacts to stormwater and runoff from the site.

2. Cows do not and cannot be trained to strategically place manure evenly throughout the paddocks. As a result, an engineering calculation that assumes even manure distribution is in error. Even if the manure was spread with a drag, it would be concentrated near the gate or water troughs where the cows wait to go to the parlor or other areas where the cows may tend to congregate.

In addition, the odor section describes minimum odors and sufficient distance to dissipate odors before contact with humans. We completed an odor survey for a hog

feeding operation in central Montana and it was not the predominant wind or strong winds that caused the problem. It was morning and evenings with calm breeze that transported the odors to private properties with 5 miles of the farm that caused the issue. The residences could not be outside in the morning or the evening, due to the strong, intermittent hog odors and the infestation of flies. This is not something that is easy to predict or calculate, but once it occurs, it is almost impossible to control.

The overall theme of the document is that this is an experimental process. HDF will start with 699 cows and expand to 2000 cows. During that time, crop growth, nutrient balances, soil conditions, ground water and surface water will be monitored to determine when, and at what population of cows, the carrying capacity of the property is exceeded by the waste generated by the Cattle. Unfortunately, when soil, ground water or surface water impacts are detected (breakthrough), the media that is saturated will continue to contaminate the watershed. At the point a problem is detected, it will be too late to quickly remedy the impacts and the watershed will be contaminated for years or decades to come. Here are 3 scenarios that will occur if the Dairy operates in the valley:

1. Ground Water Quality. Discharges from animal waste and chemical fertilizer cause increased nutrient concentration in ground water. Ground water drains to the existing ditches designed specifically to lower the ground water table. Doe to the added irrigation, more ground water twill discharge to surface water than prior to the dairy operation. These impacts discharge directly downstream adding additional compounds to the watershed. Once detected, ground water will continue to seep into the stream causing contamination of the water for decades into the future.

2. Surface Water Quality. Surface water can be contaminated from ground water seepage or direct discharges to surface water such as storm water runoff, irrigation overflow or simple over irrigation of the crop. Once the cows are on-site and animal waste starts to accumulate in the range of 38 to 109 million pounds per year, it is impossible to remove the waste from the site. By the time impacts are detected, a surplus of waste will already be spread throughout the site.

3. Soils Nutrient levels. Once the combination of animal waste and chemical fertilizer exceed the plant uptake, the nutrient move into the soil below root depths and into the shallow water table. Both drainage from ground water into the drainage ditches and runoff from the surface carry elevated levels of contaminates down the watershed and into the ocean. This does not have to be a site-wide issue; it will occur in specific areas of the paddocks where the cows congregate. The nutrients released into the environment cause significant



changes to surface water quality and ultimately the ocean environment where they discharge.

Monitoring water quality and soil nutrient levels is an important aspect of any dairy operation, but those tools can only *detect* problems, they cannot immediately halt problems from persisting.

The Maha' alupu Valley has a fascinating history as an agricultural area of Kauai. The area was a large wetland complex that was drained to promote crop growth and controlled agricultural activity.[1] Large drainage ditches were dug to the depth needed to drain both surface water and ground water from the valley. Leveling, tilling and planting have occurred throughout history.

Currently, ground water discharges to surface water across the site and water quality degradation are evident through the monitoring we completed and concurred by a statement from Mr. Dollar "As water flows through the HDF site, it appears that nutrient concentrations are augmented by input from drainage of surface water that contains some leachate from surrounding lands." (Appendix F pg. 6). If we add the waste leached from an addition of dairy waste and chemical fertilizer to the soil, this input or contamination will greatly increase.

The ground water and surface water data collected as part of the EIS provide clear and direct evidence that:

1. The current ditch system was designed to transmit storm water off the property quickly and efficiently to prevent ponding and crop damage, and

2. The ditch system drains the shallow ground water table to prevent saturation of the crop roots, which would result in poor growth.

These two characteristics, while good for crop farming, are detrimental to a rest-rotation scenario with the waste from 699-2000 dairy cows on the property. The ditches were designed to remove any ponded water to prevent the crops from overwatering and to drop the ground water table below the root depth to prevent plant mortality by constantly or continuously saturated roots. Either condition is not conducive to proper agricultural production.

Based on estimates from The American Society of Agricultural Engineers (ASAE D384.2 MAR2005), dairy cows produce up to 150 pounds of waste per day. That equates to 104,850 to 300,000 pounds of waste per day deposited, spread or sprayed

[1] *See, e.g.,* 1897 map of Maha'ulepu from Kaua'i County Historical Archives identifying a "swamp" at the proposed dairy site, attached hereto as Exhibit A.

on the property every day during the operation of the dairy. Over the course of a year, 38,270,250 to 109,500,000 pounds of dairy waste will be placed on the property.

This dairy waste contains organic matter, nitrates, ammonium, phosphate, potassium, calcium, magnesium, zinc, copper, manganese, chloride, sulfur, and sodium, as well as bacteria, gut microbes, antibiotics and growth hormones. All of these are mobile in the soil, ground water and surface water that comes in contact with the manure and other dairy waste water. The DEIS does not specifically identify the antibiotics and hormones it intends to use, making it impossible to evaluate impacts from surface runoff transporting those pharmaceuticals.

Given the precipitation characteristics of the area, multiple events per year will flush manure and wastewater on the surface down the drainage ditches, through the Wai'opili stream or ditch into the ocean. Large, turbid discharges to the ocean are common and the dairy will only add cow manure, wastewater and bacteria to an already impacted stream.

HDF is proposing to retain a 25-year storm event, based on USGS data. On-site precipitation records indicate that multiple events occur each year that would cause runoff from the property to impact the stream and ocean.

Due to high bacteria counts, the Wai'opili Stream is the topic of many studies with the most recent completed by the Department of Health (DEIS 4-62). The stream shows impacts from bacteria associated with fecal sources. There are several fecal sources in the area, including wastewater treatment sludge disposal facilities within the watershed. One of the Department's conclusions was that the bacteria contamination is from feral animals. While a possibility, this would require a large population of feral animals.

Identifying the specific source or sources of contamination in the watershed would require extensive studies in ground water and surface water and the interaction between the two. This is specifically the problem with siting the Dairy within the watershed; while the cursory level study has been complete, it does not identify the pathways for millions of pounds per year of manure that can impact ground water and surface water and it does not provide any specific preventative measures for preventing extensive contamination of the property and the water that leaves the property to the Pacific Ocean and nearby beaches.

Mr. Nance documented a rapid and immediate response of ground water to precipitation events. With ground water 2' to 4' below the surface, the recharge of ground water is very rapid. Once the Dairy cows are on the property, the soils will contain excess nutrients and contaminants from the manure and wastewater. These nutrient levels will be both much higher and in more mobile forms than are currently present (organic nitrogen vs. nitrate). Soils will be maintained at field capacity or above



to promote plant growth, which is the ideal condition for infiltration, mobilization and transport of contaminants into the ground water system, ultimately draining into the surface water through the ditches designed to drain the soil. This drainage water will supply a constant nutrient, bacteria and contaminant rich discharge to surface water during both high and low water situations and, once the contaminants are in the soils, it will require many decades without the Dairy to remove the contaminants.

Figures 6 and 7 in Mr. Nance's report show a rapid and significant recharge of ground water during and after a 5.5" precipitation event on 11/21/15, followed by several smaller precipitation events that caused additional recharge. Once the precipitation event is over, the ground water elevation in HDF-1, -2, and -3 slowly decrease as ground water drains to the ditches or into the deeper aquifer. After the cows are on the property, this infiltration will carry a constant load of nutrients, bacteria and other introduced chemicals.

Mr. Nance also states that aquifer tests in the deeper well do not show an effect in the shallow ground water table; however, his own data does not support this conclusion. Figure 19 in his report shows a steepening of the curve in HDF-2 during the pump test and Figure 24 shows drawdown in a surface sump during the test, coinciding directly with pumping of a deep well. The shallow ground water both drains to the manmade wetland drainage ditches and moves down to the deeper aquifer. When the shallow aquifer becomes contaminated by animal waste, it will result in contamination of both the surface water and, given sufficient time, the deeper aquifer. The shallow ground water may also pose a problem for the planned animal cemetery, as the burial pits must be dug to a certain depth that protective of both surface and groundwater. It is not clear in the DEIS whether the selected location has been studied to determine that it is a suitable location for the animal cemetery.

Even with questionable assumptions that compare current conditions with 699-2000 cows added to the site, Mr. Nance states "[r]elative to nutrient loads under existing conditions, the potential increase due to operations of HDF are obviously substantial" (Appendix E pg. 43). This statement is echoed by Mr. Dollar "[r]elative to nutrient loads under existing conditions, the potential increase due to operations of the HDF are obviously substantial" (Appendix F pg. 12) The shortfall in this statement is that it is specific to nutrients and does not discuss the other contaminants present in the Dairy wastewater and excreted waste from the herd (organic matter, nitrates, ammonium, phosphate, potassium, calcium, magnesium, zinc, copper, manganese, chloride, sulfur, sodium, bacteria, gut microbes, antibiotics and growth hormones). Potential discharge of contaminants from the site is also much more complex than depicted.

Some of the language in both Mr. Nance and Mr. Dollar's report are word for word similar. One assumption in both analyses that bring the validity of the reports into question is that there will be no increase in ground water discharge due to operations (Dollar pg. 13). The addition of irrigation water to the valley will increase ground water

elevation and result in an increase of ground water discharge to the drainage ditches and water ways on the property. To discount contaminated ground water seepage into the surface water significantly underestimates the potential impact from the dairy to the local environment.

Mr. Nance's report documents current conditions with predictions also based on Mr. Nance's first order approximation. Again, this approximation is not based on a technical analysis of runoff potential. Mr. Nance concludes that there are high concentrations present in the surface water currently, and that the nutrient load from site runoff once cows are present will be 300 to 800 times greater than current levels. Again, he neglects the other contaminants present in dairy and cattle waste. The logic seems to be that the nutrient load is less than the estimated load from other industries, so it is not relevant. However, the "other" sources do not discharge to this area or watershed and with Mr. Nance's estimate of 10 significant runoff events each year, this watershed and beach area will receive significant contamination from the Dairy. Given the precipitation data that I have seen showing multiple events greater than the 25-year, 24-hour average and several multi-day events during the on-site monitoring period, including three major events (12/1/13 = 11.3", 8/23/14 = 16.1", and 11/20/15 = 14"), two of which exceeded the 100-year event., Based solely on these data, Mr. Nance further underestimates the degree of contamination that will likely occur.

The overall position of the technical authors is that the impacts are obvious and substantial, but not compared to other impacts on the island. While this may be true; however, the "other" impacts are mentioned but not scientifically documented or proven in this document, it does not provide technical justification to allow this facility to pollute the ground water, the stormwater, the stream or the ocean. In addition, the other source mentioned do not discharge into the Waiopili stream or the ocean in this location, and none of them discharge storm water containing raw dairy waste or manure.

## IV. STORMWATER SPECIFIC COMMENTS

Paragraph 5 of Section 4.17.2 acknowledges the Hawaii DOH Sanitary Survey that found the Wai'opili Ditch, whose waters originate in and above the HDF site, contain degraded water quality due to elevated nutrients and pathogens. HDF also acknowledges the Sanitary Survey's conclusion that soils containing fecal indicator bacteria (ex., enterococcus) can be transported by precipitation into the stream. What HDF fails to acknowledge; however, is the potential for further and more substantial surface water contamination from storm water runoff under the proposed dairy plan, which would irrigate clayey soils (increasing runoff), and adding 38 to 109 million pounds of manure to the soil every year (increasing the amount of pollutants that can be transported to surface water by precipitation).



Surface water data shows that water quality is impacted as water flows onto and down through the site. The stream is already impacted by elevated bacteria counts, and the only apparent pollutant sources that are causing the high counts at present are decomposing vegetation and small numbers of feral or domesticated animals. The EIS does not acknowledge the added impacts of the waste produced by 699 to 2,000 additional animals to this already polluted ecosystem.

I also completed a technical review of The Hydrologic Assessment for the HDF proposed dairy, which is provided as Appendix K of the Draft EIS. The Assessment was prepared by Group 70 International and contains limited information about the existing hydrologic conditions at the site. The Assessment does not, however, provide anything more than a conceptual plan regarding the proposed hydrologic conditions in the scenario of a working dairy. It lists best management practices (BMPs) that may be implemented to control storm water runoff but does not provide locations, size requirements, or any other design details about how the BMPs will be implemented. These details should be disclosed and properly factored in to an evaluation of the BMPs' ability to mitigate or prevent impacts.

The following paragraphs discuss the ways in which specific sections of the Hydrologic Assessment compare with observations I personally made during WET's inspection of the HDF site in March of 2016.

### Rainfall Intensity

Although no specific storm water design elements are provided in the Hydrologic Assessment, Section 2.7 does state HDF's intentions to use published National Oceanographic and Atmospheric Administration (NOAA) rainfall data as design criteria for sizing Farm-wide storm water improvements. However, HDF has accumulated site-specific daily rainfall totals from 2013 to the present using an on-site rain gauge. Table 1 below lists several NOAA storm event recurrence intervals and durations and their corresponding rainfall totals. Also listed in the table are the number of storm events recorded at the HDF site that exceed a given NOAA event.

Table 1. NOAA 24-hour Rainfall Events Compared With Site-Specific Rainfall Data

| NOAA Storm Event | Rainfall, inches | Documented HDF Storms Exceeding NOAA Event, 12/1/2013 to 6/8/2016 |
|---|---|---|
| 1-year, 24-hour | 3.47 | 17 |
| 2-year, 24-hour | 4.78 | 10 |
| 10-year, 24-hour | 8.18 | 7 |
| 25-year, 24-hour | 10.4 | 3 |
| 50-year, 24-hour | 12.2 | 2 |
| 100-year, 24-hour | 14.1 | 1 |

These site-specific data indicate that actual 24-hour precipitation totals at the site routinely exceed the design storm events HDF intends to use for storm water infrastructure design. For example, a 2-year, 24-hour storm event is defined as a precipitation event with an annual probability of 50%, meaning there is a 50% probability that a storm of this size will occur in a given year. The onsite data indicates that ten such storms occurred in approximately two and a half years, far more than the NOAA data would predict. Similarly, a 10-year storm event is one that has a 10% annual chance of occurring, and a 100-year storm has a 1% annual chance. HDF's onsite weather station recorded seven storm events above the 10-year event in this time period, three of which also exceeded the 25-year threshold. Documentation of three 25-year storms in less than three years indicates that the NOAA values listed may not be applicable to this site, which appears to receive more intense rainfall.

As summarized in the table above, the use of NOAA rainfall data for sizing storm water features at the HDF site may result in undersized infrastructure that is routinely overcome by intense precipitation events. The use of site-specific rainfall data, when available, would be more protective of downstream receptors when sizing storm water improvements at the site. The DEIS should have used this site-specific data for its baseline precipitation calculations.

**Existing Hydrology**

Section 3.5 generally provides an accurate description of the site and the nature of storm water runoff with a few exceptions. First, the use of the term "sheet flow" to describe runoff at the site is inappropriate and may result in underestimating peak flows in drainage ditches conveying stormwater offsite. The steep terrain surrounding the site had numerous small rills, and the network of drainage ditches on the site indicate that sheet flow does not occur at the site, and rather runoff begins as shallow concentrated



flow in small rills, followed by open channel flow in drainage ditches until it discharges to the ocean.

In addition, the Assessment states that storm water run-on originating in the uplands surrounding the site must be considered in storm water design, but that most run-on is captured by cutoff ditches on the uphill side of the farm boundary. The Assessment does not provide any peak flow vs. capacity calculations for these cutoff ditches and therefore does not demonstrate that they capture the majority of storm water running on to the property.

**Section 4.1 Grading and Topography**

This section states that "no grading activities have occurred on site thus far." However, I observed several areas of grading during my site inspection.

In Section 4.2, the Assessment states that soils at the HDF site are severely nutrient deficient, and that the addition of cow manure will actually reduce the quantity and improve the quality of storm water running off the site by establishing grasses used for cow feed. This is contrary to observations I made and data I collected during WETs site inspection. First, our soil test results of eight soil samples collected throughout the site (see Exhibit B) show that significant nutrients are available in the soil, largely in the form of organic nitrogen. Limited nitrate and phosphorus are present within the upper 1 foot of soil simply because the extremely robust vegetation present at the site takes up these nutrients as soon as they become available from decomposing organic matter.

With regard to storm water quality and quantity, it is true that establishing grasses on an otherwise disturbed or thinly vegetated of land can improve storm water quality and quantity. However, I personally observed that the entire site already supports extremely dense vegetation with grasses up to ten feet high in uncultivated areas of the property. The only areas that exhibit bare soils or are lacking in the dense native grasses are those that have been disturbed by construction activities in preparation for the HDF Dairy. The addition of cow manure to this environment would not benefit storm water quality or quantity in any way. Rather, cow manure would constitute a pollutant source to storm water.

The Assessment reiterates this idea in Section 4.4, stating that planting of pasture grasses will improve the vegetation quality from "fair" to "good" regarding pasture's ability to slow down and reduce the quantity of storm water leaving the site. This does not take into account the dense vegetation already present at the site, insinuating instead that the existing conditions at the site are of only "fair" vegetation and depleted soils. In fact, since the pastures will be irrigated under the proposed dairy plan, the soils comprising the pastures will be saturated more often than at present. This will even further increase the quantity of runoff leaving the site.

Also ignored in Section 4.4 are the proposed gravel race ways that will traverse the site in every direction to allow milking cows to travel from farm paddocks to the milking parlor twice per day. These will be similar to gravel roads, will likely be almost completely impervious to infiltration, and will contribute some amount of sediment to storm water, thus further increasing the quantity and further decreasing the quality of runoff.

## V. CONCLUSION

This site has many issues that are problematic for the Dairy: shallow ground water, large storm water events, existing drainage system, clay soils and an impacted stream. The Dairy Plan and the DEIS do not address these issues using sound engineering, hydrologic or hydrogeologic mitigation measures. Instead, the document minimizes the potential impacts by referring to other sources and larger discharges on the Island.

Based on the information provided, the Dairy will experiment with the holding capacity of the property and once contamination is detected, they will continue to operate with that size Dairy herd. At this point, they do not know the holding capacity or production capacity of the property, but are estimating it to be somewhere between 699 and 2,000 lactating dairy cows. According to this document, the point at which contamination is detected means, essentially, once impacts are detected in the stream. At that point, remediation of those impacts is nearly impossible and will require decades to remedy, after the Dairy ceases operation, if possible. At that point, considerable resources will be required to fix the problem.

If the shallow ground water is contaminated with nutrients or other contaminants contained in Dairy waste, it will continue to drain and seep into the drainage ditches as a constant load, ending up running down the stream to the ocean.

If storm water runoff leaves the site, it will carry manure and other wastes down the stream to the ocean. In this form, it will be detected as both chemical contamination and visual organic matter along the stream and at the beach.

The DEIS based its conclusions and impacts analysis on flawed and incomplete data. The conclusions vacillate between it is already contaminated and not used for any purpose to the impacts are less than areas of Kauai that are already contaminated to it will be substantial but not that bad. Even so, it is clear from the data that do exist that if the Dairy were to operate as planned, contamination of water resources is a near certainty and will pose a significant technical challenge and considerable expense to repair and to remediate.



**REFERENCES**:

*Designing with Geosynthetics*, 6th edition, Koerner, 2012.

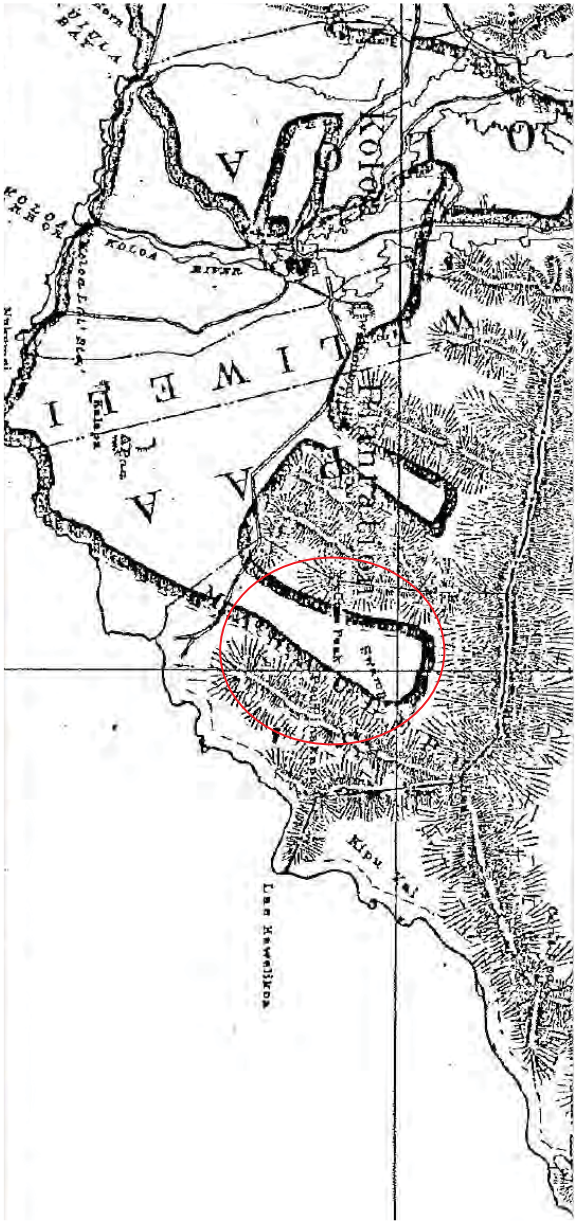
GSE Design Guidance Documents

Prepared By:

David J. Erickson PG CPG

Steven Nicholls PE

Exhibit A, Historical Map



# LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

**Client:** Water and Environmental Technologies
**Project:** CAFO MO2
**Workorder:** H16040068

**Report Date:** 04/15/16
**Date Received:** 04/05/16

| | | Analysis | | Moisture | Sand | Silt | Clay | Texture | pH-SatPst | COND-SatPst | Ca-SatPst-Sat Paste | Mg-SatPst-Sat Paste | Na-SatPst-Sat Paste | SAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Units | | wt% | % | % | % | | s_u_ | mmhos/cm | meq/L | meq/L | meq/L | unitless |
| **Sample ID** | **Client Sample ID** | **Up** | **Low** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** |
| H16040068-001 | SS-05 | 0 | 0 | 27.7 | < 1 | 40 | 60 | C | 7.8 | 0.4 | 1.65 | 0.84 | 1.08 | 1.0 |
| H16040068-002 | SS-06 | 0 | 0 | 24.7 | 5 | 36 | 59 | C | 7.8 | 0.4 | 2.08 | 0.70 | 0.56 | 0.5 |
| H16040068-003 | SS-07 | 0 | 0 | 28.0 | 8 | 38 | 54 | C | 7.0 | 0.6 | 2.47 | 1.60 | 1.03 | 0.7 |
| H16040068-004 | SS-08 | 0 | 0 | 26.8 | 4 | 37 | 59 | C | 5.6 | 0.3 | 0.63 | 0.58 | 0.76 | 1.0 |

Exhibit B. Soil Analytical Results.

# LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

**Client:** Water and Environmental Technologies
**Project:** CAFO MO2
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**Report Date:** 04/15/16
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Units | | wt% | % | % | % | | s_u_ | mmhos/cm | meq/L | meq/L | meq/L | unitless |
| **Sample ID** | **Client Sample ID** | **Up** | **Low** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** | **Results** |
| H16040067-001 | SS-01 | 0 | 0 | 29.5 | 2 | 22 | 76 | C | 5.0 | 0.5 | 0.65 | 0.64 | 3.45 | 4.3 |
| H16040067-002 | SS-02 | 0 | 0 | 26.5 | 9 | 41 | 50 | SiC | 6.0 | 0.3 | 0.65 | 0.82 | 0.84 | 1.0 |
| H16040067-003 | SS-03 | 0 | 0 | 24.7 | 6 | 39 | 55 | C | 6.0 | 0.2 | 0.62 | 0.63 | 0.67 | 0.8 |
| H16040067-004 | SS-04 | 0 | 0 | 28.6 | 6 | 34 | 60 | C | 6.1 | 0.2 | 0.63 | 0.52 | 0.90 | 1.2 |

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# LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

**Client:** Water and Environmental Technologies
**Project:** CAFO MO2
**Workorder:** H16040068

**Report Date:** 04/15/16
**Date Received:** 04/05/16

| | | Analysis | | Cl-SatPst | Olsen Phos-Olsen | Ammonia as N, KCL | NO3 | TKN |
|---|---|---|---|---|---|---|---|---|
| | | Units | | meq/L | mg/kg | mg/kg | mg/kg | mg/kg |
| **Sample ID** | **Client Sample ID** | **Up** | **Low** | **Results** | **Results** | **Results** | **Results** | **Results** |
| H16040068-001 | SS-05 | 0 | 0 | 0.84 | 8 | 0.7 | 15 | 1520 |
| H16040068-002 | SS-06 | 0 | 0 | 0.63 | 4 | 1.2 | < 1 | 2070 |
| H16040068-003 | SS-07 | 0 | 0 | 1.68 | 11 | 1.1 | 3 | 2640 |
| H16040068-004 | SS-08 | 0 | 0 | 0.76 | 2 | 1.5 | < 1 | 1660 |

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Prepared by Helena, MT Branch

**Client:** Water and Environmental Technologies
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**Report Date:** 04/15/16
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| | | Analysis | | Cl-SatPst | Olsen Phos-Olsen | Ammonia as N, KCL | NO3 | TKN |
|---|---|---|---|---|---|---|---|---|
| | | Units | | meq/L | mg/kg | mg/kg | mg/kg | mg/kg |
| **Sample ID** | **Client Sample ID** | **Up** | **Low** | **Results** | **Results** | **Results** | **Results** | **Results** |
| H16040067-001 | SS-01 | 0 | 0 | 0.88 | < 1 | 1.5 | < 1 | 1430 |
| H16040067-002 | SS-02 | 0 | 0 | 0.46 | 2 | 2.1 | 3 | 2860 |
| H16040067-003 | SS-03 | 0 | 0 | 0.79 | 1 | 2.4 | 2 | 2470 |
| H16040067-004 | SS-04 | 0 | 0 | 0.59 | 2 | 4.7 | 9 | 3080 |

# Appendix 4

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Greenfield Advisors
Economic, Market and Valuation Analysts

# Economic and Valuation Impacts of a Proposed Concentrated Animal Operation on Kaua'i

John A. Kilpatrick, Ph.D., MAI, FRICS

July 25, 2016



## 1. Introduction

I am John A. Kilpatrick, Ph.D., MAI, FRICS, Chairman and Co-Managing Director of Greenfield Advisors, a boutique consulting firm specializing in complex real estate and related issues. More specifically, I have authored the two authoritative articles on the valuation impacts of concentrated animal operations which appeared in 2001 and 2015 in *The Appraisal Journal*, the peer-reviewed, official publication of the Appraisal Institute. A synopsis of my professional qualifications is attached to this document as an appendix.

I have been asked by the Friends of Maha'ulepu to evaluate the impacts of the proposed concentrated dairy cattle operation on surrounding property values and on the overall economy of Kaua'i. My evaluation is based on my professional experience as an appraiser and an economist, on the salient scholarly literature and other professional studies on this subject, my personal inspections of the areas to be affected by the CAFO[1], my interviews with residents of the island, and on salient economic theory and practice. It is my professional determination that:

- Properties downwind of this proposed facility, and particularly properties between the facility and the shoreline, will be diminished in value by 50% or more.
- The remainder of the island, and its residents, will feel additional negative economic impacts as a result of the damage to the Kaua'i tax base, loss of jobs (particularly in the tourism industry), increased public sector costs, and opportunity costs arising from the pollution of natural resources.

The remainder of this report outlines and summarizes the basis for these findings.

## 2. Background

Hawai'i Dairy Farms (HDF) proposes to construct a concentrated animal feeding operation (CAFO) on a 557-acre[2] portion of TMK (4)2-9-003:001 in Maha'ulepu Valley. I have been informed that initially,

[1] Code of Federal Regulation, 40 C.F.R. §122.23 defines Animal Feeding Operations ("AFO") and also defines Concentrated Animal Feeding Operations ("CAFO"). As set forth in 40 CFR §122.23(b)(2) CAFO means an AFO that is defined as a Large CAFO or as a Medium CAFO by the terms of §122.23 §122.23(b)(4) Large concentrated animal feeding operation ("Large CAFO"). (i) 700 mature dairy cows, whether milked or dry; §122.23(b)(6) Medium concentrated animal feeding operation ("Medium CAFO"). (A) 200 to 699 mature dairy cows, whether milked or dry;

[2] I note that the property size appears to have changed slightly from the original proposed size of 578 acres.

the CAFO will be stocked with 699 pregnant dairy cows.[3] Within several weeks, these cows will give birth, nominally doubling the size of the herd. At an undisclosed time, presumably in the near future after that, the herd will max-out at 2,000 head[4]. Pennsylvania State University estimates that cattle of this size will produce in excess of 100 pounds of manure per cow per day.[5] I have seen estimates, apparently part of the permit filings for this CAFO, placing the total at between 75 and 150 pounds per cow per day. Thus, at full capacity, this proposed CAFO will produce about 100 tons of manure per day, or over 35,000 *tons* of manure per year. In my studies of CAFOs, I've found that this manure concentration leads to problems with odors, airborne and waterborne pollution, and insects and other pests. Naturally, property values in affected areas diminish, as the use and enjoyment of properties decrease and marketability of these properties decrease as well. Local businesses and thus the local tax base and economy also suffer.

Hrarber and Schultz (2010), writing for the National Association of Local Boards of Health, note that CAFOs were known pollution problems as far back as the 1972 Clean Water Act. This act identified CAFOs (called "feedlots") as "point sources" for pollution along with other industries, such as fertilizer manufacturing. Consequently, a permit program entitled the National Pollutant Discharge Elimination System ("NPDES") was created which set effluent limitation guidelines and standards for CAFOs. CAFOs have been regulated by NPDES or a state equivalent since the mid-1970s.[6]

According to the EPA, a dairy cattle operation of this size[7] is automatically considered in the largest category of concentrated animal feeding operations, and is thus automatically regulated under the Clean Water Act. Burkholder, et al., (2006), writing in the journal *Environmental Health Perspectives,* note the numerous public health and environmental risks associated with these facilities. While I am not an environmental scientist *per se*, a physical scientist, or a physician, I am aware of and familiar with these environmental and epidemiological concerns as a function of my real estate consulting practice. In short, these concerns have significant impacts on real estate markets, and thus on real estate values, and by extension on local economies[8]. These impacts include, but are not limited to, pathogens, veterinary

[3] Readers familiar with CAFO regulation will note that this number is apparently not random – it is exactly one cow lower than the threshold for a "LARGE CAFO," which would automatically be regulated under the Clean Water Act. However, as these cows will all be pregnant, this advantage quickly dissipates.
[4] See letter from Group 70 International to State Department of Health dated May 25, 2016.
[5] "Average daily production and total content of manure", Pennsylvania State University College of Agricultural Sciences, 2016
[6] Hribar, Carrie, and Mark Schultz, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities* (Bowling Green, OH: National Association of Local Boards of Health, 2010).
[7] 700 head of cattle or above; I understand that HDF has committed to a herd size of at least 699, but is anticipating expansion to 2,000 cows.
[8] Burkholder, JoAnn, Bob Libra, Peter Weyer, Susan Heathcote, Dana Kolpin, Peter Thorne, and Michael Wichman, "Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality," *Environmental Health Perspectives* 115-2, February, 2007, 308-312.



pharmaceuticals, heavy metals, hormones, pesticides, and nutrient-contaminants such as nitrogen and phosphorus. Burkholder, et al. are particularly critical of the impact of these substances on surrounding, adjacent, and proximate water sources, such as waterways, groundwater, water used for nearby agriculture or native crop/animal life, and aquifers. They note:

> *The impacts from CAFO pollutant loadings to direct runoff are more substantial after such major effluent spills or when CAFOs are flooded and in direct contact with surface waters... Although the acute impacts are often clearly visible—dead fish floating on the water surface, or algal overgrowth and rotting biomass—the chronic, insidious, long-term impacts of commonly accepted practices of CAFO waste management on receiving aquatic ecosystems are also significant…*

Indeed, even the Union of Concerned Scientists have weighed in on the negative local impacts of CAFOs. They detail that manure can cause the death of aquatic plant life that robs the marine environments of the oxygen that fish and many other aquatic organisms need to survive. They estimate that manure run-off from CAFOs contributes about 15 percent of the nutrient pollution that reaches the Gulf of Mexico…

> *…where a large "dead zone"—devoid of fish and commercially important seafood such as shrimp—has developed. CAFO manure also contributes to similar dead zones in the Chesapeake Bay (another important source of fish and shellfish) and other important estuaries along the East Coast. The Chesapeake Bay's blue crab industry, which had a dockside value of about $52 million in 2002, has declined drastically in recent years along with other important catches such as striped bass, partly due to the decline in water quality caused in part by CAFOs.*[9]

They also detail the air pollution problem from CAFOs, noting that ammonia, a respiratory irritant, can combine with other air pollutants to form fine particulate matter leading to respiratory disease. Ammonia is also re-deposited onto the ground nearby, potentially impacting biodiversity. Ammonium ion deposition also contributes to the acidification of some forest soils. This ammonia may exceed the capacity of forests and other environments to absorb it, leading to harm to these surrounding forests.

[9] Gurian-Sherman, Doug, *CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations*, Union of Concerned Scientists, April, 2008.

The scientists also found that CAFO manure run-off pollutes nearby drinking water wells. One study in Missouri found pollution from CAFOs in 42% of the tested wells. U.S. Geological Survey testing found animal waste pollution in drinking water wells in Oklahoma.

Weida (2004) finds that all of this leads to negative economic impacts on nearby property values and the surrounding community. He found that CAFOs lead to reduced property values, fewer jobs, smaller tax base, increased taxpayer-borne expenses such as road repair, and lower or absent economic multiplier effects.[10] Chism and Levins (1994) support this, and specifically found that small farms (that is, farms with gross incomes of $100,000 or less) make 95% of their expenditures locally. However, large farms (those making more than $100,000 per year) spend less than 20% locally.[11]

I have inspected these affected areas twice in recent years. First, I appraised all of the Grove Farm properties in 2008 subsequent to the recent transfer of ownership of this entity. Thus, I inspected every portion of the Grove Farm holdings, including the area designated for this CAFO. Second, from July 13 – 17, I re-inspected the affected area, gave a talk at the community center, met with several public officials including Mayor Bernard J. Carvalho, Jr. and three councilmembers, and met with numerous local property owners.

## 3. Property Valuation Basics

Animal feeding operations such as this one affect the value of proximate properties in two ways. First, AFOs have a substantial indirect negative impact on surrounding communities, which would include property values in those communities, via shifts in sources of purchases and other inputs in the factors of production[12]. Gomez and Zhang (2000) studied 1106 rural communities and concluded that economic growth rates in communities with conventional farming were 55% higher than in those with AFOs. They note that conventional farmers buy most or all of their supplies locally, thus stimulating the local community and, by extension, stimulating the local real estate market. On the other hand, AFOs bypass local retailers and import the factors of production. AFOs exacerbate the economic negative impact by "importing" large quantities of pollution and the attendant costs. They determined that AFOs were responsible for "...disruption of local social and economic systems, pollution problems resulting from

[10] Weida, W.J., *The CAFO: Implications for rural economies in the US.* Global Resource Action Center for the Environment (GRACE), 2004.
[11] Chism, J.W., and R.A. Levins. 1994. Farm spending and local selling: How do they match up? *Minnesota Agricultural Economist* 676:1–4.
[12] Miguel Gomez and Liying Zhang, "Impacts of Concentration in Hog Production on Economic Growth in Rural Illinois", (Illinois State U. working paper presented to the American Agricultural Economics Association, July, 2000).



intensive agriculture, and negative impacts on the quality of life in rural communities." Hence, local communities suffer the negative economic byproducts without the attendant economic benefits.

Second, at the individual residential appraisal level, the AFO is viewed by market participants as a negative externality. As an externality, it is not typically considered to be economically "curable" under generally accepted appraisal theory and practice. Hence, the value diminution of a property attributable to proximate location of an AFO can be attributed to stigma.

### 3.1 A primer on property values.

Some of this may appear obvious to readers familiar with home ownership and enjoyment of property rights, but it provides the basis for any consideration of property value diminution. From an economic perspective, the rights enjoyed by a fee-simple owner fall into three categories:

1. Right of use
2. Right of exclusion, and
3. Right of transfer[13]

It is important to note that in the United States, property itself is not "owned," but rather the rights of the property are owned (Demsetz, 1967, Alchien and Demsetz, 1973). The ability to delineate these rights, and the ability of owners to transfer some or all of these rights voluntarily is a necessary condition for property valuation.

The first of these, the right of use, is generally interpreted to mean that the owner may determine how property will be used, or if it is to be used at all. The right of use is traditionally limited in western culture by both public restrictions (e.g. -- eminent domain, police power) and private restrictions (e.g. -- liens, mortgages). Private restrictions are generally voluntary, and property owners willingly submit to the disutility of such restrictions in trade for some other economic benefit. For example, a property owner will issue a mortgage to a lender in trade for leverage in the purchase. Also, a homeowner will purchase in a subdivision with covenants and restrictions in trade for the assurance of uniform property use within the neighborhood. It is noteworthy to stress that the voluntary acceptance of private restrictions is always in trade for some economic compensation. Impairment places a restriction on the right of use without

[13] While delineated in one fashion or another in many texts, this specific wording derives from Jaffee, Austin J. and Demetrios Louziotis, Jr., "Property Rights and Economic Efficiency", Journal of Real Estate Literature 4, July, 1996, pg. 137-162.

some economic compensation. This is illustrated in potential restrictions which may be placed on the use of real estate due to a physical impairment and which can thus limit the property to something less than its highest and best use.

The right of exclusion -- often called the right of exclusive use or right of exclusive enjoyment -- provides that those who have no claim on property should not gain economic benefit from enjoyment of the property. In other words, the right of use is exclusive to the property owner, and any violation of the right of exclusive use typically carries either payment of compensation to the rightful owner or assessment of a penalty. For example, if "A" trespasses on land owned by "B," then "A" will be guilty of a crime and a possible criminal penalty may be in order, as well as civil damages. Physical impairment by a third party is, in effect, a trespass on property rights, violating the right of exclusion.

Society places a high value on the right of exclusion, for justifiable reasons. Exclusion provides that both the current benefits of ownership as well as future benefits accrue only to the rightful owner, and his/her successors and assigns. In the absence of exclusion, the right of use is under constant threat of nullification without just compensation. In an economy without the right of exclusion, property owners would adopt short-term strategies for use, rather than long-term strategies. In an economic sense, this would lead to widespread inefficiency in the allocation of resources. Hence, the right of exclusion carries with it a significant societal good (Snare, 1992), and thus a significant societally-recognized value (Stigler, 1992).

Finally, the right of transfer provides the owner with the ability to swap one resource for another. An impairment restricts the right of transfer, and may in fact destroy the right of transfer altogether.

Real estate economics – and appraisal practice – uniformly recognizes that contamination has a negative impact on property values. Indeed, appraisers are required by the Uniform Standards of Professional Appraisal Practice to consider the impacts of such contamination in the value estimation process.[14]

Fitchen (1989) was one of the first to look at the value of the rights of a property owner in the face of impairment – in this case, a toxic chemical pollution. As an anthropologist and a Professor of

[14] This is specifically covered under USPAP Rule 1-2(e). An appraiser may not fail to take physical disutility into account, except through a totally fictional hypothetical condition, the impact of which must be disclosed under USPAP Rule 2-1(c). A thorough discussion of the appraiser's responsibility is also contained in Eaton, J.D., Real Estate Valuation in Litigation (Chicago: The Appraisal Institute, 1995). For specific references, see pages 128, 129, 149-54, and 235-37. It is clear that an appraisal of a residence which fails to account for a physical deficiency such as a failure in the siding would violate the Uniform Standards. As of this writing, all 50 states have adopted these standards or standards consistent with this language as a matter of law or regulation. In addition, adherence to these standards is mandatory for all federally-insured mortgage transactions.



Anthropology at Ithaca College, she looked principally at residential values, and not only at the real aspects of "violation of the home" by contamination (e.g. – carcinogenic effects of polluting chemicals) but also the symbolic interference on what she called "…a threat to the assumptions people have about themselves and the way life is supposed to be.[15]" She continued, "Toxic contamination also attacks the valued institution of homeownership, violating many of the rights that are assumed to flow from the ownership of ones home, including the assumed right to control entry to it….chemical contamination may affect homeowners more seriously than renters, not only in terms of potential financial loss, but also in terms of devaluation of the achieved status of homeowners."

Edelstein (1986) also dealt with this "home" theme, and he called impairment to or near a residence an "…inversion of home…" when "…the previous locus of family security and identity becomes instead a place of danger and defilement." He builds on previous works, such as Perin (1977) and Altman and Chemers (1980), who show the very special place the home has in American society, culture, and economics. To quote Perin (1977, pg 129): "Not being a nation of shopkeepers, America is one of homeowners, busily investing in plant maintenance and expansion with both money and time, keeping the product attractive for both use and sale.[16]"

Edelstein (1986) specifically stressed the investment diminution aspect of the inversion of home principle. In citing case studies of experiences following neighborhood-wide impairment in the Legler section of Jackson Township in southern New Jersey, he showed that residents could not separate the psychological pride in home ownership from the question of economic value. Surveys of the population found uniformity of opinion that property values had diminished as a result of the problem. While previous studies had focused on the diminution of value from existing homes, Edelstein (1986) was one of the first to focus on the opportunity costs stemming from the inability to move. In short, homeowners were stuck holding unsellable homes with stagnant prices, while homes in other neighborhoods were soaring in value. Thus, the owners were harmed not only by the diminution of value in the existing residences, but by the opportunity costs inherent in lost gains from alternative home investments[17].

Edelstein (1986) referred in a general sense to the issue of ***stigma*** as a mechanism for manifestation of value diminution in residential property. Stigma is an increasingly common term in the appraisal and real estate economics literature, and refers in fact to a very specific quantitative mechanism by which value is impacted by proximate contamination or negative externalities.

[15] Fitchen, Janet M., 1989, "When Toxic Chemicals Pollute Residential Environments: the Cultural Meanings of Home and Home Ownership", *Human Organization* 48-4, 313-324.
[16] Perin, Constance, *Everything in Its Place: Social Order and Land Use in America*, (Princeton, NJ: Princeton U. Press, 1977)
[17] Edelstein, Michael R., 1986, "Toxic Exposure and the Inversion of the Home", *J. Architectural Planning Research* 3, 237-251.

The earliest references to stigma as a quantitative concept in real estate economics appears to be in the writings of Patchin (1991) and Mundy (1992). This latter study differentiated between the costs to cure and stigma. The former is an out-of-pocket expense born by either the property owner or some other responsible party, while the latter manifests in property value diminution even in the absence of a cost to cure. For example, a property which is completely cured may continue to suffer a diminution in value, and hence damages, as a result of stigma.

Kilpatrick, et al., (1999) outlined the quantitative model by which the value of income producing property is reduced by stigma effects, which are manifested via increases in market driven capitalization rates. He outlined four components of income producing property value impacts: Net Operating Income, actual Cost-to-Cure, Ongoing Increases in Maintenance, and Stigma. In his model, the stigma losses actually overwhelm the other three factors as a component of value diminution. He concluded that, under many circumstances, the stigma impacts are actually the greater portion of value losses to property owners[18].

The valuation literature on the impact of air quality on residential property values traces its origins to Ridker and Henning (1967), who used 1960 Census information in St. Louis and measures of both sulfation and suspended particulates to show a direct correlation between poor air quality and property value diminution. In the wake of their groundbreaking hedonic study, the consensus of studies has shown this causal relationship[19].

Deyek and Smith (1974) studied 100 metropolitan areas using 1970 Census data and compared housing values with air pollution. They found a statistically significant relationship between housing values and air pollution across the U.S. Harrison and Rubinfield (1978) examined owner-specific house values in Boston against $NO_2$ levels and found highly statistically significant value diminution[20]. Nelson (1978) examined median property values by census tract in Washington, DC, against particulate and oxidant concentration, again finding statistically significant value diminution[21].

Li and Brown (1980) examined sales prices in suburban Boston towns relative to sulfur dioxide and total suspended particles, and found statistically significant diminution[22]. Murdoch and Thayer (1988)

[18] Kilpatrick, John, Douglas Brown, and Ronald Rogers, ""Performance of Exterior Insulation Finish Systems," *Appraisal Journal*, January 1999
[19] Ridker, Ronald G., and John A. Henning, 1967, "The Determinants of Residential Property Values with Special Reference to Air Pollution, *The Review of Economics and Statistics* 49-2, 246-257
[20] Harrison, David, and Daniel rubenfeld, 1978, "Hedonic Housing Prices and the Demand for Clean Air", *J. Environmental Economics and Management* 5, 81-102.
[21] Nelson, Jon P., 1978, "Residential Choice, Hedonic Prices, and the Demand for Urban Air Quality", *J. Urban Economics* 5, 357-369
[22] Li, M., and J. J. Brown, 1980, "Micro-Neighborhood Externalities and Hedonic Housing Prices", *Land Economics* 56-2, 125-141.



used 1979 sales data from California and found property value diminution from a variety of air quality issues[23]. Zabel and Kiel (2000) studied nitrogen dioxide and sulfur dioxide in four different urban areas, and consistently found negative property value diminution.

Kiel and Boyle (2001) noted that the most significant air quality studies are those which measure impacts which are important to homeowners. In other words, air quality issues which directly impact homeowners' enjoyment of their property will have a measurable, direct, and statistically significant impact on property values[24].

### 3.2 Pollution Impacts on Nearby Property

Data from the U.S. Department of Agriculture (USDA) and the EPA estimate that livestock in the U.S. produce 130 times the total amount of manure as the entire human population of the country. For example, according to the EPA, one large dairy cow excretes nearly 95 pounds of waste per day. According to a 307 page study by the EPA, published in 2012, their evaluation of the nitrate impact on drinking water wells in the Lower Yakima Valley concluded that 700 mature dairy cows produce a daily waste equivalent to a city of 115,000 people.[25] A 2,000-cow factory will thus produce about 95 tons of raw manure a day. This manure contains large amounts of nitrogen gas, phosphorus pentoxide (a powerful irritant and corrosive) and potassium oxide, a highly reactive deliquescent that reacts violently with water to produce potassium hydroxide.[26]

Reportedly, spills from such AFOs have killed fish in several states; excessive levels of phosphorus in land and water have been correlated with livestock density; and manure has caused eutrophication and degradation of U.S. waterways.[27] CAFOs are generally recognized to affect the surrounding environment in several key ways: air quality and odors (ammonia, hydrogen sulfide, methane, and particulate matter), greenhouse gas and climate change, insect vectors (often carrying resistant strains of pathogens), groundwater and surface water contamination, and a variety of pathogens.[28]

[23] Murdoch, J. and M. Thayer, 1988, "Hedonic Price Estimation of Variable Urban Air Quality", *J. Environmental Economics and Management* 15, 143-146.
[24] Kiel, K., and M. Boyle, 2001, "A Survey of House Price Hedonic Studies of the Impact of Environmental Externalities", *J. Real Estate Literature* 9-2, 117-144
[25] U.S. EPA Region 10 September 2012, EPA-910-R-12-003, pg 32.
[26] Tao, Jing, and Karen Mancel, "Estimating Manure Production, Storage Size, and Land Application Area", Ohio State University, 2008 Agricultural Fact Sheet.
[27] Jann, Stephen, "Recent Developments in Water Pollution Control Strategies and Regulations", a talk presented at the ABA's Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, Minneapolis, MN, May 12, 1999.
[28] Hribar, Carrie, Understanding Concentrated Animal Feeding Operations and Their Impact on Communities, National Association of Local Boards of Health, 2010.

On September 15, 2006, the U.S. Food and Drug Administration (FDA) issued a press release informing consumers of an outbreak of E. coli 0157:H7 that began between August 26 and September 12, and was associated with the consumption of fresh spinach. By October 10, there had been 199 reported cases of infection related to this outbreak in 26 states including 31 cases of Hemolytic Uremic Syndrome, 102 hospitalizations and 3 deaths. This stimulated national recalls of fresh-bagged spinach for products either bagged by or purchased from Natural Selection Foods, LLC of San Juan Batista, California. The spinach implicated in the outbreak was grown in the Salinas Valley region of California, which is located 100 miles south of San Francisco Bay Area.[29]

The FDA released a guide to minimizing Microbial Hazards in 1998, and lists potential sources of this type of contamination including: agricultural water, wild or domestic animals, worker hygiene, production environment (use of manure, previous or adjacent land use), and sanitation of facilities and equipment.[30] An *L.A. Times* article concerning the outbreak stated that growers do not draw water from the local surface water source for agriculture use because they are known to be contaminated from AFOs. The Centers for Disease Control, the California Department of Health Services, and the FDA finally traced the source of the contamination to cow manure.[31]

One of the leading causes of food and waterborne illness in the United States is this E. coli 0157:H7 organism. The E. coli 0157:H7 is a specific strain of the Escherichia coli bacteria, and it can commonly be found in the intestines of healthy cattle. One of the common means of transfer to humans is when untreated manure is able to enter water sources or used for fertilization.[32] AFOs are regarded as potential sources for contamination because of the large amounts of manure that they produce, and the proximity in which the animals are confined allows for disease to be easily transferred.[33] Spillage of animal waste may occur as a result of flooding, leeching into the soil, or through disregard of regulations.

[29] "FDA Announces Findings from Investigation of Foodborne E. coli 0157:H7 Outbreak in Spinach U.S. Food & Drug Administration. 2 Oct. 2006, <http://www.fda.gov/bbs/topics/NEWS/2006/NEW01474.html>.
[30] "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables." U.S. Food & Drug Administration 28 Sept. 2006, < http://www.cfsan.fda.gov/~dms/prodguid.html>.
[31] "Tainted spinach tied to cattle ranch," Los Angeles Times, March 24, 2007
[32] "Disease Listing, Escherichia Coli 0157:H7, Gen Info" Center for Disease Control & Prevention 2 Oct. 2006 <http://www.cdc.gov/ncidod/dbmd/diseaseinfo/escherichiacoli_g.htm>
[33] "National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal feeding Operations (CAFOs); Final Rule" Federal Resister 68 (12 February 2003)



Because the trend toward CAFOs has been so rapid and pronounced in the U.S., federal and state laws have some gaps. In addition to water quality issues resulting from manure and waste run-off, these facilities attract flies and other insects and then other pests that parasitize the insects.[34]

Ikerd (1998) notes, "Piling up too much 'stuff' in one place causes problems." Writing about hog CAFOs, he goes on to say, "If you spread out the hogs and let hog manure lay where it falls in a pasture, it doesn't bother anyone very much. But if you start collecting it, flushing it, spreading and spraying it around – all normal practices in confinement hog operations – it becomes air pollution."[35]

As a result of these problems, many states have enacted restrictions on permitting. For example, in 1997 the legislature of typically livestock-friendly Oklahoma mandated setbacks and other pollution controls, and in 1998 that legislature enacted a moratorium on new livestock permits.[36] Kansas, another typically agriculture-friendly state, recently enacted a moratorium on CAFOs and even considered legislation to end CAFOs.[37] In 1998, the North Carolina legislature – the home of CAFOs and faced with unregulated establishment of CAFOs in that state -- enacted House Bill 1480, which mandated the registration of growers for integrators, extended a moratorium, and mandated substantial elimination of both atmospheric emission of ammonia as well as odor beyond the boundary of existing AFOs.[38] Minnesota had enacted similar odor control legislation in 1997, and established both a complaint control protocol and an enforcement response protocol specific to AFOs.[39]

In 2000 – 2001, the U.S. Environmental Protection Agency began levying fines against concentrated beef production facilities in the Northwestern U.S. which met two criteria: the facility confined animals for at least 45 non-consecutive days per year and the confinement area was devoid of

[34] "Concentrated Animal Feeding Operations – Resources for Environmental Responsibility", working paper prepared by Smith-Comeskey Ground Water Sciences, April 1, 2000. See http://www.groundwatersystems.com/agwaste.html for more details.
[35] Ikerd, John "Social, Econmoic, and Cultural Impacts of Large-Scale, Confinement Animal Feeding Operations." Working Paper, University of Missouri, 1998
[36] Stephens, Michelle, "NGO and Grassroots Perspectives and Action", a talk presented at the ABA's Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, Minneapolis, MN, May 12, 1999
[37] Myers, Roger, "Graves May Lift Licensing Ban on Large-Scale Hog Farming", The Topeka Kansas Journal, Saturday, January 24, 1998
[38] Williams, C. Mike, "CAFO Odor Control Options", North Carolina State University unpublished working paper presented at the ABA's Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, September 23, 1999.
[39] Sullivan, Mike, "Minnesota's Program Regarding Hydrogen Sulfide Emissions from CAFOs", Minnesota Pollution Control Agency unpublished working paper presented at the ABA's Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, September 23, 1999.

vegetation. The rules generally applied to any operation with 300 head of cattle or more. At the time of the regulations, the EPA estimated that this would affect between 26,000 and 39,000 AFOs in the U.S.[40]

### 3.3 Empirical Evidence from the Appraisal Literature

The diminution in property values was reinforced by Kim and Goldsmith (2008), who analyzed property values of 2,155 homes located within 3 miles of an AFO in North Carolina. The principle focus of their study was on spatial hedonics, and within a three-mile area, they found the average impact to be *negative* 18%. At one mile, the impact was *negative* 23.5%.[41] Note that their study did not take into account wind patterns. Thus, properties at three-miles up-wind of the facility were averaged with properties three-miles down-wind.

Kuethe and Keeney (2012) find that the negative impacts of AFOs are comparable to those generated by industrial waste, solid waste, and septic waste facilities.[42] They focused on airborne-related problems, and noted that odor is a particular source of nuisance, and higher valued residences are more severely impacted.

The odor and airborne particulate issues have been explored by two studies in Iowa (2002) and two in North Carolina. The first North Carolina study, Schiffman, et al. (1995) reported emotional impacts (tension, depression, anger, reduced vigor, fatigue, and confusion) linked to airborne contamination emanating from an AFO.[43] The second North Carolina study, Wing and Wolf (2000), reported increased incidences of headache, runny nose, sore throat, excessive coughing, diarrhea, burning eyes, and "reduced quality of life."[44] The first Iowa study, Thu, et al. (1997), found increases in eye and upper respiratory problems among those living within 2 miles of an AFO.[45] Again, this does not take into account

[40] Steward, Peggy, "Cattlemen Find CAFO Rules Confusing", Capital Press Agricultural Weekly, March 9, 2001.
[41] Jungik Kim and Peter Goldsmith, "A Spatial Hedonic Approach to Assess the Impact of Swine Production on Residential Property Values", *Environmental Resource Economics* 42-4, (2008) 509-534.
[42] Todd H. Kuethe and Roman Keeney, "Environmental Externalities and Residential Property Values: Externalized Costs along the House Price Distribution, *Land Economics* 88-2 (2002), 241-250.
[43] S. Schiffman, E. Miller, M. Suggs, and B. Graham, "The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents," *Brain Research Bulletin* 37 (1995), 369-375.
[44] S. Wing and S. Wolf, "Intensive Livestock Operations, Health, and Quality of Life Among North Carolina Residents," *Environmental Health Perspectives* 108, (2000), 233-238.
[45] K. Thu, K. Donham, R. Ziegenhorn, S. Reynolds, P. Thorne, P. Subramanian, P. Whitten, and J. Stookesberry, "A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation," *Journal of Agricultural Safety and Health* 3, (1997), 13-26.



the impact of wind direction. The second, unauthored Iowa study[46] summarized the extant empirics, including studies of AFO workers, and concluded two things:

1. *There is now an extensive literature documenting acute and chronic respiratory disease and dysfunction among workers, particularly swine and poultry workers, from exposures to complex mixtures of particulates, gases, and vapors.*
2. *It is, therefore, also concluded that CAFO air emissions may constitute a public health hazard.*

In 2008, the EPA published revised regulations which addressed the Federal 2nd Circuit's ruling in *Waterkeeper Alliance v. EPA (399 F. 3rd 486, 2005)*. Some aspects were struck down by the 5th Circuit in 2011 (*National Pork Producer's Council v. EPA),* but the remainder of the regulations stand in force, recognizing the significant environmental impact of an AFO.[47]

Extensive studies reveal the impacts of AFOs on community life and values. The 2002 Iowa study cited Gomez and Zhang (2000) who documented the negative impact of AFOs on the economy of the surrounding community, as revealed by sales tax receipts and reduced local purchases.[48] This finding replicated Abeles-Allison & Connor (1990), who showed that AFOs had the effect of crowding out more traditional farmers, and purchases by those farmers decreased in local stores.[49] A similar study by Chism & Levins (1994) found that smaller farms made nearly 95% of their expenditures locally, while larger operations spent less than 20% locally.[50]

These problems have been well known and documented by the State of Colorado for some years. In Keske (2012), a study performed for the Colorado State University Extension Office, poultry operations and swine operations were lumped together as generators of biogas, "containing methane and carbon dioxide." The study was conducted to examine the feasibility of anaerobic conversion, and noted that there was a fairly high threshold of cost and requirements for this to be feasible. In support of this, the study documented ten recent lawsuits in which claimants were awarded as much as $50 million for

[46] *Iowa Concentrated Animal Feeding Operations Air Quality Study – Final Report*, Iowa State University and the University of Iowa Study Group, (February, 2002).
[47] "National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal feeding Operations (CAFOs); Final Rule" *Federal Resister* 68 (12 February 2003).
[48] Iowa State University and the University of Iowa Study Group, *Iowa Concentrated Animal Feeding Operations Air Quality Study – Final Report*, (February, 2002).
[49] M. Abeles-Allison and L. Connor, *An Analysis of Local Benefits and Costs of Michigan Hog Operation Experiencing Environmental Conflicts*, (Department of Agricultural Economics, Michigan State University monograph, 1990).
[50] J. Chism, and R. Levins, "Farm Spending and Local Selling: How Do They Match Up?", *Minnesota Agricultural Economist* 676, (1994) 1-4.

agricultural nuisance. Notably, the two largest awards cited ($50 million and $19 million) were for poultry operations.[51]

### 3.4 Comparable Case Studies

Kilpatrick (2001) presented a series of case studies from the 1990s. For example, a Minnesota homeowner reportedly lived near two swine CAFOs. Her family became ill, and testing found that the level of hydrogen sulfide was well above the danger levels.[52] Taff, et. al, (1996) performed a hedonic price analysis on 292 rural residences in Minnesota and found a statistically significant pricing impact related both to the existence of an CAFO as well as the distance to the CAFO.[53] Palmquist, et al., (1997) quantitatively determined that CAFOs depressed nearby home values and developed a model to measure the spatial impacts of AFOs.[54]

Additional empirical studies have supplemented these findings. Ables-Allison and Connor (1990) were among the first to examine property value impacts resulting from airborne contamination and odors.[55] Examining 288 sales between 1986 and 1989, they found statistically significant impacts within a 5-mile radius. Notably, during the first half of 1989, they found that a CAFO with greater than 500 animals was 50 times more likely to have an odor complaint lodged with the state than one with fewer than 500 animals.

Hamed, et al. (1999), quantified both the average value impact of a CAFO as well as the impact by distance with a study of 99 rural, non-family real estate transactions of more than one acre near an AFO. Thirty-nine of the properties in the study included a residence. They found statistically significant pricing impacts within three miles. However, if that parcel was located within one-tenth of a mile of the AFO (the minimum unit of measure in their study), then the loss in value was estimated at about 88.3%.[56]

Weida (2001), studied the economic and financial impact of AFOs. While this study principally focused on the diminished economic growth rates in communities surrounding CAFOs, it also noted the

[51] C. Keske, "Determining the Economic Feasiblity of Anaerobic Digestion in Colorado: Guidelines for Animal Farm Producers", CSU Extension Fact Sheet 1.229 (2012).
[52] Presentation a the American Bar Association Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, September 23, 1999.
[53] Stephen J. Taff, Douglas Tiffany, and Sanford Weisberg, "Measured Effects of Feedlots on Residential Property Values in Minnesota: A Report to the Legislature", (U. Minnesota Staff Paper Series, July, 1996).
[54] R. Palmquist, F. Roka, and T. Vukina "Hog Operations, Environmental Impacts, and Residential Property Values", *Land Economics* (1997).
[55] Abeles-Allison, M., and L. Connor, *op. cit.*
[56] Hamed, Mubarek, Thomas Johnson, and Kathleen Miller, "The Impacts of Animal Feeding Operations on Rural Land Values," U. Missouri-Columbia Community Policy Analysis Center Report R-99-02, (May, 1999).



substantial decreases in property values in those areas, as evidenced by property tax reductions.[57] Weida (2004), found that homes within ½ mile of an AFO decreased in value by 40%, within 1 mile by 30%, 1.5 miles by 20%, and 2 miles by 10%.[58] Again, this study does not take wind direction into account.

Increasingly, studies have relied on Geographic Information Systems (GIS) technology and other spatial methods to investigate property value impacts. Worley, et al. (2000) utilized GIS to examine the efficacy of buffers to mitigate CAFO impacts.[59] Milla, et al. (2005), studying homes in Craven County, North Carolina, utilized both GIS and hedonic pricing and determined that a farm with 5,000 animals 1 mile away had a statistically significant impact on home values.[60] Cajka, et al., (2004), modeled air pollution emanating from CAFOs.[61] Isakson and Ecker (2008) examined the impact of swine facilities and found large adverse impacts within 3 miles, with decreasing but nonetheless adverse impacts beyond 3 miles.[62]

In 2000, Central Industries operated a large-scale poultry processing plant near Central, Mississippi. As part of the process large quantities of poultry processing, byproducts were brought to this facility for further processing. The plant had been subject to a number of flooding events, when the holding ponds were allowed to overflow into nearby creeks spreading bacteria laced poultry byproducts into those creeks and downstream rivers. Poultry byproducts were discovered in trees, low density livestock areas, crop fields, and personal residences up to 50 miles away from the rendering plant. In a parallel case, the company and its officers of the facility plead guilty to 26 Clean Water Act charges, officers were individually fined varying amounts up to $300,000 each, and two of them were sentenced to confinement. The company was fined $14 million[63]. Researchers found property value diminution of up to 60% for farms closest to the plant, and transaction prices impacted as far as 11 miles away.

Julie Janson lives about 2 miles from one swine CAFO and about ¾ mile from a second AFO in Minnesota. When these CAFOs were first opened, she was initially a supporter. However, she and her family immediately began suffering illnesses which they attributed to the proximate AFOs. She

[57] William Weida, "A Summary of the Regional Economic Effects of CAFOs," (Colorado College working paper, July 21, 2001).
[58] Weida, William J., "The CAFO: Implications for Rural Economies in the US," (Colorado College working paper, 2004).
[59] Worley, J.W., C. Rupert, and L.M. Risse, "Use of GIS to Determine the Effect of Property Line and Water Buffers on Land Availability," *Applied Engineering in Agriculture* 17(1), 49-54, September, 2000.
[60] Katherine Milla, Michael H. Thomas, and Winsbert Ansine, "Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS-Based Hedonic Price Model Approach," *URISA Journal* 17-1 (2005) 27 – 32.
[61] Cajka, Jamie, Marion Deerhake, and Chengwei Yao, "Modeling Ammonia Dispersion from Multiple CAFOs Using GIS," *Proceedings of the 24th ESRI Users Conference*, August 9-13, 2004.
[62] Isakson, Hans R., and Mark D. Ecker, "An Analysis of the Impact of Swine CAFOs on the Value of Nearby Houses," U. Northern Iowa unpublished working paper, July 23, 2008.
[63] U.S. Department of Justice Press Release, November 2, 2000.

contacted the Minnesota poison control center and for the first time learned about the dangers of hydrogen sulfide emissions. She kept track of her illnesses and weather conditions (e.g. – wind and direction) and concluded that her illnesses were caused by the emissions from the AFOs. Badge testing was warranted, and on at least one occasion the reading was above 1,000 ppb hydrogen sulfide, well above danger levels.[64]

A 309-acre family farm in Pasco, Washington, had been operated for many years produced alfalfa, asparagus, corn, apples, peaches, nectarines, cherries, melons, and a range of garden produce. A cattle CAFO was located nearby, and as a result their farm product was impacted by dust, flies, fly fecal matter, and odor. The farm was appraised for litigation purposes and a value diminution of over 50% was determined, based on traditional farm appraisal methods.[65]

I examined a 17,000 acre hunting club near Eufaula, Alabama, located several miles downwind from the Charoen Pokphand chicken processing facility. Despite extensive forest lands between the club and the facility, odors and airborne contaminants had driven away the deer and other wildlife, resulting in severely diminished utility of the hunt club.

In numerous counties across the country, tax assessors have granted property value reductions as a result of proximity to CAFOs. Beasley (2001) reported that Clark County, Illinois, established a property tax abatement for 50 homes around a swine CAFO. Homes within ½ mile were determined to be diminished 30%, ranging down to a 10% reduction for homes at 1½ miles.[66] Again, these do not take wind direction into account.

**Table 1**
**Property Tax Reductions In Areas Around CAFOs**

| Area | Amount of Reduction | Reduction In Value Of: |
|---|---|---|
| Grundy Co, MO | 30% | |
| Mecosta Co, MI initially: | 35% | dwellings only |
| Later changed to: | 20% | land and structures |
| Midland Co, MI | 20% | |
| DeWitt Co, IL | 30% | |
| McLean Co, IL | 35% | |
| DeKalb Co, AL | base reassessment, variable rates | |
| Renville Co, MN | base reassessment, variable rates | dwellings only |
| Humbolt Co, IA | 20-40% dwellings only | |
| Frederick Co, MD | 10% | |
| Muhlenberg Co, KY | 18% | dwellings only |

[64] Presentation made at the ABA's Special Committee on Agricultural Management Roundtable II on Environmental Challenges in Animal Feeding Operations, dated September 23, 1999.
[65] Greenfield Advisors files.
[66] Lee Beasley, "Cumberland Hog Facility May Affect Clark County Homeowners Property Values", *Guardian Publishing* (2001).



According to Allen (2002), the Nebraska Court of Appeals ruled that county board of equalization erred in not considering a rural residence's proximity to a swine facility in determining the residence's valuation. The owner of the facility, which contained 5,200 sows, also built a house ¾ of a mile away and had obtained an easement to spray the hog manure on the cropland across the road from the house. The court ordered the county to ignore the fact that the swine were also the property of the owner. The court cited Nebraska livestock nuisance decisions which show that hog odors would influence the home's value. Upon the ruling the county accepted a determination by a local, independent appraiser that the value was diminished 30%.[67]

Spears (2003) reported that in the summer of 2003, health officials declared about 40 kilometers of beaches on Lake Huron permanently unsafe because of E. coli bacteria emanating from nearby AFOs. This became the first new pollution hot-spot on Canada's side of the Great Lakes in almost 20 years. Lab tests demonstrated that the E. coli levels in the streams feeding Lake Huron, and draining off nearby AFOs, exceeded water quality standards by as much as 41,000 percent.[68]

Ready and Abdulla (2005), of Penn State's Agricultural and Environmental Economics Department, expand upon the hedonic analyses of others and reviewed the amenity and disamenity impacts of agriculture in Berks County, Pennsylvania, including different types of open space (publicly owned, eased, vacant, pasture/crops), landfills, airports, mushroom production, and AFOs. The study determined that "…only landfills have a worse effect on adjacent property values."[69] Further, "…a sewage treatment plant has less depressing effects on nearby housing prices than a factory farm operation…" according to their findings. The study found that the clustering of AFOs within a certain area is the controlling factor not the nearest operation when considering proximity. A threshold impacts of 4.1% from AFOs within 800m, and at least 6.4% from within 500m, both of which were half of a landfill's. The study also reviewed the effects of size, species, and environmental stewardship (registration of waste management plans). Their findings were presented at the Sustainable Hog Farming Summit in Gettysburg, PA, in June, 2003.

Similar to the Berks County study, Herriges, et al. (2003) expands upon the work done in the University of Minnesota & University of Mississippi studies. The variables used to quantify the effects in this hedonic analysis included proximity, size, and direction of nearest facility. Direction from site was included to determine the effect of being downwind and the odor and pest issues associated. Results from

[67] J. David Aiken, "Property Valuation May be Reduced by Proximity of Livestock Operation" Cornhusker Economics, Department of Agricultural Economics University of Nebraska – Lincoln, (May 2002).
[68] Spears, Tom, "Ontario's West Coast Permanently Polluted," The Ottawa Citizen, (November 15, 2003); also Dines, R.E., Deborah Henderson, and Louise Rock, "The Case Against Intensive Hog Operations," (working paper February, 2004).
[69] Richard Ready and Charles Abdalla "The Impact of Open Space and potential Local Disamenities on Residential Property Values in Berks County, Pennsylvania" *American Journal of Agricultural Economics,* 87 (May 2005) p. 314-326.

this study determined that a moderate size facility has a measurable impact within 1½ miles and 26% within a ¼ mile[70]. Finally, Keske (2012) documents ten lawsuits over CAFO nuisance in which the plaintiff prevailed, with jury awards ranging up to $50 million, which I have presented in Table 2 (following).

The establishment of a CAFO results in value diminution to other nearby properties both through a negative externality as well as through indirect economic impacts. The amount of the value loss is an inverse function of distance (closer properties diminish more), a function of property type (newer, nicer residences lose more) and a function of property use (farms will lose value due to diminished productivity and comparative marketability to farm lands further away; residential use will no longer be a highest-and-best use).

**Table 2**
**Jury Awards from Keske (2012)**

| Year/State | Jury Award | Case/Remarks |
|---|---|---|
| 1991/NE | $375,600 | Kopecky v. National Farms, swine operation |
| 1996/KS | $12,100 | Swine settlement – parties undisclosed in news article |
| 1998/KS | > $15,000 | Twietmeyer, beef operations (see above) |
| 1999/MO | $5,200,000 | Hanes v. Continental Grain, swine operation |
| 2001/OH | $19,182,483 | Seelke et al v. Buckey Egg Farm, poultry |
| 2002/IA | $33,065,000 | Blass, et. al, v. Iowa Select Farms, swine operation |
| 2004/OH | $50,000,000 | Bear et. al. v. Buckey Egg Farm, et al, poultry |
| 2006/AL | $100,000 | Sierra Club, et. al, v. Whitaker and Sons, swine |
| 2006/MO | $4,500,000 | Turner v. Premium Standard Farms, swine |
| 2007/IL | $27,000 | State of Illinois (respondent unreported), swine |

**Table 3**
**Summary of CAFO Impacts**

| Case Study | Value Loss | Remarks |
|---|---|---|
| Ables-Allison & Connor (1990) | Statis. significant within 5 mi | Greatest impact within 1.6 miles |
| Taff, et al. (1996) | N/A | CAFO sited near older, less-expensive homes |
| Palmquist, et al. (1997) | 9% | Average up to 2 miles |
| Hamed, et al. (1999) | Up to 88% | Largest loss if within 1/10 mile |
| ABA Presentation (1999) | N/A | Confirmed respiratory problems |
| Central Industries (2000) | 60% for farms closest to plant | USDOJ cases, values by appraisal |
| Beasley (2001) | Up to 30% | Impacts 10% at 1½ miles |
| Allen (2002) | 30% @ ¾ mile | Confirmed by court & local appraiser |
| Spears (2003) | N/A | 40km of beaches closed due to CAFO emissions |
| Herriges, et al. (2003) | 26% @ ¼ mile | Moderate sized CAFO, 6% at 1½ miles |
| Weida (2004) | 40% @ ½ mile | 10% at 2 miles |
| Ready & Abdulla (2005) | Statis. Significant within a mile | Roughly ½ of the impact of a landfill |
| Kim & Goldsmith (2008) | 23.5% @ 1 mi | 18% average within 3 mile radius |
| Isakson & Ecker (2008) | 44% | Directly downwind & within 2 miles |

[70] Joseph Herriges, Silvia Secchi, and Bruce A. Babcock "Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural residential Property Values," Iowa State University Center for Agricultural and Rural Development working paper, August 2003.



It is clear from the broad array of empirical studies and case studies that diminished marketability, loss of use and enjoyment, and loss of exclusivity results in a diminishment which can range from 50% to nearly 90% of otherwise unimpaired value for homes which are adjacent to the facility. Negative impacts are noted at distances exceeding 3 miles, and in the case of a flood or other weather event, waste from the facility can be spread over far greater areas (See Table 3).

**4. Economic Impacts**

As noted earlier, I am not only a real estate appraiser, but a financial economist as well. I hold a Ph.D. in Finance, and have worked as a consulting economist and econometrician for many years. I have been accepted in this role as an expert witness in both state and federal courts.

As also noted earlier, there is ample scholarly and professional research which recognizes that CAFOs have a negative impact on the communities in which they are located. In this section, I will elaborate on that topic, and specifically discuss the county-wide impacts which an economist would expect to occur on this island. I am informed of certain facts which affect my research in this regard:

1. The downwind areas which will be directly affected by this CAFO are more-or-less described in tax maps 2-6, 2-8, and 2-9, referred to as the "South Shore Region."
2. These areas do not include Omao, which is inland from the coastal areas and north of Tax Map 2-6. The directly affected areas are south of Koloa Road from Lawai Valley to Poipu Road and includes the National Tropical Botanical Gardens and the Kukuiula development. The affected areas are also the northern most areas of Tax Map 2-8, north of Koloa, and roughly along the east side of Maluhia Road between Koloa and Kaumualii Highway. This would also include the Koloa Landing Boat Launch as the western boundary and Poipu Kai Resort as the eastern boundary. Note that this includes the Hyatt Hotel and Poipu Bay Golf Course. It includes 4,622 tax parcels.
3. The total assessed value in this directly affected area, as of 2015, is approximately $3.7 Billion. Note that the county as a whole has an assessed value of about $20.7 Billion, spread over 33,579 parcels. Thus, the directly affected area constitutes about 17.8% of the whole county value.
4. However, while the directly affected area only constitutes 17.8% of the county value, it generates 24.1% -- nearly one quarter – of the county tax revenues.
5. In 2015, the Koloa/Poipu region accounted for $213 million in lodging revenue, or about 31% of the entire island. This mostly comes from the Hyatt, which at about 650 rooms is the largest such facility on the island.

6. Note that the golf course and the Hyatt together paid about $5 million in property taxes last year, or 4.1% of the county total.
7. Residential, vacation rental, and hotel and resort combined constitute 66.4% of the property taxes paid in this area, or about $23.5 million. This alone is about 20% of the county's total property tax collections.
8. Finally, tourism accounts for about 2,600 jobs in this area of the island. According to the Kauai Economic Outlook Summary, May, 2016, the total employment on the island at the end of 2015 was about 30,000. Thus, tourism in this region of the island accounts for about 8.7% of the island's total workforce.

Based on the foregoing, several economic issues become evident:

1. This part of the island has a concentration of the specific types of real estate which would be worst affected by a nearby CAFO – residences, tourist rental residences, and up-scale lodging. A 50% reduction in property values across just these three sectors would have a devastating impact on the county's finances. Specifically, a 50% reduction in these values would cause a 10% shortfall in the county's property tax collections.
2. The county would be left with two equally untenable choices. Either a) reduce the county budget by about $12 million per year, or b) raise taxes in other, unaffected portions of the island. Under option b), a homeowner several miles away, say in Princeville, would feel a 10% increase in property taxes as a result of a CAFO nowhere near his or her property.
3. Anecdotally, I am informed that South Shore hotels and resorts may already be facing convention and party cancellations as a result of fear about the CAFO. This is not surprising – convention and destination party business is typically booked many years in advance.[71] Destination parties, such as weddings, are huge business for a resort and generate revenues for many other businesses in the area.[72] Hence, a reduction in revenues for area hotels and resorts will have a direct and immediate impact on local jobs.

[71] The American Real Estate Society held its annual meeting on the big island in 2013. It was so impressed with the facility, that it re-booked it for 2017, four years in advance, which was the norm. When increased volcanic activity gave this group pause about the health of its members, it cancelled (in 2015) and paid a $50,000 fine rather than risk its members. The 2017 meetings will now be held in Florida.
[72] One resort county's economic development office, which we recently interviewed, employs six people. One of those was taxed exclusively with attracting destination weddings.



4. The reduction in jobs will have an immediate and detrimental impact on the county's finances. As these workers become unemployed, they will have a higher propensity to seek public assistance, which the county will be less able to provide. Ironically, these workers will also be less able to pay their own taxes.

In summary, the establishment of a CAFO will have an immediate, negative impact on the Island's economy, the county government's finances, and the tourism industry. Given the concentration of sensitive jobs in this region, it is ironic that this CAFO is proposed for what is perhaps the worst site on the island, from an economic perspective.

**5. The Concept of Kuleana**

While this report is focused on the empirical, quantitative economic and property value issues resulting from this proposed CAFO, as an economist with a focus on environmental issues, I would be remiss in not noting the very special environmental quality of the island of Kaua'i. Indeed, among the various Hawaiian Islands, Kaua'i has a very special ecology which is hardly duplicated on other islands. This environmental "specialness" is a vital and valuable economic asset to the island, one which defines the economy of Kaua'i in a way few other places in the world are defined. In the November 27, 2015 issue of Forbes, there was a list of the 21 most beautiful places in the world. The first place on this list was Kaua'i.[73]

Garavoy (2006), writing in the Harvard Environmental Law Review, traces this history of Kuleanas from their inception in the mid-1800's to today, and discusses the impact on conservation land trusts.[74] While her article deals primarily with the legal issue of Kuleanas when a land trust is acquiring conservation property, the overarching tone of the article gives rise to consideration of the Kuleana as both a right and a responsibility. This appears doubly important in the 21st century, as so many threats to the environment and native rights raise their heads.

While I do not claim expertise in Kuleanas or Hawaiian Native culture, I do recognize that there is a very special environment on Kaua'i, and from the perspective of an economist who works frequently in environmental issues, I clearly recognize the need for stewardship over that environment. As an

[73] Nace, Trevor, "21 Most Beautiful Places in the World to Visit," *Forbes*, available at http://www.forbes.com/sites/trevornace/2015/11/27/21-most-beautiful-places-in-the-world-visit/#5be679ef53c3, accessed July 23, 2016.
[74] Garavoy, Jocelyn B., 2005, "Ua koe ke kuleana o na kanaka" (reserving the rights of native tenants): Integrating kuleana rights and land trust priorities in Hawaii, *Harvard Environmental Law Review* 29, 523-572.

economist, I would posit that this proposed CAFO is the wrong thing in the wrong place. It brings no positive benefits to the local economy, and yet imposes severe economic and environmental costs on its neighbors and the community as a whole.

**6. A Caveat**

Please note that while I am a Hawai'i state certified real estate appraiser, I have not performed an appraisal as commonly defined under the Uniform Standards of Professional Appraisal Practice ("USPAP")[75], and this document does not constitute an appraisal report. That said, I am clearly operating as an appraiser in this assignment, and certain other aspects of USPAP apply to my work in this matter.

Thank you for the opportunity to be of assistance in this matter.

Sincerely,
**Greenfield Advisors LLC**

John A. Kilpatrick, PhD, MAI, FRICS
Hawaii State Certified (General) Appraiser No. CGA 0001054

Attachment: Summary of Professional Qualifications

[75] USPAP has been adopted by the State of Hawai'i under Administrative Regulation §16-114-88. I would specifically note from paragraph (C) of that section, "An appraiser shall perform all appraisals, review, or consulting service with impartiality, objectivity, and independence, without any direct or indirect interest in the property."

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Greenfield Advisors
Economic, Market and Valuation Analysts

## JOHN A. KILPATRICK, PhD, MAI, FRICS

### PROFESSIONAL QUALIFICATIONS

John Kilpatrick is the Chairman and Co Managing Director of Greenfield Advisors, formerly Mundy Associates. He has over 35 years of experience in finance and financial analysis, real estate, business development, statistical analysis, consulting, and teaching, including the following:

- Greenfield Advisors (1998–present)
- Kilpatrick Research Group (1994–1998), Principal conducting economic, financial, and market analyses for governments and private firms in the Southeast
- University of South Carolina: Lecturer in Real Estate (1992–1998), Researcher in the Center for Applied Real Estate (1997–1998), Administrator of the South Carolina Supercomputer Network (1994–1996), Project Coordinator of the Washington, DC, based Academic Coalition for Intelligent Manufacturing Systems (1994–1995), Assistant to the Senior Vice President for Research (1990–1994)
- Kilpatrick and Associates Realty (1987–1990), Broker-in-Charge, and Vice President of Sand Creek Development Company
- The Shumaker Company (1978–1981 and 1984–1987), CFO of a large-scale residential subdivision development, homebuilding, and brokerage company
- Dean Witter Reynolds (now Morgan Stanley, 1981–1984), Account Executive and S.C. Municipal Bond Coordinator

He has published extensively, including *Financing Development and Construction in the 90s* and *Understanding Home Construction*, published by the National Association of Home Builders, *The Complete Real Estate Financing Desk Reference* by M.E. Sharpe, and *Subdivision Development* for the National Association of Realtors. His invited presentations have included members of the U.S. Senate (on advanced manufacturing R&D), *Institutional Investor's* Integrated Wealth Management Forum, the American Real Estate Society, the annual Applied Geography Conference of the American Association of Geographers, the Southeastern Builders Conference, the American Real Estate and Urban Economics Association, the National Trust for Historic Preservation, and the National Association of Homebuilders annual Executive Officers Conference. Dr. Kilpatrick is a regular participant and speaker at the famed *Renaissance Weekend* in Charleston, S.C. He is a frequent contributor and reviewer for numerous scholarly and practitioner journals, having served on the editorial boards of *The Appraisal Journal* and the *Journal of Sustainable Real Estate*, and on the review board for the *Journal of Real Estate Research* among others. In 2003, his industry peers in Western Washington honored him by naming him Editor of the semi-annual *Central Puget Sound Real Estate Research Report*.

His consulting and academic research activities include work for the National Science Foundation; the U.S. Departments of Energy, Interior, Defense, and Commerce; Oak Ridge National Lab; Southeastern Universities Research Association; Oak Ridge Associated Universities; SC Budget and Control Board; SC Department of Archives and History; SC Downtown Development Association; SC Housing Finance and Development Authority; and many city and county governments and private corporations. He has been featured in *The Wall Street Journal*, the *Boston Globe*, *The New York Times*, and other national publications. Dr. Kilpatrick served on the Working Group of the Data Consortium, which set the agenda for real estate information in 21st century technology. In 2000, the State of South Carolina and the U.S. Department of the Interior published a monograph honoring his research. In 2002, following the terrorist attacks on the World Trade Center, Dr. Kilpatrick was a consulting expert on real estate for Bloomberg Network News. In 2003, he became a Fellow of the American Real Estate Society. In 2004, Dr. Kilpatrick was elected to be a Member of the Faculty on Valuation of the Royal Institution of Chartered Surveyors, and he was named a Fellow of that organization in 2011. Also in 2004, the Appraisal Qualifications Board in Washington, DC, designated Dr. Kilpatrick a Nationally Certified Instructor for the *Uniform Standards of Professional Appraisal Practice*. In 2006, Dr. Kilpatrick was named a *Visiting Scholar in Real Estate Finance* at the Zicklin School of Business, Baruch College, City University of New York. Dr. Kilpatrick is featured in the 2006 and later editions of *Who's Who in America*. He is an MAI-Designated Member of the Appraisal Institute.

John Kilpatrick has been qualified as an expert witness on finance, real estate, economics, construction matters, and statistical research in various state and federal courts throughout the United States.

## EDUCATION

Bachelor of Science in Business Administration (Accounting), University of South Carolina

Master of Business Administration, University of South Carolina

Doctor of Philosophy, Finance, University of South Carolina
Dissertation: *Agency Costs and the Determinants of the Capital Structure of REITs*

## HONORS AND AWARDS

Review Panel, *The Appraisal Journal*, (2015–)

Visiting Scholar in Real Estate, Zicklin School of Business, Baruch College, New York (2006-2015)

International Association of Assessing Officers' Bernard L. Barnard Outstanding Technical Essay Award, 2014

Keynote address, Darla Moore School of Business Graduate Hooding Ceremony, Spring 2014

MAI-Designated Member, Appraisal Institute

Invited Participant, *Renaissance Weekend*

*Fellow*, Royal Institution of Chartered Surveyors, Faculty of Valuation

Editorial Board, *The Appraisal Journal* (2013–2014)

Editorial Board, *Journal of Sustainable Real Estate* (2010-2015)

Reviewer, *Journal of Real Estate Research*

Editorial Board (U.S.), *Modus* (2011–2013)

National Board of Advisors, Washington State University College of Business Administration

*Who's Who in American Business and Finance*

*Who's Who in America*

*Journal of Property Investment and Finance* Highly Commended Paper award (2013)

American Real Estate Society annual meetings, Best Paper on Valuation award sponsored by the Appraisal Institute (2010)

Editorial Board, *Brownfield News* (2005–2006)

*Principal Member*, Real Estate Counseling Group of America

Nationally Certified Instructor, Uniform Standards of Professional Appraisal Practice, designated by the Appraisal Qualifications Board, Washington, DC

*Fellow*, American Real Estate Society

Strategic Planning Committee Vice Chair (2013–)

Education Committee (2008–09)

Technology Committee Vice Chair (2010–11)

Professional Member, International Code Council

American Real Estate and Urban Economics Association 1994 Doctoral Seminar Honoree (1993)

Omicron Delta Epsilon Economics Honor Society (elected, 1993)

*National Graduate Scholar*, The Appraisal Institute (1992–1993)

*Arthur Warner Scholar,* The S.C. Association of Realtors (1991–1992)

*National University Scholar*, Commercial Investment Real Estate Council of the National Association of Realtors (1990–1991)

*Who's Who in the South and Southwest* (1984–1991 editions)

*Who's Who Among Students in American Universities and Colleges* (1976 edition)

Omicron Delta Kappa Leadership Honor Society (elected, 1975)

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## PUBLICATIONS AND WORKING PAPERS

"Valuation of Brownfield Properties," with Clifford A. Lipscomb, Chapter 29 in *Brownfields Law and Practice: The Cleanup and Redevelopment of Contaminated Land* (LexisNexis Matthew Bender Publications, 2015).

"Using a Random Forest Process in an Automated Valuation Model," with Clifford A. Lipscomb, Jessica Kenyon, and Daniel Tetrick, accepted for presentation at the 2015 annual meetings of the American Real Estate Society, April 2015.

"The Impact of the NAREIT Light Awards on REIT Performance," with Clifford A. Lipscomb, accepted for presentation at the 2015 annual meetings of the American Real Estate Society, April 2015.

"Can We Forecast the Next Bubble?," with Clifford A. Lipscomb, accepted for presentation at the 2015 annual meetings of the American Real Estate Society, April 2015.

"Animal Operations and Residential Appraisal," *Appraisal Journal,* Winter 2015.

"Appraisal and Valuation," Chapter 12 in *Private Real Estate Markets and Investments*, Peter Chinloy and Kent Baker, eds. (New York: Oxford U. Press, 2014).

"Do Survey Results Systematically Differ from Hedonic Regression Results? Evidence from a Residential Property Meta-Analysis," with Clifford Lipscomb and Abigail Mooney, *Journal of Real Estate Literature* 21-1, Fall 2013, 233–254. ***International Association of Assessing Officers' Bernard L. Barnard Outstanding Technical Essay Award, 2014.***

"The Impact of Institutional Controls on Property Values," with Clifford Lipscomb and Abigail Mooney, accepted for presentation at the 2013 American Real Estate Society annual meetings.

"Using Contingent Valuation to Estimate the Impact of a Feed Contamination Disclosure on Alpaca Values," with Clifford A. Lipscomb and Abigail Mooney, under Review at *Applied Economic Perspectives & Policy*.

"The U.S. Valuation Reconciliation is Still Ongoing," *Modus (Americas Edition)*, May 2012, p. 8.

"USPAP vs. International Valuation Standards – Compare and Contrast," *Greenfield Advisors working paper* presented at the 2012 American Real Estate Society annual meetings.

"Integration of Sector Analysis into a Hedonic Pricing Model," with Clifford A. Lipscomb and Andy Krause, *Greenfield Advisors working paper* presented at the 2012 American Real Estate Society annual meetings.

"Deconstructing the Housing Price Bubble," accepted for presentation at the 2012 American Real Estate Society annual meetings.

"Willingness to Pay Convergence Between Contingent Valuation and Hedonic Methods," with Clifford A. Lipscomb, Andy Krause, and Michael C. Farmer, *Greenfield Advisors working paper* presented at the 2012 American Real Estate Society annual meetings. Under review at *Real Estate Economics.*

"Contaminated Properties, Trespass, and Underground Rent," with Andy Krause, Ron Throupe, and Will Spiess, *Journal of Property Investment and Finance* 30-3, 2012, pp. 304–320. ***Designated as a "Highly Commended Award Winner" at the Emerald Publishing Literati Network Awards for Excellence, 2013.***

"Expert Systems and Mass Appraisal," a Greenfield Advisors Working Paper, presented at the 2010 Valuation Colloquium; *Journal of Property Investment and Finance*, 2011.

"Contingent Valuation and Real Estate Damage Estimation," with Cliff Lipscomb, Max Kummerow, Will Spiess, and Sarah Kilpatrick, *Journal of Real Estate Literature* 19-2, 2011, pp. 235–282.

"Valuing Brownfields" with Bill Mundy, Chapter 10 in *Brownfields: A Comprehensive Guide to Redeveloping Contaminated Property, Third Edition.* Todd S. Davis and Scott A. Sherman, editors. (American Bar Association, 2010).

"What Is the Error Rate of a Commercial Appraisal?" a Greenfield Advisors Working Paper, winner of the ***Appraisal Institute's Best Appraisal Paper*** award at the 2010 meetings of the American Real Estate Society.

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**PUBLICATIONS AND WORKING PAPERS (continued)**

"The Gulf Oil Spill Updated," a Greenfield Advisors White Paper, with Cliff Lipscomb and Chris Miner, October 2010.

"The Gulf Oil Spill," a Greenfield Advisors White Paper, with Cliff Lipscomb, June 2010.

"Chinese Drywall," with Chris Miner, a Greenfield Advisors Working Paper, presented at the 2010 meetings of the American Real Estate Society.

"Can We Trust Market Values?" with Max Kummerow, a *Greenfield Advisors Working Paper,* presented at the 2009 meetings of the American Real Estate Society.

"Residential Real Estate Pricing Disequilibrium," presented at the 2008 annual meetings of the American Real Estate Society.

"Valuing Historic Preservation Easements in Regulated Historic Districts – An Empirical Study," presented at the 2008 annual meetings of the American Real Estate Society.

"Liquidation Value: The Valuation of Real Estate in Distress," presented at the 2008 annual meetings of the American Real Estate Society.

"From Brownfields to Greenfields – Case Studies in Environmentally Sensitive Development," *Greenfield Advisors Working Paper,* presented at the 2008 annual meetings of the Asian Real Estate Society, July 2008.

"Preservation Easements," with Vicki Adams, *Journal of Wealth Management*, Summer 2008.

C*entral Puget Sound Real Estate Research Report* (Editor), published semi-annually by the Central Puget Sound Real Estate Research Committee, Inc., 2003–2007.

"Certifying the Real Estate Damages Class – An Appraisal Perspective," a Greenfield Advisors Working Paper.

"Real Estate in the High Net Worth Portfolio," presented to the Integrated Wealth Management Forum, sponsored by *Institutional Investor*, New York, September 2007.

"Foreign Direct Real Estate Investment in the U.S. – Opportunities and Cautions," presented at the annual meetings of the Asian Real Estate Society, Macao, China, July 2007.

"Economic Feasibility – the Challenge for Eminent Domain Appraisers under *Lucas*," a Greenfield Advisors Working Paper

"Real Estate Investments of the Rich and Famous," *Journal of Wealth Management,* Spring 2007.

"When is a Taking 'Fair'?, a Repeat Sales Analysis," presented at the American Real Estate Society annual meetings, April 2007; presented at the Eminent Domain Institute annual meeting, April 2007.

"Valuing Multiple Contemporaneous Events: The Case of the Murphy Oil Spill," presented to the American Real Estate Society annual meetings, April 2007.

"The Impact of Transit Corridors on Residential Property Values," with Ron Throupe, John Carruthers, and Andy Krause, *Journal of Real Estate Research*, Spring 2007.

"The Aftermath of Katrina – Recommendations for Real Estate Research," with Sofia Dermisi, *Journal of Real Estate Literature*, 15-2, Spring 2007.

"Valuation of Impaired Land: Greenfield Advisors Experience with Contaminated Sites", with Vicki Adams, Max Kummerow, Bill Mundy, and Ron Throupe, *Proceedings of the 13th Pacific-Rim Real Estate Society Conference,* January 2007.

"Highlights from 'Valuation of Brownfield Properties,'" American Bar Association's *Section on Environmental Transactions and Brownfields Newsletter*, November 2006.

"Non-Parametric Methods and the Appraisal Process," a working paper in progress.

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**PUBLICATIONS AND WORKING PAPERS (continued)**

"Stigma Revisited Again," with Max Kummerow, a working paper in progress presented at the American Real Estate Society annual meetings, Key West, FL, April 2006.

"Application of Repeat Sales Analysis to Determine the Impact of a Contamination Event," *Journal of Housing Research,* Fall 2006.

"Redevelopment Brings Developers, Conservationists Together," with Nina Marshtein, *Charleston (SC) Business Journal*, March 2, 2006.

"Valuation of Impaired Property" with Ron Throupe, Bill Mundy, and Will Spiess, Chapter 6 in *When Bad Things Happen to Good Property*, Robert A. Simons, ed., (Washington, DC: National Environmental Law Center, 2005).

"5 mega-trends for Puget Sound Real Estate," *Daily Journal of Commerce* (Seattle, WA), October 6, 2005.

"Brownfields Let Texans Do Well While Doing Good," with David I. Mayes, *Dallas Business Journal*, October 28, 2005.

"Recycling Land Around D.C. Offers Field of Dreams," with John E. Tabella, *The Washington Construction News*, September 2005.

"Brownfields Offer Chance for Urban Redevelopment," with Steven Lamb, *Charlotte Business Journal*, July 29, 2005.

"Find Creative New Ways to Develop Land in Tampa Bay," with Mark Tumlin, *Tampa Bay Business Journal,* July 25, 2005.

"Contamination Needn't Be Barrier to Developing Site," with Helen Swenson, *Greater Cincinnati Area Business Courier*, July 15, 2005.

"Creative Redevelopment Can Turn Brownfields to Gold," with David Brewer, *Kansas City Business Journal*, June 10, 2005.

"Provide More Housing, While Cleaning Up Our Environment," with Brad Anderer, *Arizona Journal of Business and Real Estate*, May 2005.

"Multiple Regression Models and Diminishing Marginal Returns in Land Values," with John I. Carruthers, working paper in progress. Presented at the American Real Estate Society annual meetings, April 2005.

"Geotechnical Problems and Property Values: Market Evidence from the Pacific Northwest," a working paper in progress.

"Appraising Real Estate in Complex Environmental Class Actions: An Expert's View," *Toxic Law Reporter*, January 13, 2005.

"Agency Costs and REIT Debt Announcements," with Ronald C. Rogers, a working paper in progress (presented at the American Real Estate Society meetings in 2004).

"Brownfields Offer Optimism as Options Dissipate," with Joseph Kesling, *Puget Sound Business Journal*, December 10, 2004, pg. 41.

"Real Estate Issues in Class Certification," *Class Action Litigation Report,* October 8, 2004.

"Terrorism Impacts on the Value of Major Downtown Office Buildings," Mundy Associates LLC working paper series.

"Agency Costs and REIT IPO's," with Ronald C. Rogers, a working paper in progress, presented at the American Real Estate and Urban Economics Association meetings in January 2004.

"Windfall Lien Guidance," *Newsletter of the Environmental Transactions and Brownfields Committee*, American Bar Association Section on Energy, Natural Resources, and the Environment, January 2004.

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**PUBLICATIONS AND WORKING PAPERS (continued)**

"Looking Backward and Forward: Economic Restructuring and United States Real Estate Markets," with John Carruthers, Bill Mundy, and Ron Throupe, *Real Estate Issues*, Fall 2003.

"Appraisal of Contaminated Real Estate in the United States," with Bill Mundy, prepared by invitation of and for publication in the *Journal of the Japan Real Estate Institute*, October 2003.

"Construction Defects and Stigma," *Mealey's Construction Defects*, July 2003.

"*Daubert* Raises Its Ugly Head Again," *In-House Counsel Committee Newsletter*, American Bar Association, February 2003.

"Concentrated Animal Feeding Operations and Proximate Property Values," *Appraisal Journal,* July 2001.

"The Future of Real Estate Information," *Real Estate Issues,* Spring 2001.

"Valuation Implications of EIFS," *Mealey's Construction Defects,* January 2001.

"Factors Influencing CBD Land Prices," with Bill Mundy, *Real Estate Issues*, Fall 2000.

"Lead Contamination Impact on Property Values Significant," *Real Estate Environmental Liability News*, March 2000.

*The Economic Impact of Historic Designation* (monograph reviewing research done over several years, published by the S.C. Department of Archives and History, January 2000).

"Summation of Evidentiary Rules for Real Estate Experts Mandated by Daubert v. Merrell Dow Pharmaceuticals, Inc." with Bill Mundy and Dave McLean, *Real Estate Issues*, Fall 1999.

"Valuing Brownfields," *Valuation Insights and Perspectives*, February 1999, with Bill Mundy and Dave McLean.

"Performance of Exterior Insulation Finish Systems," with Douglas C. Brown and Ronald C. Rogers, *Appraisal Journal,* January 1999.

*The Economic Impact of Local Preservation Ordinances on Small Towns in South Carolina* (1998), research monograph funded by the South Carolina Downtown Development Association and the U.S. Department of the Interior – National Park Service.

*House Price Impacts of School District Choice* (1998), with Frank J. Hefner, research monograph funded by the South Carolina Center for Applied Real Estate Education and Research.

*CAREER News* (semi-annual publication of the USC Center for Applied Real Estate Education and Research), editor, 1997–1998.

"Appraisal of Contaminated Properties," *CAREER News*, August 1998.

"Real Estate Law Means Major Changes," *Business and Economic Review*, April–June 1998.

"Economic Value Added for Real Estate," *CAREER News*, February 1998.

*Complete Real Estate Finance Desk Reference (Armouk, NY: M.E. Sharpe Publishing, 1998)*

*Subdivision Development* (Chicago: Realtors Land Institute of the National Association of Realtors, 1998), John A. Kilpatrick, editor.

"Historic Designation and House Prices," *CAREER News*, August 1997.

The Five Critical C's of Credit," *Florida Home Builder Monthly*, May 1997.

"Managing the Shrinking Margins," *Florida Homebuilder*, April 1997.

*The Impact of Historic District Designation in Beaufort, South Carolina* (1997), research monograph funded by the Historic Beaufort Foundation, the S.C. Dept. of Archives and History, and the U.S. Department of the Interior – National Park Service.





**PUBLICATIONS AND WORKING PAPERS (continued)**

*The Economic Impact of Local Preservation Ordinances in Greenville, South Carolina* (1997), research monograph funded by the Historic Greenville Foundation, the City of Greenville, South Carolina, the S.C. Department of Archives and History, and the U.S. Department of the Interior – National Park Service.

*Analysis of the Columbia Owens Downtown Airport Commercial Corridor* (1996), research monograph funded by the South Columbia Development Corp. and the City of Columbia.

"Impact of Historic District Designation on House Prices in Columbia, South Carolina," (1995), research monograph prepared for the S.C. Department of Archives & History.

*Understanding Home Construction*, (Washington, DC: Homebuilder Press, 1993). **Honorable Mention**, 1993 Washington, DC, EdPress Association Awards and **Top Honors**, 1994, Society for Technical Communication Awards.

"A Study into the Risk of Sales Variability and its Effect on the Success of Strip Shopping Centers," (1992). *Papers and Proceedings of Applied Geography Conferences* Volume 15, J. Frazier, B. Epstein, and F. Schoolmaster, editors.

"Development and Construction Financing: Where Do We Go From Here?" *Maryland Builder*, Baltimore, MD, February 1992.

*Sample Letters and Memos* (Washington, DC: Homebuilder Press, 1992).

*Financing Development and Construction in the Nineties* (Washington, DC: Homebuilder Press, 1991).

## INVITED TALKS

*In addition to the invited talks listed below, John Kilpatrick is a frequent guest speaker at civic clubs and events throughout the United States.*

"The Economy of Cuba – a 2016 update", presented at the Real Estate Counseling Group of America, West Palm Beach, Florida, April, 2016

"Appraisal Litigation," presented at the University of Southern California in conjunction with the annual meeting of the Southern California Appraisal chapter, November 2015.

"Practical Statistics for Practicing Appraisers," presented at the invitation of the Appraisal Institute at the 2015 annual meetings, Dallas, TX, July 2015.

"The Impact of the NAREIT Light Awards on REIT Performance," with Clifford A. Lipscomb, accepted for presentation at the 2015 annual meetings of the American Real Estate Society, April 2015.

"Can We Forecast the Next Bubble?," with Clifford A. Lipscomb, accepted for presentation at the 2015 annual meetings of the American Real Estate Society, April 2015.

"Mentoring," Keynote Address, Graduate Hooding Ceremony, Darla Moore School of Business, University of South Carolina, May 2014.

"Computational Modeling in Real Estate," Panel Chair, American Real Estate Society annual meetings, San Diego, CA, April 2014.

"Professional Real Estate Education," invited panelist on "The Importance of Teaching: Engaging Different Learning Styles," presented at the American Real Estate Society annual meetings, Kona, HI, April 2013.

"Appraisal Implications of Proximity to Feedlots," presented at the American Real Estate Society annual meetings, Kona, HI, April 2013.

"Advanced Statistical Methods in Real Estate Appraisal," presented at the Appraisal Institute annual meetings, San Diego, CA, August 2012.

**INVITED TALKS (continued)**

"Real Estate Failure – BRAKING the Cycle," panel discussion presented at the American Real Estate Society annual meetings, St. Petersburg, FL, April 2012.

"Integration of Sector Analysis into a Hedonic Pricing Model," presented at the American Real Estate Society Annual Meetings, St. Petersburg, FL, April 2012.

"Deconstructing the Housing Price Bubble," presented at the American Real Estate Society Annual Meetings, St. Petersburg, FL, April 2012.

"USPAP versus the International Valuation Standards," presented at the American Real Estate Society Annual Meetings, St. Petersburg, FL, April 2012.

"Property Valuation Issues in Fracking Cases," Fracking Litigation Conference, Philadelphia, PA, September 2011.

"Valuation of Construction Defects," presented at the Construction Defects and Insurance Coverage Conference, March 2011.

"Expert Systems and Mass Appraisal," Valuation Colloquium sponsored by Clemson University, November 2010.

"Valuation Impacts of the Gulf Oil Spill," the BP Oil Spill Litigation Conference, Miami Beach, FL, November 2010.

"The Gulf Oil Spill," presented to the Real Estate Counseling Group of America, Washington, DC, September 2010.

"Impact of the Gulf Oil Spill on Bank Collateral Portfolios," presented to the Collateral Risk Network, Washington, DC, July 2010.

"Valuation Impacts of the BP Oil Spill," presented at the BP Oil Spill Litigation Conference, Atlanta, GA, June 2010.

"The Grove Farm Project," presented to the Real Estate Counseling Group of America, Las Vegas, NV, April 2010.

"Real Estate Education," panel presentation at the 2010 annual meetings of the American Real Estate Society, Naples, FL, April 2010.

"Valuation Impact of Chinese Drywall," presented at two Chinese Drywall Litigation Conferences in New Orleans, LA, June 2009 and November 2009.

"Appraisal Error Terms," presented to faculty and students at Valdosta State University, October 2009.

"Real Estate Investment," panel chair for the Seattle Hedge Fund Society, May 2009.

"Environmental Valuation in the United States," panel chair for the 2008 annual meetings of the Asian Real Estate Society.

"Liquidation Valuation," presented to the 2008 annual meetings of the American Real Estate Society.

"Residential Real Estate Market Disequilibrium," presented to the 2008 annual meetings of the American Real Estate Society.

"Market Demand Factors for Master's Degree Students in Real Estate," panel discussion presentation at the 2008 annual meetings of the American Real Estate Society.

"Market Factors Affecting Redevelopment of Residential and Mixed-Use Contaminated Property," presented to the Brownfield CLE meetings, Seattle, WA, March 2008.

"Complex Valuation," presented to graduate students in the Zicklin School of Business, Baruch College, New York, September 2007.

"Real Estate in the High Net Worth Portfolio," Integrated Wealth Management Conference, sponsored by *Institutional Investor* magazine, September 12, 2007.

"Dollars and Sense of Real Estate Investments," Chair of Continuing Education Program, Seattle, Washington, June 2007. Presentations: "What's Working and What's Not" and "The Future of Real Estate Financing."





**INVITED TALKS (continued)**

"Land Valuation," session chair, Asian Real Estate Society Annual Meetings, Macao, China, July 2007.

"Foreign Real Estate Investment in the U.S.: Pitfalls and Opportunities," Asian Real Estate Society annual meetings, Macao, China, July 2007.

"When is a Taking Fair?" Eminent Domain Institute, Las Vegas, NV, April 2007.

"Real Estate Investments of the Rich and Famous," American Real Estate Society annual meetings, San Francisco, CA, April 2007.

"Consistency and Bias in Eminent Domain Appraisals," American Real Estate Society annual meetings, San Francisco, CA, April 2007.

"Real Estate Investments of the Rich and Famous," American Real Estate Society annual meetings, San Francisco, CA, April 2007.

"Scope of Work Updates to the 2006 Uniform Standards of Professional Appraisal Practice, presented to the Real Estate Counseling Group of America, Philadelphia, PA, October 2006.

"Valuation of Contaminated Property in the United States," seminar presented to the faculty and students of the University of Endhoven, the Netherlands, June 2006.

"Stigma Revisited Again," working paper in progress with Max Kummerow, presented at the American Real Estate Society annual meetings, Key West, FL, April 2006.

"Application of a Repeat Sales Methodology to Evaluate Property Value Damages from Contamination," presented at the American Real Estate Society annual meetings, Key West, FL, April 2006, subsequently published in the *Journal of Housing Research.*

"The Impact of Transit Corridors on Residential Property Values," with Ron Throupe, John Carruthers, and Andy Krause, presented at the American Real Estate Society annual meetings, Key West, FL, April 2006, accepted for publication in the *Journal of Real Estate Research.*

"Real Estate Investing," Seattle Society of Chartered Financial Analysts, December 14, 2005.

"Valuation," Session Chair for the American Real Estate Society meetings, Santa Fe, NM, April 2005.

"History of Valuation" Panelist for the American Real Estate Society meetings, Santa Fe, NM, April 2005.

"Regression Analysis and Diminishing Marginal Returns – An Appraisal Case Study" with John Carruthers, accepted for presentation at the 2005 Annual Meeting of the American Real Estate Society, Santa Fe, NM, April 2005.

"The USPAP Scope of Work Proposal," presented to the Real Estate Counseling Group of America, Savannah, GA, March 2005.

"Valuation of Brownfields," presentation to officials of the City of Greensboro, NC, January 2005.

"Trophy Property," presentation at the annual meetings of the American Society of Auctioneers, Madison, WI, July 2004.

"Environmental Valuation Issues," Session Chair for the American Real Estate Society meetings, Captiva Island, FL, April 2004.

"Agency Costs and REIT Debt Announcements," presented at the American Real Estate Society meetings, Captiva Island, FL, April 2004.

"The Future of Real Estate," presented at the invitation of the Real Estate Counseling Group of America, Half Moon Bay, CA, March 2004.

"Property Tax Appraisal," presented at a seminar in Tacoma, WA, February 2004.

"Agency Costs and REIT IPOs," presented at the invitation of the American Real Estate and Urban Economics Association, San Diego, CA, January 2004.

**INVITED TALKS (continued)**

"Updates on the EPA's New Windfall Lien Provisions," presented at the invitation of the U.S. EPA at the Brownfields Conference, Portland, OR, October 29, 2003.

"Updates on the EPA's New Windfall Lien Provisions," presented in a nationwide teleconference sponsored by the American Bar Association's Section on Energy, Environment, and Natural Resources, August 20, 2003.

"Can a Tribal Utility Pay for Itself," presented at the Tribal Utilities Conference, Seattle, WA, June 9 & 10, 2003.

"Financing Residential Development," Master Builders Association of Olympia, WA, April 2003.

"Agency Costs and REIT Mergers," American Real Estate Society annual meetings, Monterrey, CA, April 2003.

"Economics of Brownfield Redevelopment," presented at the Advanced Brownfields Redevelopment Workshop, Anchorage, AK, January 27, 2003.

"Appraisal of Contaminated Property," International Association of Assessing Officials, West Puget Sound Chapter, Olympia, WA, April 26, 2002.

"Market Value(s)," presented to the Seattle Chapter of the Appraisal Institute, Seattle, WA, November 2001.

"Loss Profits and Damages from an Economist's Point of View," presented at the Washington State CPA's Association Litigation Services Seminar, May 4, 2001.

"Appraisal of EIFS Residences," presented at a Symposium on emerging litigation areas sponsored by Mealy Publications, Marina del Mar, CA, November 2000.

"The Puget Sound Economy," guest speaker for KIRO-TV (Seattle CBS affiliate) at client breakfast, September 21, 2000.

"Public Interest Value," presented at the conference Valuation 2000, jointly sponsored by the Appraisal Institute, the American Society of Appraisers, and the American Farm Managers and Rural Appraisers, Las Vegas, NV, July 6–7, 2000.

"An Economic Model of Downtown Seattle Land Prices," presented to the Pacific Northwest Regional Economic Conference, Western Washington U., April 2000.

"Deposing the Real Estate Expert Witness," presented to participants in the Trial Advocacy classes, U. of Washington School of Law, March 2000.

"Economic Impact of Real Estate Development," presented to the Seattle Economists Club, December 1999.

"Appraisal of Contaminated Property," presented to the International Association of Assessing Officials, Evergreen Chapter, Woodinville, WA, November 1999.

"Appraisal of EIFS Residences," presented at a Symposium on EIFS sponsored by U.S. Inspect, Washington, DC, June 1999.

"House Price Implications of School District Choice," presented at the American Real Estate and Urban Economics Association, New York City, January 1999.

"Economic Impact Studies for Homebuilding," presented to the National Assn. of Homebuilders annual Governmental Affairs, St. Louis, MO, November 7, 1998.

"Economic Assessment of Historic Properties," presented to the 52nd annual Preservation Conference, National Trust for Historic Preservation, Savannah, GA, October 23, 1998.

"Current Topics in Financial Management for Homebuilders and Developers," presented to the South Eastern Builders Conference, Orlando, FL, August 17, 1998.

"Valuation of Contaminated Property," presented to the Quarterly Meeting of the South Carolina Appraisal Institute, Columbia, SC, July 23, 1998.





**INVITED TALKS (continued)**

Panel discussion on Land Use, Regulation, and House Prices, presented at the American Real Estate and Urban Economics Association Mid-Year Meeting, held at the National Association of Homebuilders, Washington, DC, May 26, 1998.

"Accounting and Financial Management for Homebuilders," presented to the Southeastern Builders Conference, Orlando, FL, July 1997.

"Impact of Historic District Designation in Beaufort, South Carolina," presented to the American Real Estate Society, Sarasota, FL, April 1997.

"The Value of History to Real Estate," presented to the Lovable Communities Conference sponsored by the South Carolina Downtown Development Association, Charleston, SC, October 1996.

"Valuation of Historic Residences," presented to Appraisal Institute members, Savannah, GA, May 1996.

"House Price Implications of Historic District Designation," presented to the American Real Estate Society, Lake Tahoe, CA, March 29, 1996.

"Economics of Historic Districts," presented to the Georgia Trust for Historic Preservation, Atlanta, GA, February 16, 1996.

"Accounting and Financial Management for Homebuilders," presented to the South Eastern Builders Conference, Orlando, FL, July 1995.

Panel chair, "Appraisal of Historic Properties," presented at "Historic Preservation for Realtors," sponsored by the S.C. Department of Archives and History, Columbia, SC, January 13, 1995.

Presentation on Advanced Manufacturing Capabilities made to members of the U.S. Senate, Washington, DC, July 1993.

"A Study into the Risk of Sales Variability and its Effect on the Success of Strip Shopping Centers," presented at the Applied Geography Conference, Denton, TX, October 20, 1992.

## TEACHING

From 1992 through 1998, John Kilpatrick taught corporate finance and real estate in the Moore School of Business at the University of South Carolina. Courses developed and taught included the following:

- Principles of Real Estate (FINA 366 – certified as a pre-licensing course by the S.C. Real Estate Commission)
- Real Estate Market Analysis (FINA 367 – certified as a pre-licensing course by the S.C. Real Estate Commission)
- Principles of Finance (FINA 363 – required of all undergraduate business majors)
- Commercial and Central Banking (ECON 301)

John Kilpatrick's students won many of USC's top undergraduate Business scholarships, and his courses were consistently oversubscribed months in advance. Additionally, John Kilpatrick was a featured speaker for the Daniel Management Center of the University of South Carolina, teaching Executive Education courses on Real Estate (1995–96) and Corporate Budgeting (1997–98). He was the first person in South Carolina certified by the Real Estate Commission to teach continuing education courses via statewide closed circuit broadcast. As a Lecturer in Finance, Kilpatrick has taught Appraisal or Real Estate Continuing Education in South Carolina (1995–1998), Georgia (1996), Florida (1995–1998), and Washington (1999–present), and he has recently taught appraisal continuing education for the Seattle chapter of the Appraisal Institute, Bellevue College, and various chapters of the International Association of Assessing Officials.

Dr. Kilpatrick is a frequent lecturer on Real Estate Appraisal Standards and Methods, and in 2004 he was appointed by the Appraisal Standards Board (Washington, DC) as a Nationally Certified instructor of the *Uniform Standards of Professional Appraisal Practice*. He occasionally teaches the pre-licensing course for Bellevue

College, Bellevue, Washington. Also in 2004, he was nominated for a seat on the Appraisal Qualifications Board. From 2006-2015, Dr. Kilpatrick was a Visiting Scholar in Real Estate Finance at the Zicklin School of Business, Baruch College, New York City, New York, Dr. Kilpatrick also serves on the National Board of Advisors for the Washington State University College of Business.

## PROFESSIONAL ASSOCIATIONS

John Kilpatrick is an active member of various academic and professional organizations, including the Royal Institution of Chartered Surveyors (Fellow, Faculty of Valuation), the Appraisal Institute (MAI-Designated Member), the American Bar Association (Associate Member), the American Real Estate Society (Fellow), the American Real Estate and Urban Economics Association, the Financial Management Association, the American Finance Association, the American Statistical Association, the Econometric Society, the International Right of Way Association, the International Association of Assessing Officials, the International Code Council (Professional Member), the National Association of Realtors, and the Washington State Bar Association (Associate Member).

# Appendix 5

# Evaluation of Hawai'i Dairy Farms' Draft Environmental Impact Statement

Byron H. Shaw, Ph.D.
Soil and Water Consulting

July 25, 2016

**Byron H. Shaw, Ph.D.**
Soil and Water Consulting
*Professor Emeritus of Water Resources, University of Wisconsin-Stevens Point*
*Professional Soil Scientist #104-112*
*Professional Hydrologist #162-111*

Evaluation of Hawaii Dairy Farms' Draft Environmental Impact Statement ("DEIS")

I am a licensed soil scientist and hydrologist in the State of Wisconsin, an dhave a Ph.D. in soil science. My research and publications have covered a wide range of soil and water issues, with many evaluating surface water and groundwater contamination associated with agricultural acitivites. I have also lived and worked on a farm for the past 45 years. A copy of my curriculum vitae is attached hereto.

I have read and evaluated the DEIS, Section 4.3, and Appendices C and D (discussing soils and nutrient balances) and have the following comments and concerns.

The dominant soils on the proposed dairy are the Ka'ena clay and Kalihi clay, both of which are classified as poorly drained. While these soils may be more effective at reducing or preventing leaching of nutrients to groundwater than soils of a well-drained classification, they are not ideal for crop growth and are very susceptible to surface runoff. Several references have stated that the kikuyu grass to be used on this property only does well on at least moderately well drained soils. *See, e.g.*, Reference No. 6 (Clark, 2007) and Reference No. 7 (Food and Agricultural Organization of the United Nations). The ability of kikuyu to thrive in these soil conditions could have a large impact on the potential grass yield and livestock carrying capacity of the site. The DEIS and Appendices fail to adequately disclose or consider how the soils at the site limit the livestock carrying capacity.

Mears, 1992 has listed the cattle carrying capacity of Kikuyu pastures at 1.5 to 3 head per hectare with high fertilization. This figure is much lower than what is proposed for this dairy, even under the 699 head proposal, which would be 1.47 animals per acre or 3.67 animals per hectare. With 2,000 head of cows, the density increases to 4.25 animals per acre or 10.5 animals per hectare. I highly doubt this stocking rate is achievable or sustainable without serious environmental impacts.

Hoof compaction on the already poorly drained soils is likely to make the soils more susceptible to poor infiltration and runoff. Compaction may pose a particular problem in areas where the cows congregate for extended periods of time; for example, near the gate at the entrance to the milking parlor as they wait to enter or near watering troughs. I would expect the manure buildup in these areas also to be higher than in open grazing areas, as the cows likely will linger for longer periods of time. The combination of increased hoof compaction and increased manure buildup in these areas is problematic (see discussion, below), and should be addressed

in the DEIS. Compaction is generally recognized, but not adequately discussed in the DEIS or appendices.

The travel routes used by the cattle will be the most likely route for significant nutrient runoff from these soils. The cattle will travel twice a day from the watering areas where they congregate to the milking parlor. These routes are problem areas on most rotational dairy farms I have seen, and are not discussed in the DEIS. The travel routes and areas where cattle congregate are very susceptible to soil compaction. Vegetation in these areas is likely to be non-existent, making conditions ideal for runoff to occur.

A plan for mitigation of runoff from these areas is needed. The DEIS mentions a retention pond for runoff, but in the sections I have reviewed, I do not see any specific mitigation measures for runoff from areas with heavily compacted soils..

The DEIS discusses a Natural Resources Conservation Service ("NRCS") phosphorus leaching index, which is identified as "low" for the site due to the poor drainage and low permeability. The DEIS does not evaluate the potential for phosphorus in runoff, however, which generally is high when the leaching index is low (due to diminished ability of surface liquid to permeate through the soils). The DEIS also discusses the buildup of organic matter that may occur from addition of manure. All manure to be deposited and used on this site will be surface applied with no tillage to incorporate it into the soils. This no-till practice could lead to a high buildup of nutrients near the soil surface, making the nutrients more susceptible to runoff. Organic matter will only increase in the soil with the growth of root material or through incorporation via soil organisms. Surface applied manure and fertilizers will lead to very high nutrient concentrations at or near the soil surface, making the concentration of nutrients in soil runoff very high. The DEIS does not cite to any literature to back up its claims of improved soil health from a facility of this type.

Whenever there is runoff from areas with highly compact soils or areas with a high buildup of nutrients, there will be bacteria, viruses, and nutrients carried in the runoff waters. Surface runoff could also contain hormones or pharmaceuticals used by the dairy. The fact that the DEIS does not mention the use of hormones or pharmaceuticals by the dairy is a flaw. The use of hormones and pharmaceuticals and their impacts should be addressed in the DEIS, because the surface runoff could contain these additives. While the DEIS acknowledges the possibility of surface runoff, it does not adequately address the impacts of the nutrients, bacteria, viruses, hormones, or pharmaceuticals that may be carried downstream, nor does it include a discussion of adequate mitigation measures for these impacts. The buffers that have been proposed are not likely able to mitigate runoff from the cattle traffic areas and watering locations; a detention pond with grass infiltration and treatment area at the outlet of the property would be needed to remediate sediment, microbes, and nutrients generated on the property.



The nutrient budget presented for the site is based on an assumption of about 16 tons per acre yield of kikuyu grass, which is only achieved with high fertilization. This yield is questionable based on the soil properties discussed above, and has only been demonstrated on a few sample plots without use of cattle and without their impacts on the soil. The poorly drained soils along with the expected compaction will limit the rooting depth of the kikuyu grass, which could significantly decrease crop yield from what the DEIS projects.

Some of the soils on the edges of the site have better drainage classifications and could lead to some groundwater contamination, especially under the planned high fertilization rates. The DEIS needs to consider the timing of any fertilizer application, including manure, and prevent the application of excessive amounts of fertilizer during periods of high leaching or runoff potential such as rainy season and during irrigation. The combination of high precipitation, 50 inches per year, with a 10 year storm frequency of over 8 inches in a 24 hour period makes leaching and runoff highly probable. This probability is increased with the planned irrigation to maximize yields which would result in soils kept near their field capacity allowing for little additional water before leaching or runoff would occur.

The DEIS does not include an adequate plan for groundwater monitoring. The list of monitoring parameters includes nitrogen, but the DEIS does not include specifics on the forms of nitrogen to be monitored in soils or water samples. At a minimum ammonium, nitrate and kjeldahl nitrogen should be analyzed in soil and water samples. Available and total phosphorus should be analyzed in soil and water samples. Proper soil and water sampling is essential in order to be able to detect any problems with manure management on the site. Once excees nutrients reach groundwater, it may take decades for the contamination to move through the system.

In conclusion, the DEIS likely overestimates the yield of the kikuyu grass and does not fully consider the impacts of cattle on soil compaction and crop yield. The DEIS also does not adequately evaluate or mitigate the surface runoff—or the contents of that runoff—that is likely to occur from areas of poorly drained soils, especially when those soils are compacted by a high density of cattle. Based on the limited data I have found, I believe the planned initial animal density may exceed that carrying capacity of the site, and I do not believe the expansion to 2000 animals will be feasible. The poorly drained soils, along with high susceptibility to soil compaction, the frequency of heavy rainfall, and the close proximity to drainage ways, all lead to a high probability of runoff that will contain bacteria and nutrients from the intensly farmed site. I do not believe the DEIS has adequately addressed these risks, and I do not believe the DEIS has presented adequate remedial measures.

Byron H. Shaw, Ph.D

**References**

1. Mears, P. T., 1992. *Pennisetum clandestinum* Hochst. ex Chiov.. Record from Proseabase. Mannetje, L.'t and Jones, R.M. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia.

2. Kikuyu (Pennisetum clandestinum), Feedipedia, Animal feed reources information system, *available at*, <www.feedipedia.org/node/398>.

*3.* Fukumoto, Glen K. and Chin N. Lee, Kikuyugrass for Forage, Livestock Management, April 2003, *available at* <*www.ctahr.**hawaii**.edu/oc/freepubs/pdf/LM-5.pdf*>.

4. Fulkerson, Bill, Kikuyu grass, Future Dairy Tech Note, January 2007, *available at* <http://futuredairy.com.au/wp-content/uploads/2016/02/TechNoteKikuyu.pdf>.

5. Fact Sheet, EverGraze Action – Growing kikuyu for summer feed and soil cover, EverGraze, 2008, *available at*, <http://www.evergraze.com.au/library-content/evergraze-action-growing-kikuyu-for-summer-feed-and-soil-cover/>.

6. Clark, S., "Kikuyu Fact Sheet," Department of Primary Industries, Primary Industries Victoria Research, Hamilton, Victoria, Dec. 2007, *available at* <http://keys.lucidcentral.org/keys/v3/pastures/Html/Kikuyu.htm>.

The following quote is from this publication:

"Kikuyu is widely adapted **but prefers fertile, at least moderately drained, light to medium textured soils.** It grows best on well-structured, red basalt soils, but also on alluvial and fertilized moist sandy soils. It can tolerate some waterlogging and up to 10 days inundation, as well as moderate salinity levels. It performs best in soils with moderate acidity (pH 5.5-7.0), but tolerates pH as low as 4.5 and the often accompanying high aluminium and manganese."

7. Pennisetum clandestinum Hochst. Ex Chiov, FAO, *available at*, <http://www.fao.org/ag/agp/agpc/doc/Gbase/data/pf000298.htm>.

The following quotes are from this publication:

*Soil requirements*

*Its natural occurrence is mainly on deep latosolic soils of good fertility, and it has quickly adapted to similar soils elsewhere. It also thrives on alluvial soils and on moist, sandy soils where the fertility has been raised by animal excrete or mineral fertilizer. It is an excellent colonizer and soil stabilizer in small paddocks around dairy bails, piggeries and feed-lots, and where non-toxic effluent is discharged from factories**. It does require soils with good drainage.***

Grazing management



Close grazing or cutting designed to avoid the build-up of a dense mat of stolons is necessary to maintain temperate legumes with Kikuyu. Renovation of worn-out or degenerate pastures by mechanical ripping has no long- term effect unless accompanied by fertilization with inorganic nitrogen or the inclusion of a legume. Where Neonotonia wightii cv. Clarence was the associated legume, grazing every four weeks reduced the legume percentage, compared with the eighth- or 12-week grazing interval. The sward should be maintained with a dressing of at least 150 kg N/ha applied in split dressings in spring and autumn. If weeds are troublesome the pasture can be slashed. With a Kikuyu/tropical legume mixture, grazing to a height of 10-15 cm should take place every six to eight weeks. With strip grazing, 50 beasts per hectare per day can be grazed on a grass/legume mixture.

# Byron H. Shaw, Ph.D.
## *Curriculum Vitae*
## 2016

**Education**

- Bachelor of Science, soil science, University of Wisconsin, Madison (1964).
- Master of Science, soil science, University of Wisconsin, Madison (1966).
- Ph.D., soil science (major), water chemistry (minor), University of Wisconsin, Madison (1968).

**Experience**

- Soil and water Consultant (2000-present).
- Emeritus Professor Water Resources, University of Wisconsin-Stevens Point, College of Natural Resources (2001).
- Professor of soil and water science, University of Wisconsin-Stevens Point, College of Natural Resources (1978-Present).
- Associate Professor (1973-78), Assistant Professor (1968-73), University of Wisconsin-Stevens Point, College of Natural Resources.
- Discipline Coordinator, Water Resources, University of Wisconsin-Stevens Point, College of Natural Resources (1983-86).
- Water Resource Specialist, University of Wisconsin-Extension (1977-2000).
- Director, Environmental Task Force Program, University of Wisconsin-Stevens Point, College of Natural Resources (1973-2000).
- Major Professor to over 50 MS graduate students (1971-2000).

**Courses Taught** (last 5 years at University of Wisconsin-Stevens Point)

- Water 492/692 - Advanced Techniques of Environmental Analysis
- Water 350 - Current Issues in Water Resources
- Water 475/675 - Groundwater Management
- Water 381 - Internship - Supervise about 40 interns/semester in ETF Lab
- Water 499 - Special Studies
- Water 799 - Thesis, advise four-six graduate students/semester
- Water 385/585 - Techniques in Hydrogeology
- NR 475 - International Environmental Studies

**Publications** (past 10 years)

- Russelle, M.P., J.F.S. Lamb, M.B. Turyk, B.H. Shaw and B. Peterson. 2007. Managing Nitrogen Contaminated Soils: Benefits of N2-Fixing Alfalfa. Agron. J. 99:738-746.



**Consulting activities (**past 4 years)
*Byron Shaw Soil and Water Consulting, LLC*

- Western Environmental Law Center: drafted model "Best Management Practices" relating to field and nutrient management (2016).

- Midwest Environmental Advocates: reviewed and commented on nutrient management plan and related documents relative to a dairy CAFO expansion and potential environmental impacts; testified at hearing in February, 2014 (2012-2014).

- Law Offices of Charles M. Tebbutt: reviewed documents and presented opinion relative to groundwater pollution from dairies in Yakima Valley, WA (2013-2015).

- Cornelli Law Group: reviewed data and depositions in case *Preisler v. Kuettel's Septic Service, Inc.*; produced report on likely source of nitrate to groundwater (2012).

- Nick Karris, Nekoosa Farms: reviewed application material for proposed Golden Sands Dairy and Comment Letter to DNR for EIS development (2012).

- Monterey Coastkeeper: reviewed and commented on nutrient management plan for Gallo Farms, Monterey CA (2010).

- Law Offices of Charles M. Tebbutt: reviewed groundwater data and proposed groundwater monitoring program for Faria Dairy CAFO in central WA (2009-10).

- Town of Little Black, Taylor Co., WI: reviewed and commented on environmental adequacy of nutrient management plan for a proposed 5000+ head dairy operation (2009-10).

- Town of Magnolia: reviewed Nutrient Management Plan and evaluated environmental impacts from a large dairy operation; testified at several town Board hearings (2007-10).

**Presentations** (past 10 years)

- Keynote presentation: "Do Current Laws and Policies Protect Wisconsin's Water Resources?," Wisconsin Association of Land Conservation Employees annual meeting, 2007.

**Committees and boards** (past 10 years)

- Phosphorus Standards Advisory Committee, Wisconsin Dept. of Natural Resources (2008-2010).

- River Alliance of Wisconsin, Member-Board of Directors (2002 to 2010).

**Awards**

- Wisconsin Clean Water Achievement Award. Wisconsin Dept. of Natural Resources (2002).
- Emeritus Professor, Water Resources, University of Wisconsin Stevens Point (2001)
- Distinguished Service Award, American Water Resources Association-Wisconsin chapter (2000).
- Distinguished Service Award, University of Wisconsin Stevens Point (2000).

**Professional Licenses**

Wisconsin Professional soil scientist #104-112

Wisconsin Professional Hydrologist #162-111

# Appendix 6

COUNTY COUNCIL
COUNTY OF KAUAI

# Resolution

No. 2001-25, Draft 1

## RESOLUTION SUPPORTING THE FUTURE PRESERVATION OF MĀHĀ'ULEPŪ

WHEREAS, Māhā'ulepū is a heritage landscape where it is possible to preserve and restore diverse significant natural, scenic, cultural, archaeological, historic, scientific and recreational resources; and

WHEREAS, Māhā'ulepū is a living cultural landscape and a place sacred to many Native Hawaiians, particularly to those of the Kōloa area whose ancestral remains are buried at Māhā'ulepū; and

WHEREAS, it is in the economic and social interest of the County of Kaua'i to conserve its valuable natural and cultural resources and to create parks and preserves for the future; and

WHEREAS, the ahupua'a of Māhā'ulepū is also directly adjacent to Kīpū Kai, an entire ahupua'a which is a future State land preserve; and

WHEREAS, the unique opportunity to apply the ahupua'a framework of care-taking and management of watersheds from mountain peak to the ocean exists at both Kīpū Kai and Māhā'ulepū; and

WHEREAS, landowners should receive fair value for land dedicated or sold for public purposes; and

WHEREAS, the Kaua'i General Plan states that Māhā'ulepū needs a community-based planning effort that engages the landowner and local community interests, drawing upon the County government, the State Department of Land and Natural Resources (DLNR), and various professional experts, as needed; NOW, THEREFORE:

BE IT RESOLVED, that the Council of the County of Kaua'i supports and is willing to participate in collaborative planning efforts to explore options for the preservation of Māhā'ulepū that would make it possible to preserve the irreplaceable natural and cultural resources of Māhā'ulepū, and to sustain the experience of this place as an undeveloped area with compatible uses.

BE IT FURTHER RESOLVED, that the Council of the County of Kaua'i extends its mahalo to the Grove Farm Company, Inc., for continuing to keep Māhā'ulepū open to the public, both residents and visitors.

BE IT FURTHER RESOLVED, that the Council of the County of Kaua'i thanks Governor Benjamin J. Cayetano for his declaration of support for preservation of Māhā'ulepū and asks the Governor to continue his leadership towards preservation of Māhā'ulepū.

BE IT FURTHER RESOLVED, that copies of this resolution be forwarded to the Honorable Benjamin J. Cayetano, Governor of the State of Hawai'i; the Honorable Mazie K. Hirono, Lieutenant Governor of the State of Hawai'i; the Honorable Maryanne W. Kusaka, Mayor of the County of Kaua'i; State Senator Jonathan Chun; State Senator Avery B. Chumbley; State Representative Ezra R. Kanoho; State Representative Bertha C. Kawakami; State Representative Hermina M. Morita; Ms. Lynn P. McCrory, State Board of Land and Natural Resources Kaua'i Member; and Mr. David W. Pratt, President and Chief Executive Officer, Grove Farm Company, Inc.

INTRODUCED BY:

/s/ RON KOUCHI
/s/ BILL "KAIPO" ASING
/s/ BRYAN BAPTISTE
/s/ GARY HOOSER
/s/ DARYL KANESHIRO
/s/ JAMES KUNANE TOKIOKA
/s/ RANDAL VALENCIANO

| | Aye | Nay | Exc. |
|---|---|---|---|
| Asing | X | | |
| Baptiste | X | | |
| Hooser | X | | |
| Kaneshiro | X | | |
| Kouchi | X | | |
| Tokioka | X | | |
| Valenciano | X | | |
| TOTAL | 7 | 0 | 0 |

**CERTIFICATE OF ADOPTION**

*We hereby certify that Resolution No 2001-25, Draft 1, adopted by the Council of the County of Kauai, State of Hawaii, Lihue, Kauai, Hawaii, on April 11, 2001.*

County Clerk

Chairman & Presiding Officer

Dated 4/12/2001

# Appendix 7

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

| | |
|---|---|
| FRIENDS OF MAHAULEPU, INC., Hawaii non-profit corporation, Plaintiff, | CIVIL NO. 1:15-cv-00205-LMK-KJM |
| vs. | |
| HAWAII DAIRY FARMS, LLC, a Delaware Limited Liability Company; ULUPONO INITIATIVE, LLC; a Delaware Limited Liability Company; MAHAULEPU FARMS, LLC; a Delaware Limited Liability Company, Defendants. | |

DEPOSITION OF JAMES J. GARMATZ,

VOLUME 1,

Taken on behalf of Plaintiff at Koloa Public Library, 3451 Poipu Road and Sheraton Kauai Resort, 2440 Hoonani Road, Koloa, Hawaii 96756, commencing at 9:02 a.m. on June 13, 2016, pursuant to Notice.

REPORTED BY:

TERRI R. HANSON, CSR 482

Registered Professional Reporter



APPEARANCES

For Plaintiff:

CHARLES M. TEBBUTT, ESQ.
SARAH A. MATSUMOTO, ESQ.
Law Offices of
Charles M. Tebbutt, PC
941 Lawrence Street
Eugene, Oregon 97401

For Defendants:

DIRK B. PALOUTZIAN, ESQ.
Baker, Manock & Jensen, PC
Suite 421
5260 North Palm Avenue
Fresno, California 93704-2209

Also Present:

Bridget Hammerquist

I N D E X

EXAMINATION BY PAGE
Mr. Tebbutt 5

EXHIBITS FOR IDENTIFICATION

Deposition Exhibit No. 1
Invoices, HDF 000481 - 000555 59

Deposition Exhibit No. 2
Amended Notice of 30(b)(6) Deposition of
Hawaii Dairy Farms, LLC. 71

Deposition Exhibit No. 3
Amended Notice of Deposition of
Mr. James Garmatz. 71

Deposition Exhibit No. 4
Figure 7B, Farm Post Construction Conditions.
FOM_002495 80

Deposition Exhibit No. 5
Aerial photograph. FOM_000231 104



Index (Continued) PAGE

Deposition Exhibit No. 6
Photograph. 112

Deposition Exhibit No. 22
Declaration of James Garmatz in Support of
Defendants' Motion for Summary Judgment. 113

WHEREUPON, the following proceedings were duly had:

JAMES J. GARMATZ,
after having been first duly sworn,
was examined and testified as follows:

EXAMINATION

BY MR. TEBBUTT:

Q. Good morning, Mr. Garmatz.

A. Good morning.

Q. Please state your full name and residence address for the record.

A. James John Garmatz, 3755 Omao Road, Koloa, Hawaii.

Q. And, sir, what is your present employment?

A. I'm a farm manager, Hawaii Dairy Farms.

Q. And how long have you been in that position?

A. Since October of 2013.

Q. And who hired you?

A. Mr. Kyle Datta.

Q. How did you find out about the job opportunity?

A. They had been in a long association with Kyle and some of the earlier investors.

Q. You have? You have?



October 2013, what did you -- what were your first functions?

A. Farm manager. We needed to grow grass.

Q. For what?

A. We needed to grow grass on the farm and establish grass so we could have grass when the cattle were going to start milking.

Q. Okay. So what did you do to establish grass on the facility?

A. Started with the nursery. The nursery was a four-acre patch. We planted that in November of 2013. Prior to the planting, we disked that ground with a harrow disk six times. We installed --

Q. Over what period time did you harrow the six times?

A. We probably started the first part of November, November of '13.

Q. Right. But over what period of time did you disk the six times? How many? Over days, weeks?

A. Thirty days.

Q. Okay.

A. We installed a drip system, drip irrigator system under the ground of the four acres, and then we sprayed the seed on via mulch.

Q. The drip irrigation system that you installed,

Q. Okay. What trees or shrubs clearing took place on the site from the time you started there in October 2013 until June 2014?

A. Just any tree that was taller than what our pivot could go under or go over.

Q. So what height would that be?

A. Eight to 10 feet.

Q. So anything over 8 to 10 feet was cleared, was that on the whole over 500 acres?

A. Yes.

Q. And how many of those trees or shrubs were there, would you say?

A. Numerous.

Q. How many?

A. Fifty.

Q. What kind of trees were they?

A. Primarily -- you know, I can't identify that 'cause I just don't know.

Q. Okay. What were the tallest trees that were cleared?

A. The albizia trees.

Q. And how tall were they?

A. Some of them as high as 20 feet.

Q. How many of them would you say were 20 feet?

A. Six or seven of them.



Q. Were any over 20 feet?

A. Yes.

Q. What were the tallest ones?

A. Thirty footers, 30 to 35 feet.

Q. And how many were in the 30- to 35-foot range?

A. Just two.

Q. And you think about a total of 50 trees of approximately 20 feet?

MR. PALOUTZIAN: Objection, misstates testimony.

BY MR. TEBBUTT:

Q. Is that a fair statement?

A. Say that again.

Q. About 50 trees that were approximately 20 feet tall?

A. No. Most of -- the balance of the 50 would have been 10 foot at the max, but they were tall enough we couldn't get the pivot across.

Q. Okay. About how many would you say were 15 feet or more?

A. Ten to 15.

Q. And what did you do with those trees?

A. We ground them to the stump.

Q. Okay. And just left the material on site?

A. Uh-huh. Let me say that again. We ground them

questions with respect to the categories of questioning in Exhibit 2. Have we discussed everything there is to discuss about 1A with grading and grubbing?

MR. PALOUTZIAN: I'm going to object to the form of the question. Go ahead.

THE WITNESS: Yes.

BY MR. TEBBUTT:

Q. With respect to 1B, the watering troughs, how many watering troughs have been installed?

MR. PALOUTZIAN: Object to the form of the question on that as well. Go ahead.

THE WITNESS: Approximately 160.

BY MR. TEBBUTT:

Q. Okay. And those to the concrete watering troughs referred to in 1B in Exhibit 2, correct?

A. Correct.

Q. And what did you do to prepare the area for the installation of the water troughs? Was it -- well, let me ask you this: Was the preparation similar for all 160?

A. Yes.

Q. Tell me what the preparation was.

A. The ground was left as is, level as it was, and we brought in the limestone from the quarry and leveled the ground and raised the water trough up on a level



plane so they could place the water trough on that level plane.

Q. Okay. Was there any excavation work done?

A. No.

Q. So the limestone was added to the surface?

A. Correct.

Q. And built up?

A. Built up and leveled.

Q. Okay. And it was brought from the neighboring quarry?

A. Yes.

Q. The one that's pretty close to the site?

A. Yes.

Q. That you can see from the site?

A. Yes.

Q. And how much over ground level was each water trough built up or the setting for the water trough?

A. The design was 12 to 15 inches, but some places we had to put more. If the ground was unlevel, we had to put more.

Q. Okay. And are all the watering troughs, do they now have waterlines that connect them?

A. No.

Q. Do any of them have waterlines that feed them?

A. Some.

Q. How many?
A. Forty.
Q. Are they in one particular area, those 40?
A. Yes.
Q. Okay. And are they fed by one of the two irrigation pipes that was installed at the facility that you testified about earlier?
A. No.
Q. Are they fed by an existing waterline?
A. No.
Q. How are they fed?
A. Not fed at all yet.
Q. Right. But that infrastructure is there, correct?
A. Uh-huh.
Q. Is that a yes?
A. The infrastructure to the --
Q. To the watering troughs.
A. That was installed.
Q. Okay. And when was that installed?
A. April of '14, March and April of '14.
Q. And those installations were in addition to the two pipes that you testified about earlier, correct?
A. Correct.
Q. And how was that piping installed?



Q. Okay. So the fences then are all neighbors' fences, not HDF fences?
A. Uh-huh (moves head up and down).
Q. Has HDF maintained any of those fences?
A. No.
(Garmatz Deposition Exhibit No. 5 was marked for identification.)
BY MR. TEBBUTT:
Q. Sir, handing you what's been marked Exhibit 5, an aerial photo, do you recognize the area that's depicted in this photo?
A. Yeah.
Q. Do you recognize it to be some portion, at least, of the HDF site?
A. Yeah.
Q. Do you see what we're going to refer to and what was referred to in Exhibit 2 as the keyhole pond?
A. Yes, sir.
Q. Tell me how that pond -- well, strike that. When was that keyhole pond dug?
A. Late April or early May of '14.
Q. And why was it dug?
A. Observation purposes.
Q. Observation of what?
A. Possible rock formations closer to the surface.

Q. So would you characterize it as a geological excavation?
A. Yeah.
Q. All right. And what were the results of that excavation?
A. That there was no rock there.
Q. Okay. Were any samples taken?
A. No.
Q. Any soil samples taken?
A. No.
Q. No water quality samples?
A. No.
Q. What's the source of the water in that pond?
A. Probably groundwater.
Q. How deep was that pond dug?
A. Originally dug about 8 to 10 feet.
Q. And what about the area around it, was that excavated at all before that pond was dug?
A. No, we just had the excavator down -- well, the excavator might have done some work around it. But I was there that day, and I don't recall any of that going on there.
Q. The excavated material, what was done with that?
A. As you see there, it's placed to your left in



that little berm, that grassy berm.
Q. Can you, with my blue pen, please circle the area where the excavated material was placed?
A. (Writing.) How do you want me to identify it?
Q. Just put EXC.
A. (Writing.)
Q. Do you see how the area there looks squared off?
A. Uh-huh (moves head up and down).
Q. Where keyhole pond was.
A. Uh-huh.
Q. Was there excavation done to create that square or rectangular area?
A. I couldn't tell you that. I wouldn't know.
Q. Wasn't, in fact, that whole area excavated before the keyhole pond was dug?
A. I couldn't tell you that.
Q. Who could?
MR. PALOUTZIAN: Calls for speculation, lacks foundation. Go ahead.
THE WITNESS: Probably Mason, the excavator operator.
BY MR. TEBBUTT:
Q. Mason who?
A. Slako, S-l-a-k-o.

Q. Were you there with him the whole day when that --

A. No, I came later that day when they decided to go ahead, but I remember we followed the excavator in there.

Q. Who's we?

A. Myself and Doyle Waybright.

Q. Just the two of you?

A. No, Marty was there also.

Q. Who's Marty?

A. Marty Forster is the guy that owns Effluent Irrigation.

Q. Okay. Who else was there?

A. Myself and Doyle and Mason. And I believe Adam was with us, too. I'm not for sure about that.

Q. Who requested that this area be dug?

A. The geophysicist that was doing the soil work, the geophysical study for the slab for the parlor, the dairy parlor.

Q. And who is that?

A. I can't recall his name.

Q. Was he present during the excavation?

A. No.

Q. Was this all done in one day?

A. Yeah, one afternoon.



Q. Did you take pictures for the geophysicist?

A. No, we never did.

Q. How did he get information about what you did?

A. We just told him, called him the next day and told him what we ran into. But this wasn't for his study.

Q. What was it for then?

A. Our own information.

Q. For what kind of information?

A. To determine if there was any stone or what depth the stone was at.

Q. Was this the area where you planned to put the lagoon, the effluent lagoon?

A. Yes.

Q. So was part of the purpose to determine depth to groundwater?

A. No, we were looking for stone.

Q. Have you determined what the depth to groundwater is in that area?

A. Varies from time to time.

Q. Right where the keyhole pond is, have you determined the depth to groundwater there?

A. Like I said, it varies.

Q. From what to what?

A. Two or three feet.

Q. Have you changed your lagoon design plan for the proposed dairy based on the work that was done at the site?

A. No.

Q. Do you know if any neighbors have installed additional fencing along the perimeter of the HDF property since HDF said it was planning to put a dairy site there?

A. Yes.

Q. How many?

A. Only one to my knowledge.

Q. And how much additional fencing?

A. Oh, man. He probably put in a thousand feet.

Q. Where?

A. On his boundaries.

Q. Yeah. Which are his boundaries?

A. He's right here (indicating).

Q. Okay. Draw just a line across the red for where it starts.

A. His boundaries?

Q. No, where the -- where you say the fence is.

A. Okay. It started way back here (writing).

Q. Okay. And if you go above that line, just put the name of the person, say right up here.

A. (Writing.)



Q. Or installing more water troughs?

A. Couldn't do that.

Q. Did he tell specifically not to do that stuff?

A. I understood that, yes.

Q. My question is: Did he tell you specifically not to do that stuff?

A. Yes, yes.

Q. Okay. Did you have any other lists of things, that you said, Can I do this or can I not do this, other than the things I've mentioned?

A. No, he was very clear. I understood what he wanted to do.

MR. TEBBUTT: I think we're going to break for the rest of the day.

MR. PALOUTZIAN: All right.

MR. TEBBUTT: We'll pick up in the morning.

THE COURT REPORTER: Reading and signing?

MR. PALOUTZIAN: Yes.

(Concluded at approximately 5:22 p.m., June 13, 2016.)

* * * * *

I, JAMES J. GARMATZ, VOLUME 1, hereby certify that I have read the foregoing typewritten pages 1 through 133, inclusive, and corrections, if any, were noted by me, and the same is now a true and correct transcript of my testimony.

DATED: Koloa, Hawaii _____

_____

JAMES J. GARMATZ

Signed before me this _____

day of _____ 2016.

_____

Friends of Mahaulepu, Inc. vs. Hawaii Dairy Farms, LLC; Civil No. 1:15-cv-00205-LMK-KJM; Deposition taken on June 13, 2016, by Terri R. Hanson, RPR, CSR 482.



STATE OF HAWAII )
) ss.
COUNTY OF KAUAI )

I, TERRI R. HANSON, RPR, CSR 482, do hereby certify:

That on Monday, June 13, 2016, at 9:02 a.m. appeared before me JAMES J. GARMATZ, VOLUME 1, the witness whose deposition is contained herein; that prior to being examined, the witness was by me duly sworn;

That pursuant to Rule 30(e) of the Hawaii Rules of Civil Procedure, a request for an opportunity to review and make changes to this transcript:

_X_Was made by the deponent or a party (and/or their attorney) prior to the completion of the deposition.
___Was **not** made by the deponent or a party (and/or their attorney) prior to the completion of the deposition.
___Was waived.

That the foregoing represents, to the best of my ability, a full, true and correct transcript of said deposition.

I further certify that I am not an attorney for any of the parties hereto, nor in any way concerned with the cause.

This 135-page Deposition of James J. Garmatz, Volume 1, dated June 13, 2016, was subscribed before me this 23rd day of June, 2016, in Lihue, Hawaii.

_____
TERRI R. HANSON, CSR 482
Registered Professional Reporter

# Appendix 8

**Law Offices of Charles M. Tebbutt, P.C.**
**941 Lawrence Street**
**Eugene, OR 97401**
**Ph: 541-344-3505 Fax: 541-344-3516**

May 7, 2015

*Via Certified Mail, Return Receipt Requested:*

Virginia Pressler, M.D.
Director, State of Hawaii Department of Health
1250 Punchbowl St.
Honolulu, Hawaii 96813

Keith Kawaoka
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*Via E-mail to:*

Sara Roser (roser.sara@epa.gov)
Standards and TMDL Office
U.S. EPA Region IX, Hawaii

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Monitoring, 305(b) and Integrated Reporting for Region IX States
U.S. EPA Region IX

**PETITION FOR § 303(d) LISTING OF WAIOPILI STREAM AS IMPAIRED WATER OF THE STATE AND FOR IMMEDIATE POSTING OF HEALTH RISKS POSED FROM HUMAN CONTACT WITH WATER**

Dear Director Pressler and Deputy Director Kawaoka:

This firm represents the Friends of Māhā'ulepu ("Friends") and the Kaua'i Chapter of the Surfrider Foundation ("Surfrider") (hereinafter collectively referred to as "Petitioners"). Pursuant to Hawaii Revised Statute § 91-6 and Department of Health Administrative Rule ("HAR") § 11-1-51, Petitioners hereby formally petition the Hawaii Department of Health ("DOH") to identify and list the Waiopili Stream on the Island of Kaua'i as a § 303(d) impaired waterway under the Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. 1313(d). Furthermore, Petitioners formally petition DOH



to immediately post warning signs at the Waiopili Stream cautioning the public about the risks posed from human contact with the impaired water.

Pursuant to HAR § 11-1-51(b)(1), Petitioners provide the following information: the Petitioners' names are:

- Friends of Māhā'ulepu, Inc., a not-for-profit corporation organized under the laws of the State of Hawaii. Friends' mailing address is: P.O. Box 1654, Koloa, Hawaii 97656. Friends' telephone number is 808-742-1037.

- Kaua'i Chapter of Surfrider Foundation. Surfrider's mailing address is P.O. Box 819, Waimea, Hawaii 96796. Surfrider's telephone number is 808-639-2968.

All communications related to this petition should be directed to this law firm at the address identified above. E-mail communications, which are preferred, should be sent to Charles M. Tebbutt (Charlie@tebbuttlaw.com); Daniel C. Snyder (Dan@tebbuttlaw.com); and Sarah A. Matsumoto (Sarah@tebbuttlaw.com).

Pursuant to HAR § 11-1-51-(b)(3), Petitioners submit as follows: Petitioners are dedicated to the protection of the natural beauty, land, and water of the Māhā'ulepu Valley and Island of Kaua'i, and to the protection of the health and safety of individuals and families who reside in, work, or visit spaces in the Māhā'ulepu Valley and the Island of Kaua'i. Members of Friends, Surfrider, and the community-at-large make use of the Waiopili Stream, a waterway that runs down through the Māhā'ulepu Valley to the coastline, where it meets the ocean at a point just southwest of Gillin's House and beach. Petitioners have learned that the Waiopili Stream is highly contaminated, so much so that continued recreation in and around the Stream is dangerous to human health. No warning signs have been posted alerting the public of the contamination or the health risks it poses. Petitioners believe that listing of the Waiopili Stream will trigger the water quality protections guaranteed by the Federal Clean Water Act and the State's implementing laws and regulations.

Under HAR § 11-1-51-(b)(4), Petitioners request that DOH take immediate and emergency action to identify and list the Waiopili Stream as a CWA § 303(d) impaired water, and to thereafter take appropriate steps to establish a total maximum daily load such that water quality standards for the Stream may be attained and not further degraded. Petitioners also request that DOH immediately exercise its authority to post warning signs at the various public access points along the Stream warning the public about the dangers of coming into contact with the contaminated water.

Specifically, Petitioners request the adoption of a rule within HAR § 11-1-54 directing DOH to amend and re-submit its "2014 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to §303(d) and §305(b), Clean Water Act (P.L. 97-117)" to include the Waiopili Stream as an inland impaired water under CWA § 303(d). The text of the proposed rule could read as follows:

"§11-54-16. Amendment of 2014 Integrated Report. The section authorizes and directs the Department to amend and re-submit to the United States Environmental Protection Agency the "2014 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to §303(d) and §305(b), Clean Water Act (P.L. 97-117)" (the "Integrated Report"). The Integrated Report shall be amended to identify and list the "Waiopili Stream" on the Island of Kauai as an § 303(d) impaired water. Relevant water quality data obtained by the Department shows that the Waiopili Stream is one of the most contaminated waters in the State. The Enterococci results demonstrate consistent and significant violations of the applicable water quality standard found at HAR § 11-54-8. Other water quality violations have also been documented. The Department shall accordingly amend and resubmit the Integrated Report, such resubmittal to be completed as soon as reasonably practicable, but no later than September 1, 2015, and request that EPA re-approve the Integrated Report as amended. The TMDL priority for the Waiopili Stream shall be identified as "High."

## LEGAL FRAMEWORK

The objective of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (and hereinafter referred to as the "Act"), is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To accomplish this objective, Congress established a national goal that "the discharge of pollutants into the navigable waters ***be eliminated*** by 1985[.]" 33 U.S.C. § 1251(a) (emphasis added). The Act thus makes the discharge of pollutants into waters unlawful except to the extent such discharge is done in compliance with a National Pollution Discharge Elimination System Permit. *See* 33 U.S.C. § 1311(a). The Act also requires that water quality standards be promulgated for all jurisdictional waters within each state and that effluent limitations be established for all point sources. Hawaii, as a delegated state, has the authority and responsibility to establish water quality standards for its waters. As it is directly relevant here, that responsibility also requires the State to identify those waters "for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters." 33 U.S.C. § 1313(d)(1). Such waters are placed on what has been referred to as the "303(d)" list. For those waters, the State is required to establish "total maximum daily loads" of pollutants that are permitted to be discharged into the water. The load "shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." 33 U.S.C. § 1313(d)(1)(B). The State must evaluate "all existing and readily available water quality-related data and information to develop" its § 303(d) list, including data for waters for which "water quality problems have been reported by...members of the public[.]" 40 C.F.R. § 130.7(b)(5).



Hawaii has designated all waters within the State as either "inland waters" or "marine waters," and has promulgated water quality standards for those waters as well as generally-applicable narrative standards that apply to all State waters. *See* HAR § 11-54-4. Inland waters are classified based on certain characteristics, such as whether they are flowing streams, standing waters, or wetlands. HAR § 11-54-2. Inland waters are further categorized as "Class I" or "Class II" inland waters, according to the categories of uses of those waters and their need for protection. *See* HAR § 11-54-3(a). Different protections apply depending on whether a stream is Class I or Class II. Generally, all inland waters are classified as Class II inland waters, unless a water is specifically identified as a Class I inland water per DOH regulations. HAR § 11-54-5.1(a)(1)(C). Class I inland waters include waters specifically designated as such in Appendix A to HAR 11-54, all flowing waters within natural reserves, preserves, sanctuaries, and refuges established by the State, all flowing waters in national and State parks, all flowing waters contained in State or Federal fish and wildlife refuges, and all flowing waters identified as unique or critical habitat by the U.S. Fish and Wildlife Service. HAR 11-54-5.1(a)(1)(A).

The State has established numerical water quality standards for all inland waters. HAR § 11-54-5.2. All flowing waters, including Class I and Class II waters, are not to be contaminated beyond the numerical water quality standards pursuant to the State's anti-degradation policy. *See* HAR 11-54-1.1; 11-54-5.1(a)(1). Water quality standards are to be maintained, except that the director of DOH may allow for water quality exceeding the numerical standards upon an affirmative demonstration that exceedance is "justifiable as a result of important economic or social development and will not interfere with or become injurious to any assigned uses made of, or presently in, those waters."

Beyond the water-specific quality standards discussed *supra*, the State has also established "recreational" criteria that apply to *all* State waters (HAR § 11-54-8). The criteria "are designed to protect the public from exposure to harmful levels of pathogens while participating in water-contact activities." *Id.* The criteria are tied to enterococcus population, a potentially harmful bacteria and an indicator of water quality. While "[e]nterococcus content shall not exceed a geometric mean of 35 colony forming units per one hundred milliliters over any thirty day interval.[,]" *id.* at (b), the HARs indicate that a "Statistical Threshold Value" of 130 colony forming units per one hundred milliliters is to be used for enterococcus. *Id.* at (c).

Finally, DOH has the authority and responsibility to post public notices about potential risks to public health or safety arising out of any violation or probable violation of HAR § 11-54. Posting allows DOH to warn visitors and citizens of Hawaii that they should stay out of, avoid drinking, avoid contact with, and/or avoid using the affected water altogether.

## THE WAIOPILI STREAM IS CONTAMINATED BEYOND APPLICABLE WATER QUALITY STANDARDS

Pursuant to HAR § 11-1-51-(b)(5) and (6), Petitioners submit as follows. The Waiopili Stream (the "Stream") data obtained by Surfrider's Kaua'i Chapter Bluewater Task Force shows that this inland water is contaminated well beyond applicable water quality standards. The Stream originates in Māhā'ulepu Valley in a relatively confined watershed. It follows the general topography down toward the ocean, where the Stream discharges at a point near Gillin's House. The inland coastal areas and coastline where the Stream discharges have all been designated as "Critical Habitat" by the United States Fish and Wildlife Service. *See, e.g.*, 50 C.F.R. § 17.95 (identifying relevant coastline as critical habitat for, *inter alia*, Kaua'i Cave Wolf Spider and Kaua'i Cave Amphipod); 50 C.F.R. § 17.97 (identifying similar area as critical habitat for plant species); Attachment A hereto (map from United States Fish and Wildlife Service showing critical habitat designations on Kaua'i). Pursuant to DOH regulations, those portions of the Waiopili Stream which fall within the areas designated as "Critical Habitat" are "Class 1.a" inland flowing waters. HAR § 11-54-5.1(1)(A)(iv). The rest of the Stream is therefore a Class II inland flowing water. HAR § 11-54-5.1(1)(C). These conclusions are supported by DOH's own reference map on its website identifying the Stream as being both a Class I and Class II inland water.

The objective of designating Class I inland waters is to ensure that "these waters remain in their natural state as nearly as possible with an ***absolute minimum of pollution from any human-caused source***" HAR § 11-54-3(b)(1) (emphasis added). To accomplish this end, "[a]ny conduct which results in a demonstrable increase in levels of point or nonpoint source contamination" is prohibited. *Id.* The uses of Class 1.a waters are further protected for, among other things, their scientific and educational purposes, recreation, aesthetic enjoyment, and other uses that are compatible with protection of the ecosystems associated with the waters. *Id.* at (b)(1)(A). Class II inland waters are protected for their recreational use, support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. *Id.* at (b)(2). "These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class." *Id.*

The uses of the Waiopili Stream, including its recreational and aesthetic values, have been negatively impacted and continue to be threatened and degraded by the presence of pollutants at levels that exceed the applicable water quality standards. Attachment B hereto is a summary of water quality testing that has been completed by Surfrider for enterococcus and other sampling parameters; lab sheets from TestAmerica for nutrient and TSS sampling are included at the end of Attachment B. Relevant enterococcus results are produced below – please note that the sampling data shows additional violations of the water quality standards for Total Nitrogen, Nitrate + Nitrite, Total Phosphorus, and TSS. *See* Attachment B at p. 3, 7.



## Enterococcus Sampling Results – 2014-2015

**Site 1: Gillin's Beach (DOH Site #847)**

| Date | Time | Salinity | Turbidity | Enterococcus |
|---|---|---|---|---|
| | | (ppt) | (NTU) | (mpn) |
| 03/07/14 | 820 | 31 | | 3255 |
| 04/12/14 | 750 | 33 | | 520 |
| 05/10/14 | 745 | 35.5 | | 2.3 |
| 06/22/14 | 835 | 28 | 5.66 | 1658 |
| 06/29/14 | 844 | 16 | 11.2 | 8164 |
| 7/6/2014 | 825 | 32 | 3.22 | 1860 |
| 7/13/2014 | 830 | 34.4 | 1.58 | 213 |
| 7/20/2014 | 814 | 33 | 3.19 | 2613 |
| 7/27/2014 | 723 | 31 | 2.94 | 1793 |
| 8/6/2014 | 710 | 33.4 | 4.06 | 275 |
| 8/10/2014 | 953 | 33.9 | 6.66 | 119 |
| 8/25/2014 | 848 | 31.5 | 3.88 | 670 |
| 9/14/2014 | 925 | 34.5 | 16.4 | 288 |
| 11/8/2014 | 740 | 28.5 | 9.22 | 5475 |
| 11/24/2014 | 820 | 32.1 | 3.57 | 1850 |
| 12/13/2014 | 730 | 32.6 | | 910 |
| 12/15/2014 | 805 | 33.3 | | 480 |
| 1/10/2015 | 740 | 32.8 | | 1019 |
| 1/20/2015 | 838 | 33.8 | 2.76 | 109 |
| 2/14/2015 | 810 | 34.1 | 2.54 | 512 |

**Site 2: Waiopili Stream, Bridge**

| Date | Time | Salinity | Turbidity | Enterococcus |
|---|---|---|---|---|
| | | (ppt) | (NTU) | (mpn) |
| 04/12/14 | 745 | 0 | | 5794 |
| 05/10/14 | 740 | 0 | | 14136 |
| 06/14/14 | 730 | 1 | | 8664 |
| 06/17/14 | 945 | 0 | 22.5 | na |
| 06/22/14 | 830 | 0 | 24.1 | 8164 |
| 06/29/14 | 836 | 0 | 20.2 | 9208 |
| 7/6/2014 | 817 | 0 | 22 | 10462 |
| 7/13/2014 | 820 | 0.3 | 21.2 | 12997 |
| 7/13/2014 | 900 | 0.1 | 22.1 | 9208 |
| 7/20/2014 | 808 | 0 | 34.6 | 24196 |

| | | | | |
|---|---|---|---|---|
| 7/23/2014 | 850 | 0.07 | 23.6 | |
| 7/27/2014 | 717 | 0.18 | 24 | 7270 |
| 8/6/2014 | 725 | 0.18 | 32 | 6131 |
| 8/10/2014 | 1000 | 0.13 | 104 | 5475 |
| 8/25/2014 | 855 | 0.07 | 28.9 | 5475 |
| 9/14/2014 | 940 | 8.29 | 27.4 | 8164 |
| 10/7/2014 | 1115 | | 458 | |
| 10/20/2014 | 13:48 | 0.03 | 149 | |

**Site 2b: Waiopili Stream, Beach**

| Date | Time | Salinity | Turbidity | Enterococcus |
|---|---|---|---|---|
| | | (ppt) | (NTU) | (mpn) |
| 11/8/2014 | 738 | 0.31 | 39.6 | 14136 |
| 11/24/2014 | 821 | 0.41 | 22.5 | 14136 |
| 11/24/2014 | 822 | 0.32 | 22.9 | 4884 |
| 12/13/2014 | 720 | 0.37 | | 19863 |
| 12/15/2014 | 811 | 0.12 | | 4884 |
| 1/10/2015 | 735 | 0.33 | | 8164 |
| 1/20/2015 | 831 | 0.08 | 47.6 | 2755 |
| 2/14/2015 | 800 | 0.33 | 47.6 | 24196 |

**Site 3: Waiopili Stream, Shack**

| Date | Time | Salinity | Turbidity | Enterococcus |
|---|---|---|---|---|
| | | (ppt) | (NTU) | (mpn) |
| 05/10/14 | 720 | 0 | | 7701 |
| 06/14/14 | 715 | 0 | | 11199 |
| 06/22/14 | 833 | 0 | 27.8 | 8164 |
| 06/29/14 | 826 | 0 | 23.6 | 6131 |
| 7/6/2014 | 809 | 0 | 22.7 | 10462 |
| 7/13/2014 | 815 | 0.09 | 21.2 | 17329 |
| 7/20/2014 | 757 | 0 | 51 | >24196 |
| 7/27/2014 | 705 | 0.19 | 35 | 2603 |
| 8/10/2014 | 940 | 0.08 | 94.8 | 4352 |

As demonstrated by the above information,[1] the Waiopili Stream is highly contaminated with bacteria. Virtually all of these results exceed the State's statistical

[1] Submitted herewith as Attachment C is the Declaration of Carl Berg, the Chair of the Executive Committee of the Kaua'i Chapter of Surfrider. Dr. Berg has been obtaining



water quality benchmark of 130 colonies forming units per one hundred milliliters. According to Surfrider, these enterococcus results are some of the highest seen on the Island. This is especially concerning for those sections of the Stream that are Class I.a waters. It is also concerning because, as detailed in Attachment D hereto, Surfrider contacts have made this information known to DOH for over a year and DOH has failed to act to protect public health.

Presently there are no warning signs at the Stream cautioning people from coming into contact with the water. Petitioners request that such posting immediately occur given the large amount of bacteria present in the waterway and the fact that many people visit this area. People make use of this site and have been observed recreating in and around the stream itself. *See* Attachment E hereto (photographs).[2] Furthermore, these results demonstrate that the Stream should be immediately included on DOH's 303(d) list and that a total maximum daily load be established to ensure that levels of bacteria and other pollutants are brought down to levels consistent with the protected uses of the Stream as a Class I and Class II water.

To the extent that DOH possesses other water quality data about the Waiopili Stream, Petitioners hereby incorporate that data into this petition. *See also* Attachment F (containing data obtained from DOH's website showing high enterococcus results for Waiopili Stream and surrounding areas). Given that the enterococcus levels in the Stream exceed the State's water quality standards by orders of magnitude, it is imperative that DOH act immediately to address this clear and present danger to human health and the environment. Per HAR §11-1-51(e), Petitioners request that DOH respond to this petition within thirty days of its receipt.

Sincerely,

Charles M. Tebbutt
Attorney for Petitioners

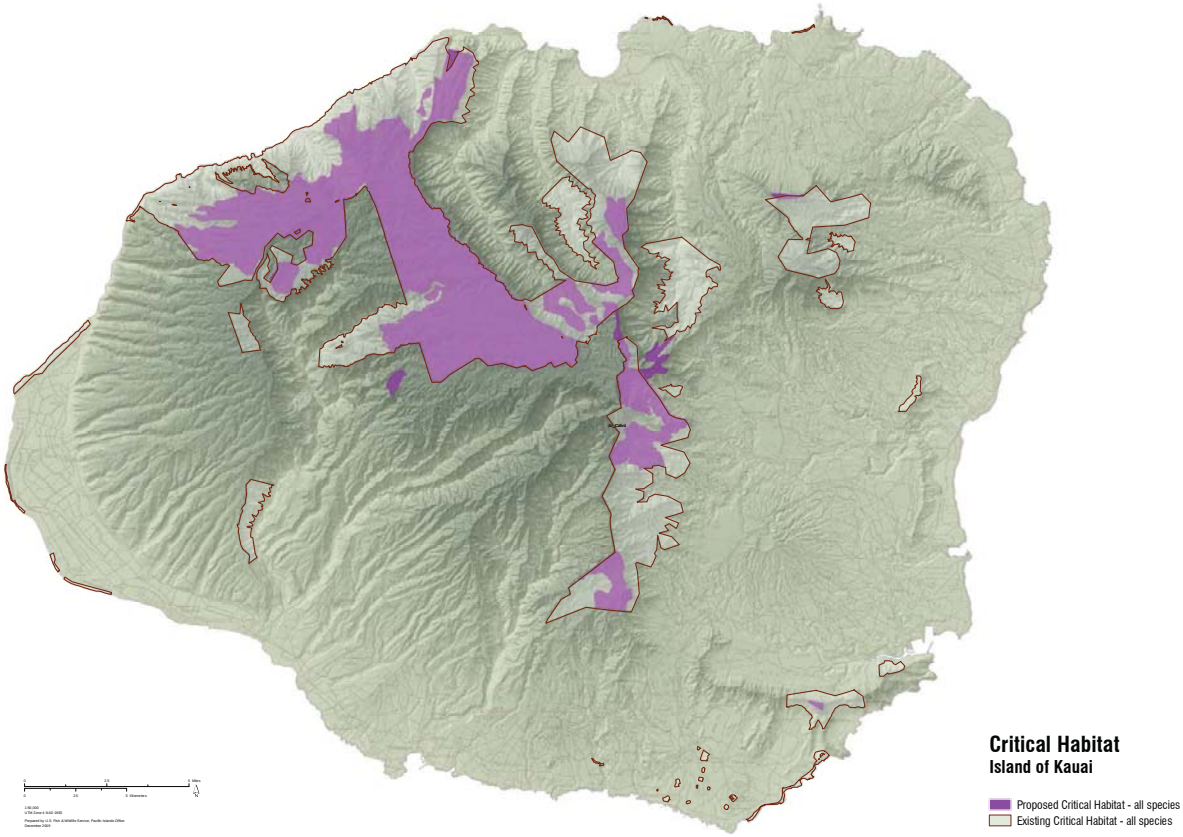
samples on behalf of Surfrider for years and is extremely knowledgeable in terms of sampling protocols and procedures. Dr. Berg's Declaration describes the sampling process and other related information.

[2] A CD is also being filed with this petition containing a movie showing individuals recreating within Waiopili Stream.

**Site 1: Gillins Beach (847)** **21° 53.322' N Lat** **159° 24.942' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 03/07/14 | 820 | 31 | | 3255 |
| 04/12/14 | 750 | 33 | | 520 |
| 05/10/14 | 745 | 35.5 | | 2.3 |
| 06/22/14 | 835 | 28 | 5.66 | 1658 |
| 06/29/14 | 844 | 16 | 11.2 | 8164 |
| 7/6/2014 | 825 | 32 | 3.22 | 1860 |
| 7/13/2014 | 830 | 34.4 | 1.58 | 213 |
| 7/20/2014 | 814 | 33 | 3.19 | 2613 |
| 7/27/2014 | 723 | 31 | 2.94 | 1793 |
| 8/6/2014 | 710 | 33.4 | 4.06 | 275 |
| 8/10/2014 | 953 | 33.9 | 6.66 | 119 |
| 8/25/2014 | 848 | 31.5 | 3.88 | 670 |
| 9/14/2014 | 925 | 34.5 | 16.4 | 288 |
| 11/8/2014 | 740 | 28.5 | 9.22 | 5475 |
| 11/24/2014 | 820 | 32.1 | 3.57 | 1850 |
| 12/13/2014 | 730 | 32.6 | | 910 |
| 12/15/2014 | 805 | 33.3 | | 480 |
| 1/10/2015 | 740 | 32.8 | | 1019 |
| 1/20/2015 | 838 | 33.8 | 2.76 | 109 |
| 2/14/2015 | 810 | 34.1 | 2.54 | 512 |





**Site 2b: Waiopili Stream, Beach** **21° 53.314' N Lat** **159° 25.069' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 11/8/2014 | 738 | 0.31 | 39.6 | 14136 |
| 11/24/2014 | 821 | 0.41 | 22.5 | 14136 |
| 11/24/2014 | 822 | 0.32 | 22.9 | 4884 |
| 12/13/2014 | 720 | 0.37 | | 19863 |
| 12/15/2014 | 811 | 0.12 | | 4884 |
| 1/10/2015 | 735 | 0.33 | | 8164 |
| 1/20/2015 | 831 | 0.08 | 47.6 | 2755 |
| 2/14/2015 | 800 | 0.33 | 47.6 | 24196 |



**Site 2: Waiopili Stream, Bridge** **21° 53.328' N Lat** **159° 24.099' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 04/12/14 | 745 | 0 | | 5794 |
| 05/10/14 | 740 | 0 | | 14136 |
| 06/14/14 | 730 | 1 | | 8664 |
| 06/17/14 | 945 | 0 | 22.5 | na |
| 06/22/14 | 830 | 0 | 24.1 | 8164 |
| 06/29/14 | 836 | 0 | 20.2 | 9208 |
| 7/6/2014 | 817 | 0 | 22 | 10462 |
| 7/13/2014 | 820 | 0.3 | 21.2 | 12997 |
| 7/13/2014 | 900 | 0.1 | 22.1 | 9208 |
| 7/20/2014 | 808 | 0 | 34.6 | 24196 |
| 7/23/2014 | 850 | 0.07 | 23.6 | |
| 7/27/2014 | 717 | 0.18 | 24 | 7270 |
| 8/6/2014 | 725 | 0.18 | 32 | 6131 |
| 8/10/2014 | 1000 | 0.13 | 104 | 5475 |
| 8/25/2014 | 855 | 0.07 | 28.9 | 5475 |
| 9/14/2014 | 940 | 8.29 | 27.4 | 8164 |
| 10/7/2014 | 1115 | | 458 | |
| 10/20/2014 | 13:48 | 0.03 | 149 | |

Additional Special Run Data - Surfrider

| Date | Total Nitrogen mg/L | Nitrate + Nitrite mg/L | Total Phosphorus mg/L | Total Suspended Solids mg/L | Turbidity NTU | Ammonia mg/L | Salinity ppt | |
|---|---|---|---|---|---|---|---|---|
| HAR Standards 1 | 0.2 | 0.008 | 0.025 | na | 1.5 | 0.006 | Estuaries | All Seasons |
| HAR Standards 1 | 0.18 | 0.03 | 0.03 | 10 | 2 | na | Streams | Dry Season |
| 7/13/2014 | 0.41 | 0.086 | 0.044 | 5.4 | 21.2 | 0.14 | 0.3 | |
| 8/10/2014 | 0.78 | 0.25 | 0.066 | 55 | 104 | 0.057 | 0.13 | |
| 9/14/2014 | 0.49 | 0.052 | 0.089 | 32 | 27.4 | 0.097 | 8.29 | |
| 1/20/2015 | 0.4 | 0.1 | <.04 | 15 | 47.6 | 0.13 | 0.08 | |
| Geo. mean | 0.500 | 0.103 | 0.064 | 19.431 | 41.180 | 0.100 | 0.401 | |

**Site 4: Mahaulepu Beach** **21° 53.365' N Lat** **159° 24.745' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 06/29/14 | 1025 | 35 | | <10 |
| 7/6/2014 | 815 | 35 | | <10 |
| 7/13/2014 | 745 | 34.7 | | <10 |
| 7/20/2014 | 735 | 35 | 1.6 | <10 |
| 7/27/2014 | | 35 | | <10 |



**Site 3: Waiopili Stream, Shack** **21° 53.619' N Lat** **159° 24.155' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 05/10/14 | 720 | 0 | | 7701 |
| 06/14/14 | 715 | 0 | | 11199 |
| 06/22/14 | 833 | 0 | 27.8 | 8164 |
| 06/29/14 | 826 | 0 | 23.6 | 6131 |
| 7/6/2014 | 809 | 0 | 22.7 | 10462 |
| 7/13/2014 | 815 | 0.09 | 21.2 | 17329 |
| 7/20/2014 | 757 | 0 | 51 | >24196 |
| 7/27/2014 | 705 | 0.19 | 35 | 2603 |
| 8/10/2014 | 940 | 0.08 | 94.8 | 4352 |

**Site 6: Gillin Well** **21° 53.354' N Lat** **159° 24.988' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 7/13/2014 | 830 | 0.28 | | 10 |
| 8/10/2014 | 1045 | 0.29 | 1.41 | <10 |
| 9/14/2014 | 908 | | | <10 |

Additional Special Run Data - Surfrider

| Date | Total Nitrogen mg/L | Nitrate + Nitrite mg/L | Total Phosphorus mg/L | Total Suspended Solids mg/L | Turbidity NTU | Ammonia mg/L | Salinity ppt | |
|---|---|---|---|---|---|---|---|---|
| HAR Standards 1 | 0.2 | 0.008 | 0.025 | na | 1.5 | 0.006 | Estuaries | All Seasons |
| HAR Standards 1 | 0.18 | 0.03 | 0.03 | 10 | 2 | na | Streams | Dry Season |
| | | | | | | | | |
| 7/13/2014 | nd | 0.035 | 0.052 | 4.2 | | 0.13 | 0.28 | |
| 8/10/2014 | 0.27 | 0.11 | 0.071 | | 1.41 | 0.03 | 0.29 | |
| 9/14/2014 | 0.33 | 0.062 | 0.15 | | | 0.14 | | |
| | | | | | | | | |
| Geo. mean | 0.298 | 0.062 | 0.082 | 4.200 | 1.410 | 0.082 | 0.285 | |



**Site 5: Kawailoa Bay** **21° 53.494' N Lat** **159° 24.642' W Long**

| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enteroccocus (mpn) |
|---|---|---|---|---|
| 06/29/14 | 1030 | 35 | | <10 |
| 7/6/2014 | 825 | 35 | | <10 |
| 7/13/2014 | 800 | 34.9 | | <10 |
| 7/20/2014 | 750 | 35 | 0.57 | <10 |
| 7/27/2014 | | 34.8 | | <10 |

| Site 6: Gillin Faucet | 21° 53.347' N Lat | 159° 24.983' W Long |
|---|---|---|
| Date | Time | Salinity (ppt) | Turbidity (NTU) | Enterococcus (mpn) |
| 7/13/2014 | 915 | 0.39 | | <10 |

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Honolulu
1946 Young St. Suite 400A
Honolulu, HI 96826
Tel: 808-486-5227

TestAmerica Job ID: HXG0027
Client Project/Site: Water Quality 6.9.14
Client Project Description: Water Quality

For:
Surfrider Foundation, Kauai Chapter
2637 Apapane St.
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Attn: Carl J. Berg

*Authorized for release by:*
*8/15/2014 4:23:05 PM*

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Definitions/Glossary



### Qualifiers

**TSAV**

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

### Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

## Case Narrative

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### Job ID: HXG0027

**Laboratory: TestAmerica Honolulu**

**Narrative**

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory unless otherwise stated in the report. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample(s) analyzed.

The Chain(s) of Custody are included and are an integral part of this report. This entire report was reviewed and approved for release.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(808)486-5227

LABORATORY REPORT

At sample receipt, the cooler/sample was 3 degrees C.

TestAmerica has determined that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

**Laboratory: TestAmerica Irvine**

**Narrative**

**Job Narrative**
**440-83462-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 7/17/2014 10:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.9º C.

**General Chemistry**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



## Sample Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| HXG0027-01 | Mahaulepu 1. Bridge | Water - NonPotable | 07/13/14 08:45 | 07/15/14 13:50 |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Water - NonPotable | 07/13/14 08:30 | 07/15/14 13:50 |

## Detection Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### Client Sample ID: Mahaulepu 1. Bridge — Lab Sample ID: HXG0027-01

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 5.4 | | 1.0 | | mg/L | 1 | | SM 2540D | Total/NA |
| Ammonia | 0.14 | | 0.050 | | mg/L | 1 | | 350.1 | Total |
| Nitrogen, Kjeldahl | 0.32 | | 0.20 | | mg/L | 1 | | 351.2 | Total |
| Nitrate Nitrite as N | 0.086 | | 0.050 | | mg/L | 1 | | 353.2 | Total |
| Phosphorus | 0.044 | J | 0.10 | | mg/L | 1 | | 365.4 | Total |
| Nitrogen, Total | 0.41 | | 0.25 | | mg/L | 1 | | Total Nitrogen | Total |

### Client Sample ID: Mahaulepu 2. Gillin's Well — Lab Sample ID: HXG0027-02

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 4.2 | | 1.1 | | mg/L | 1 | | SM 2540D | Total/NA |
| Ammonia | 0.13 | | 0.050 | | mg/L | 1 | | 350.1 | Total |
| Nitrate Nitrite as N | 0.035 | J | 0.050 | | mg/L | 1 | | 353.2 | Total |
| Phosphorus | 0.052 | J | 0.10 | | mg/L | 1 | | 365.4 | Total |

This Detection Summary does not include radiochemical test results.



## Client Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### Client Sample ID: Mahaulepu 1. Bridge — Lab Sample ID: HXG0027-01

Date Collected: 07/13/14 08:45
Date Received: 07/15/14 13:50
Matrix: Water - NonPotable

#### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 5.4 | | 1.0 | | mg/L | | | 07/18/14 14:14 | 1 |

#### Method: 350.1 - Nitrogen, Ammonia

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.14 | | 0.050 | | mg/L | | 07/22/14 14:23 | 07/22/14 14:23 | 1 |

#### Method: 351.2 - Nitrogen, Total Kjeldahl

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.32 | | 0.20 | | mg/L | | 07/24/14 16:30 | 07/25/14 15:19 | 1 |

#### Method: 353.2 - Nitrogen, Nitrate-Nitrite

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.086 | | 0.050 | | mg/L | | 07/23/14 12:25 | 07/23/14 12:25 | 1 |

#### Method: 365.4 - Phosphorus, Total

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.044 | J | 0.10 | | mg/L | | 07/24/14 16:30 | 07/25/14 15:19 | 1 |

#### Method: Total Nitrogen - Nitrogen, Total

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Total | 0.41 | | 0.25 | | mg/L | | 07/26/14 13:00 | 07/26/14 13:00 | 1 |

### Client Sample ID: Mahaulepu 2. Gillin's Well — Lab Sample ID: HXG0027-02

Date Collected: 07/13/14 08:30
Date Received: 07/15/14 13:50
Matrix: Water - NonPotable

#### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 4.2 | | 1.1 | | mg/L | | | 07/18/14 14:14 | 1 |

#### Method: 350.1 - Nitrogen, Ammonia

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.13 | | 0.050 | | mg/L | | 07/22/14 13:52 | 07/22/14 13:52 | 1 |

#### Method: 351.2 - Nitrogen, Total Kjeldahl

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | ND | | 0.20 | | mg/L | | 07/24/14 16:30 | 07/25/14 16:15 | 1 |

#### Method: 353.2 - Nitrogen, Nitrate-Nitrite

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.035 | J | 0.050 | | mg/L | | 07/23/14 13:23 | 07/23/14 13:23 | 1 |

#### Method: 365.4 - Phosphorus, Total

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.052 | J | 0.10 | | mg/L | | 07/24/14 16:30 | 07/25/14 16:15 | 1 |

#### Method: Total Nitrogen - Nitrogen, Total

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Total | ND | | 0.25 | | mg/L | | 07/26/14 13:00 | 07/26/14 13:00 | 1 |

# QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

## Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 440-194912/2
Matrix: Water
Analysis Batch: 194912

Client Sample ID: Method Blank
Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | ND | | 1.0 | | mg/L | | | 07/18/14 14:14 | 1 |

Lab Sample ID: LCS 440-194912/1
Matrix: Water
Analysis Batch: 194912

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 1000 | 1000 | | mg/L | | 100 | 85 - 115 |

Lab Sample ID: 440-83527-B-1 DU
Matrix: Water
Analysis Batch: 194912

Client Sample ID: Duplicate
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 23 | | 22.0 | | mg/L | | 6 | 10 |

## Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: 340419-5
Matrix: Water
Analysis Batch: 340419

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 340419_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | ND | | 0.050 | | mg/L | | 07/22/14 14:03 | 07/22/14 14:03 | 1 |

Lab Sample ID: 340419-6
Matrix: Water
Analysis Batch: 340419

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 340419_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Ammonia | 1.00 | 1.03 | | mg/L | | 103 | 90 - 110 |

## Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: 340976-44
Matrix: Water
Analysis Batch: 340788

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 340788_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | ND | | 0.20 | | mg/L | | 07/24/14 16:30 | 07/25/14 15:18 | 1 |

Lab Sample ID: 340976-43
Matrix: Water
Analysis Batch: 340788

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 340788_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 2.00 | 1.98 | | mg/L | | 99 | 75 - 125 |



QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

## Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

Lab Sample ID: 1034331D
Matrix: Water
Analysis Batch: 340788

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 340788_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Dup Result | Matrix Spike Dup Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.32 | | 2.00 | 2.33 | | mg/L | | 101 | 75 - 125 | 2 | 40 |

Lab Sample ID: 1034331S
Matrix: Water
Analysis Batch: 340788

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 340788_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Result | Matrix Spike Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.32 | | 2.00 | 2.29 | | mg/L | | 99 | 75 - 125 |

Lab Sample ID: 1034332X
Matrix: Water
Analysis Batch: 340788

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 340788_P

| Analyte | Sample Result | Sample Qualifier | Duplicate Result | Duplicate Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | ND | | ND | | mg/L | | NC | 40 |

## Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: 340549-13
Matrix: Water
Analysis Batch: 340549

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 340549_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | ND | | 0.050 | | mg/L | | 07/23/14 12:21 | 07/23/14 12:21 | 1 |

Lab Sample ID: 340549-15
Matrix: Water
Analysis Batch: 340549

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 340549_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 1.06 | | mg/L | | 106 | 90 - 110 |

Lab Sample ID: 340549-26
Matrix: Water
Analysis Batch: 340549

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 340549_P

| Analyte | Sample Result | Sample Qualifier | Duplicate Result | Duplicate Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | | | 1.94 | | mg/L | | 0.7 | 10 |

Lab Sample ID: 340550-13
Matrix: Water
Analysis Batch: 340550

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 340550_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | ND | | 0.050 | | mg/L | | 07/23/14 13:19 | 07/23/14 13:19 | 1 |

## Method: 353.2 - Nitrogen, Nitrate-Nitrite (Continued)

Lab Sample ID: 340550-15 — Client Sample ID: Lab Control Sample
Matrix: Water — Prep Type: Total
Analysis Batch: 340550 — Prep Batch: 340550_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 1.06 | | mg/L | | 106 | 90 - 110 |

Lab Sample ID: 1034332D — Client Sample ID: Matrix Spike Duplicate
Matrix: Water — Prep Type: Total
Analysis Batch: 340550 — Prep Batch: 340550_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Dup Result | Matrix Spike Dup Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.035 | J | 1.00 | 1.06 | | mg/L | | 102 | 90 - 110 | 1 | 10 |

Lab Sample ID: 1034332S — Client Sample ID: Matrix Spike
Matrix: Water — Prep Type: Total
Analysis Batch: 340550 — Prep Batch: 340550_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Result | Matrix Spike Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.035 | J | 1.00 | 1.05 | | mg/L | | 102 | 90 - 110 |

Lab Sample ID: 340550-20 — Client Sample ID: Duplicate
Matrix: Water — Prep Type: Total
Analysis Batch: 340550 — Prep Batch: 340550_P

| Analyte | Sample Result | Sample Qualifier | Duplicate Result | Duplicate Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | | | 0.0225 | J | mg/L | | 6 | 10 |

## Method: 365.4 - Phosphorus, Total

Lab Sample ID: 340975-44 — Client Sample ID: Method Blank
Matrix: Water — Prep Type: Total
Analysis Batch: 340788 — Prep Batch: 340788_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | ND | | 0.10 | | mg/L | | 07/24/14 16:30 | 07/25/14 15:18 | 1 |

Lab Sample ID: 340975-43 — Client Sample ID: Lab Control Sample
Matrix: Water — Prep Type: Total
Analysis Batch: 340788 — Prep Batch: 340788_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Phosphorus | 2.00 | 2.36 | | mg/L | | 118 | 60 - 140 |

Lab Sample ID: 1034331D — Client Sample ID: Matrix Spike Duplicate
Matrix: Water — Prep Type: Total
Analysis Batch: 340788 — Prep Batch: 340788_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Dup Result | Matrix Spike Dup Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.044 | J | 2.00 | 2.13 | | mg/L | | 104 | 60 - 140 | 1 | 40 |





## Method: 365.4 - Phosphorus, Total (Continued)

Lab Sample ID: 1034331S — Client Sample ID: Matrix Spike
Matrix: Water — Prep Type: Total
Analysis Batch: 340788 — Prep Batch: 340788_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Result | Matrix Spike Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.044 | J | 2.00 | 2.15 | | mg/L | | 105 | 60 - 140 |

Lab Sample ID: 1034332X — Client Sample ID: Duplicate
Matrix: Water — Prep Type: Total
Analysis Batch: 340788 — Prep Batch: 340788_P

| Analyte | Sample Result | Sample Qualifier | Duplicate Result | Duplicate Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.052 | J | 0.0472 | J | mg/L | | 9 | 40 |

# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

## General Chemistry

### Analysis Batch: 194912

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-83527-B-1 DU | Duplicate | Total/NA | Water | SM 2540D | |
| HXG0027-01 | Mahaulepu 1. Bridge | Total/NA | Water - NonPotable | SM 2540D | |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total/NA | Water - NonPotable | SM 2540D | |
| LCS 440-194912/1 | Lab Control Sample | Total/NA | Water | SM 2540D | |
| MB 440-194912/2 | Method Blank | Total/NA | Water | SM 2540D | |

## TSAV

### Analysis Batch: 340419

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 340419-5 | Method Blank | Total | Water | 350.1 | 340419_P |
| 340419-6 | Lab Control Sample | Total | Water | 350.1 | 340419_P |
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | 350.1 | 340419_P |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | 350.1 | 340419_P |

### Analysis Batch: 340549

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 340549-13 | Method Blank | Total | Water | 353.2 | 340549_P |
| 340549-15 | Lab Control Sample | Total | Water | 353.2 | 340549_P |
| 340549-26 | Duplicate | Total | Water | 353.2 | 340549_P |
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | 353.2 | 340549_P |

### Analysis Batch: 340550

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 1034332D | Matrix Spike Duplicate | Total | Water | 353.2 | 340550_P |
| 1034332S | Matrix Spike | Total | Water | 353.2 | 340550_P |
| 340550-13 | Method Blank | Total | Water | 353.2 | 340550_P |
| 340550-15 | Lab Control Sample | Total | Water | 353.2 | 340550_P |
| 340550-20 | Duplicate | Total | Water | 353.2 | 340550_P |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | 353.2 | 340550_P |

### Analysis Batch: 340788

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 1034331D | Matrix Spike Duplicate | Total | Water | 351.2 | 340788_P |
| 1034331D | Matrix Spike Duplicate | Total | Water | 365.4 | 340788_P |
| 1034331S | Matrix Spike | Total | Water | 351.2 | 340788_P |
| 1034331S | Matrix Spike | Total | Water | 365.4 | 340788_P |
| 1034332X | Duplicate | Total | Water | 351.2 | 340788_P |
| 1034332X | Duplicate | Total | Water | 365.4 | 340788_P |
| 340975-43 | Lab Control Sample | Total | Water | 365.4 | 340788_P |
| 340975-44 | Method Blank | Total | Water | 365.4 | 340788_P |
| 340976-43 | Lab Control Sample | Total | Water | 351.2 | 340788_P |
| 340976-44 | Method Blank | Total | Water | 351.2 | 340788_P |
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | 351.2 | 340788_P |



# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

## TSAV (Continued)

### Analysis Batch: 340788 (Continued)

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | 365.4 | 340788_P |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | 351.2 | 340788_P |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | 365.4 | 340788_P |

### Analysis Batch: 340997

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | Total Nitrogen | 340997_P |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | Total Nitrogen | 340997_P |

### Prep Batch: 340419_P

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 340419-5 | Method Blank | Total | Water | NA | |
| 340419-6 | Lab Control Sample | Total | Water | NA | |
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | NA | |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | NA | |

### Prep Batch: 340549_P

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 340549-13 | Method Blank | Total | Water | NA | |
| 340549-15 | Lab Control Sample | Total | Water | NA | |
| 340549-26 | Duplicate | Total | Water | NA | |
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | NA | |

### Prep Batch: 340550_P

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 1034332D | Matrix Spike Duplicate | Total | Water | NA | |
| 1034332S | Matrix Spike | Total | Water | NA | |
| 340550-13 | Method Blank | Total | Water | NA | |
| 340550-15 | Lab Control Sample | Total | Water | NA | |
| 340550-20 | Duplicate | Total | Water | NA | |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | NA | |

### Prep Batch: 340788_P

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 1034331D | Matrix Spike Duplicate | Total | Water | Digestion | |
| 1034331S | Matrix Spike | Total | Water | Digestion | |
| 1034332X | Duplicate | Total | Water | Digestion | |
| 340975-43 | Lab Control Sample | Total | Water | Digestion | |
| 340975-44 | Method Blank | Total | Water | Digestion | |
| 340976-43 | Lab Control Sample | Total | Water | Digestion | |
| 340976-44 | Method Blank | Total | Water | Digestion | |
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | Digestion | |

## QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### TSAV (Continued)

**Prep Batch: 340788_P (Continued)**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | Digestion | |

**Prep Batch: 340997_P**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HXG0027-01 | Mahaulepu 1. Bridge | Total | Water - NonPotable | NA | |
| HXG0027-02 | Mahaulepu 2. Gillin's Well | Total | Water - NonPotable | NA | |



## Lab Chronicle

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### Client Sample ID: Mahaulepu 1. Bridge — Lab Sample ID: HXG0027-01

**Date Collected: 07/13/14 08:45** — **Matrix: Water - NonPotable**
**Date Received: 07/15/14 13:50**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 194912 | 07/18/14 14:14 | NTN | TAL IRV |
| Total | Analysis | 350.1 | | 1 | 340419 | 07/22/14 14:23 | JME | TAL SAV |
| Total | Prep | NA | | | 340419_P | 07/22/14 14:23 | | TAL SAV |
| Total | Prep | Digestion | | | 340788_P | 07/24/14 16:30 | | TAL SAV |
| Total | Analysis | 351.2 | | 1 | 340788 | 07/25/14 15:19 | AJO | TAL SAV |
| Total | Analysis | 353.2 | | 1 | 340549 | 07/23/14 12:25 | GRX | TAL SAV |
| Total | Prep | NA | | | 340549_P | 07/23/14 12:25 | | TAL SAV |
| Total | Prep | Digestion | | | 340788_P | 07/24/14 16:30 | | TAL SAV |
| Total | Analysis | 365.4 | | 1 | 340788 | 07/25/14 15:19 | AJO | TAL SAV |
| Total | Analysis | Total Nitrogen | | 1 | 340997 | 07/26/14 13:00 | JER | TAL SAV |
| Total | Prep | NA | | | 340997_P | 07/26/14 13:00 | | TAL SAV |

### Client Sample ID: Mahaulepu 2. Gillin's Well — Lab Sample ID: HXG0027-02

**Date Collected: 07/13/14 08:30** — **Matrix: Water - NonPotable**
**Date Received: 07/15/14 13:50**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 194912 | 07/18/14 14:14 | NTN | TAL IRV |
| Total | Analysis | 350.1 | | 1 | 340419 | 07/22/14 13:52 | JME | TAL SAV |
| Total | Prep | NA | | | 340419_P | 07/22/14 13:52 | | TAL SAV |
| Total | Prep | Digestion | | | 340788_P | 07/24/14 16:30 | | TAL SAV |
| Total | Analysis | 351.2 | | 1 | 340788 | 07/25/14 16:15 | AJO | TAL SAV |
| Total | Analysis | 353.2 | | 1 | 340550 | 07/23/14 13:23 | GRX | TAL SAV |
| Total | Prep | NA | | | 340550_P | 07/23/14 13:23 | | TAL SAV |
| Total | Prep | Digestion | | | 340788_P | 07/24/14 16:30 | | TAL SAV |
| Total | Analysis | 365.4 | | 1 | 340788 | 07/25/14 16:15 | AJO | TAL SAV |

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL 912.354.7858

## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### Laboratory: TestAmerica Honolulu

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| USDA | Federal | | HON-S-206 | 01-31-15 |

### Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alaska | State Program | 10 | CA01531 | 06-30-15 |
| Arizona | State Program | 9 | AZ0671 | 10-13-14 |
| California | LA Cty Sanitation Districts | 9 | 10256 | 01-31-15 |
| California | State Program | 9 | 2706 | 06-30-16 |
| Guam | State Program | 9 | Cert. No. 12.002r | 01-23-15 |
| Hawaii | State Program | 9 | N/A | 01-29-15 * |
| Nevada | State Program | 9 | CA015312007A | 07-31-14 * |
| New Mexico | State Program | 6 | N/A | 01-29-15 |
| Northern Mariana Islands | State Program | 9 | MP0002 | 01-29-15 |
| Oregon | NELAP | 10 | 4005 | 01-29-15 |
| USDA | Federal | | P330-09-00080 | 06-06-15 |
| USEPA UCMR | Federal | 1 | CA01531 | 01-31-15 |

### Laboratory: TestAmerica Savannah

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 399.01 | 02-28-15 |
| A2LA | ISO/IEC 17025 | | 399.01 | 02-28-15 |
| Alabama | State Program | 4 | 41450 | 06-30-15 |
| Arkansas DEQ | State Program | 6 | 88-0692 | 01-31-15 |
| California | NELAP | 9 | 3217CA | 07-31-14 |
| Colorado | State Program | 8 | N/A | 12-31-14 |
| Connecticut | State Program | 1 | PH-0161 | 03-31-15 |
| Florida | NELAP | 4 | E87052 | 06-30-15 |
| GA Dept. of Agriculture | State Program | 4 | N/A | 06-12-17 |
| Georgia | State Program | 4 | N/A | 06-30-15 |
| Georgia | State Program | 4 | 803 | 06-30-15 |
| Guam | State Program | 9 | 09-005r | 04-16-15 |
| Hawaii | State Program | 9 | N/A | 06-30-15 |
| Illinois | NELAP | 5 | 200022 | 11-30-14 |
| Indiana | State Program | 5 | N/A | 06-30-15 |
| Iowa | State Program | 7 | 353 | 07-01-15 |
| Kentucky (DW) | State Program | 4 | 90084 | 12-31-14 |
| Kentucky (UST) | State Program | 4 | 18 | 06-30-15 |
| Louisiana | NELAP | 6 | 30690 | 06-30-14 |
| Louisiana (DW) | NELAP | 6 | LA140023 | 12-31-14 |
| Maine | State Program | 1 | GA00006 | 08-16-14 |
| Maryland | State Program | 3 | 250 | 12-31-14 |
| Massachusetts | State Program | 1 | M-GA006 | 06-30-15 |
| Michigan | State Program | 5 | 9925 | 06-30-15 |
| Mississippi | State Program | 4 | N/A | 06-30-14 |
| Montana | State Program | 8 | CERT0081 | 01-01-15 |
| Nebraska | State Program | 7 | TestAmerica-Savannah | 06-30-15 |
| New Jersey | NELAP | 2 | GA769 | 06-30-15 |

* Certification renewal pending - certification considered valid.



## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

### Laboratory: TestAmerica Savannah (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| New Mexico | State Program | 6 | N/A | 06-30-15 |
| New York | NELAP | 2 | 10842 | 03-31-15 |
| North Carolina (DW) | State Program | 4 | 13701 | 07-31-15 |
| North Carolina (WW/SW) | State Program | 4 | 269 | 12-31-14 |
| Oklahoma | State Program | 6 | 9984 | 08-31-14 |
| Pennsylvania | NELAP | 3 | 68-00474 | 06-30-15 |
| Puerto Rico | State Program | 2 | GA00006 | 12-31-14 |
| South Carolina | State Program | 4 | 98001 | 06-30-14 |
| Tennessee | State Program | 4 | TN02961 | 06-30-15 |
| Texas | NELAP | 6 | T104704185-08-TX | 11-30-14 |
| USDA | Federal | | SAV 3-04 | 06-11-17 |
| Virginia | NELAP | 3 | 460161 | 06-14-15 |
| Washington | State Program | 10 | C805 | 06-10-15 |
| West Virginia (DW) | State Program | 3 | 9950C | 12-31-14 |
| West Virginia DEP | State Program | 3 | 94 | 06-30-15 |
| Wisconsin | State Program | 5 | 999819810 | 08-31-14 |
| Wyoming | State Program | 8 | 8TMS-L | 06-30-14 |

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

**Honolulu**
1946 Young Street, Suite 400A • Honolulu, HI 96826
808-486-LABS (5227) • Fax 808-486-2456

LABORATORY USE ONLY
LAB JOB NO. HXG0027
☐ DOD QSM Required?
☐ Report to MDL with J Flag values?

## Chain of Custody / Analysis Request Form

Report to: Surfrider - Kauai
Company name: 2637 Agagame St.
Address: Lihue HI 96766
City / State / ZIP: 808 639-2968
Phone: Carl Berg
Fax: cberg@pixi.com
Sampler: # samples in shipment: 4

Project identification
Job name: Mahaulepu
Job number:
PO number:
Contact email address: cberg@pixi.com
Date results needed: 8/1/14

indicate analyses requested

| Item no. | Client sample ID | Multi Incremental | Composite | Grab | Matrix: Water | Soil | Wastewater | Drinking water | Sludge | Liquid | Solid | Oil | Other | Preservation method | Sampling: Date | Time | No. of containers | Ammonia EPA 350.3 | Nitrate + Nitrite EPA 353.2 | Nitrogen, Total SW 4500 | Phosphorus, Total EPA 365.4 | TSS EPA 160.2 | TKN EPA 351.2 | | | | | Laboratory ID no. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mahaulepu 1 Bridge | | | X | + | | | | | | | | | Chill | 7/13/14 | 845 | 1 | X | X | X | X | X | X | | | | | HXG0027-01 |
| 2 | Mahaulepu 1 Bridge | | | X | X | | | | | | | | | acid | 7/13/14 | 845 | 1 | X | X | X | X | X | X | | | | | |
| 3 | Mahaulepu 2 Gillies Well | | | X | | | | X | | | | | | chill | 7/13/14 | 830 | 1 | X | X | X | X | X | X | | | | | -02 |
| 4 | Mahaulepu 2 Gillies Well | | | X | | | | X | | | | | | acid | 7/13/14 | 830 | 1 | X | X | X | X | X | X | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Released by (print / sign) | Date / time released | Delivery method | Received by (print / sign) | Company / Agency affiliation | Date / time received | Condition noted |
|---|---|---|---|---|---|---|
| Carl Berg | 7/14/14 1200 | FedEx | [illegible] | TA-HON | 7/15/14 1350 | 3°C Wet ice |
| | / | | | | / | |
| | / | | | | / | |

Comments:

Please check one:
☐ Dispose by lab
☐ Return to client
☐ Archive (fee may apply)

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COC REV 11/2012 Distribution: White - TestAmerica Yellow - Client Page ____ of ____



## Method Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Water Quality 6.9.14

TestAmerica Job ID: HXG0027

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| SM 2540D | Solids, Total Suspended (TSS) | SM | TAL IRV |
| 350.1 | Nitrogen, Ammonia | | TAL SAV |
| 351.2 | Nitrogen, Total Kjeldahl | | TAL SAV |
| 353.2 | Nitrogen, Nitrate-Nitrite | | TAL SAV |
| 365.4 | Phosphorus, Total | | TAL SAV |
| Total Nitrogen | Nitrogen, Total | | TAL SAV |

**Protocol References:**
SM = "Standard Methods For The Examination Of Water And Wastewater",

**Laboratory References:**
TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL 912.354.7858

TestAmerica

Destination Laboratory _____

Destination Laboratory PM (if known) _____

# Drop Shipment Receipt Checklist

**Client Name:** Surfrider Kauai **Date/ Time Received:** 7/15/14 1350

**Received By:** Elizabeth Chavez

**Matrices:** **Carrier:** **Airbill# :**

| | | | | |
|---|---|---|---|---|
| Shipping container/cooler in good condition? | Yes ✓ | No | Not Present | |
| Chain of Custody present? | Yes ✓ | No | | |
| Chain of Custody Signed when relinquished and received? | Yes ✓ | No | | |
| Cooler opened at TestAmerica Honolulu? | Yes ✓ | No | | |
| Sample containers matched to COC at TestAmerica Honolulu? | Yes ✓ | No | | |
| Any sample containers obviously broken/damaged upon receipt? | Yes | No ✓ | | |
| Sample containers on ice? | Yes ✓ | No | Type: | Wet |
| Custody seals present? If so, location? (Cooler, sample containers?) | Yes ✓ | No | | |
| Custody seals intact? | Yes ✓ | No | | |
| Water - VOA Vials have Zero Headspace? | Yes | No ✓ | No VOA vials present: | ✓ |
| Water - pH acceptable upon receipt? | Yes | No ✓ | Not Checked: | ✓ |
| pH Adjusted? | Yes | No ✓ | Final pH: | |
| Encores / MI-VOC / 5035 Vials Present? | Yes | No ✓ | | |
| Sample Filtration Needed? | Yes | No ✓ | Filtered in Field: | |
| DODQSM / QAPP Project (if known)? | Yes | No ✓ | Type: | |
| Temperature Blank Present? | Yes | No ✓ | | |
| Sample Container Temperature: | 3 °C | | | |
| Samples drop shipped on ice? | Yes | No | Type: | |
| Date of drop shipment: | | | | |

**Comments/ Sampling Handling Notes:**

Attachment B, page 28



FedEx Express USA Airbill 8284 5423 5841

0200 Recipient's Copy

1 From: Date 7/14/14 Sender's Name Dr. Carl Berg Phone 808 639-2968 Company Hawaiian Wildlife Tours Address 2637 Apiapiane St City Lihue State HI ZIP 96766

2 Your Internal Billing Reference

3 To: Recipient's Name Tinson Carr Phone 203 481 5227 Company Test America Address 1911 Young Street Suite 400A City Honolulu State HI ZIP 96826

4a Express Package Service: FedEx Priority Overnight; FedEx Standard Overnight; FedEx 2Day; FedEx Express Saver; NEW FedEx Extra Hours; FedEx First Overnight

4b Express Freight Service: FedEx 1Day Freight; FedEx 2Day Freight; FedEx 3Day Freight

5 Packaging: FedEx Envelope; FedEx Pak; Other Pkg

6 Special Handling: SATURDAY Delivery; SUNDAY Delivery; HOLD Weekday at FedEx Location; HOLD Saturday at FedEx Location

7 Payment Bill to: Sender; Recipient; Third Party; Credit Card; Cash/Check

Total Packages 1 Total Weight 19 Total Declared Value $ 100.00 Total Charges

8 Release Signature

Attachment B, page 29

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Honolulu
1946 Young St. Suite 400A
Honolulu, HI 96826
Tel: 808-486-5227

TestAmerica Job ID: HXH0034
Client Project/Site: Mahaulepu-2
Client Project Description: Water Quality

For:
Surfrider Foundation, Kauai Chapter
2637 Apapane St.
Lihue, HI 96766

Attn: Carl J. Berg

*Authorized for release by:*
*8/26/2014 11:30:30 AM*
Craig O. Pilialoha, Project Manager
Craig.Pilialoha@testamericainc.com

Designee for

Jimson E. Carr, Service Center Manager
808-486-5227
Jimson.Carr@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*





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# Definitions/Glossary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

## Qualifiers

### General Chemistry

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |
| F1 | MS and/or MSD Recovery exceeds the control limits |
| U | Indicates the analyte was analyzed for but not detected. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |



# Case Narrative

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

## Job ID: HXH0034

### Laboratory: TestAmerica Honolulu

**Narrative**

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory unless otherwise stated in the report. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample(s) analyzed.

The Chain(s) of Custody are included and are an integral part of this report. This entire report was reviewed and approved for release.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(808)486-5227

LABORATORY REPORT

At sample receipt, the cooler/sample was 17 degrees C.

TestAmerica has determined that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

### Laboratory: TestAmerica Irvine

**Narrative**

**Job Narrative**
**440-85814-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 8/15/2014 9:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 6 coolers at receipt time were 2.5º C, 3.0º C, 3.1º C, 3.2º C, 3.3º C and 3.5º C.

**General Chemistry**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

## Sample Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| HXH0034-02 | Well | Water - NonPotable | 08/10/14 10:45 | 08/12/14 11:15 |
| HXH0034-03 | Stream | Water - NonPotable | 08/10/14 10:00 | 08/12/14 11:15 |
| HXH0034-04 | Stream | Water - NonPotable | 08/10/14 10:00 | 08/12/14 11:15 |



## Detection Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

### Client Sample ID: Well — Lab Sample ID: HXH0034-02

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.030 | J | 0.050 | 0.026 | mg/L | 1 | | 350.1 | Total/NA |
| Nitrogen, Kjeldahl | 0.16 | J | 0.20 | 0.15 | mg/L | 1 | | 351.2 | Total/NA |
| Nitrate Nitrite as N | 0.11 | | 0.050 | 0.010 | mg/L | 1 | | 353.2 | Total/NA |
| Phosphorus | 0.071 | J | 0.10 | 0.041 | mg/L | 1 | | 365.4 | Total/NA |
| **Analyte** | **Result** | **Qualifier** | **RL** | **RL** | **Unit** | **Dil Fac** | **D** | **Method** | **Prep Type** |
| Nitrogen, Total | 0.27 | | 0.25 | 0.25 | mg/L | 1 | | Total Nitrogen | Total/NA |

### Client Sample ID: Stream — Lab Sample ID: HXH0034-03

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 55 | | 3.3 | | mg/L | 1 | | SM 2540D | Total/NA |

### Client Sample ID: Stream — Lab Sample ID: HXH0034-04

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.057 | | 0.050 | 0.026 | mg/L | 1 | | 350.1 | Total/NA |
| Nitrogen, Kjeldahl | 0.53 | | 0.20 | 0.15 | mg/L | 1 | | 351.2 | Total/NA |
| Nitrate Nitrite as N | 0.25 | | 0.050 | 0.010 | mg/L | 1 | | 353.2 | Total/NA |
| Phosphorus | 0.066 | J | 0.10 | 0.041 | mg/L | 1 | | 365.4 | Total/NA |
| **Analyte** | **Result** | **Qualifier** | **RL** | **RL** | **Unit** | **Dil Fac** | **D** | **Method** | **Prep Type** |
| Nitrogen, Total | 0.78 | | 0.25 | 0.25 | mg/L | 1 | | Total Nitrogen | Total/NA |

This Detection Summary does not include radiochemical test results.

## Client Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

### Client Sample ID: Well — Lab Sample ID: HXH0034-02

Date Collected: 08/10/14 10:45
Date Received: 08/12/14 11:15
Matrix: Water - NonPotable

**General Chemistry**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.030 | J | 0.050 | 0.026 | mg/L | | | 08/18/14 17:12 | 1 |
| Nitrogen, Kjeldahl | 0.16 | J | 0.20 | 0.15 | mg/L | | 08/19/14 15:32 | 08/20/14 11:42 | 1 |
| Nitrate Nitrite as N | 0.11 | | 0.050 | 0.010 | mg/L | | | 08/19/14 12:26 | 1 |
| Phosphorus | 0.071 | J | 0.10 | 0.041 | mg/L | | 08/19/14 15:32 | 08/20/14 11:42 | 1 |

| Analyte | Result | Qualifier | RL | RL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Total | 0.27 | | 0.25 | 0.25 | mg/L | | | 08/21/14 14:51 | 1 |

### Client Sample ID: Stream — Lab Sample ID: HXH0034-03

Date Collected: 08/10/14 10:00
Date Received: 08/12/14 11:15
Matrix: Water - NonPotable

**General Chemistry**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 55 | | 3.3 | | mg/L | | | 08/15/14 13:44 | 1 |

### Client Sample ID: Stream — Lab Sample ID: HXH0034-04

Date Collected: 08/10/14 10:00
Date Received: 08/12/14 11:15
Matrix: Water - NonPotable

**General Chemistry**

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.057 | | 0.050 | 0.026 | mg/L | | | 08/18/14 17:12 | 1 |
| Nitrogen, Kjeldahl | 0.53 | | 0.20 | 0.15 | mg/L | | 08/19/14 15:32 | 08/20/14 11:45 | 1 |
| Nitrate Nitrite as N | 0.25 | | 0.050 | 0.010 | mg/L | | | 08/19/14 12:28 | 1 |
| Phosphorus | 0.066 | J | 0.10 | 0.041 | mg/L | | 08/19/14 15:32 | 08/20/14 11:45 | 1 |

| Analyte | Result | Qualifier | RL | RL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Total | 0.78 | | 0.25 | 0.25 | mg/L | | | 08/21/14 14:51 | 1 |



## QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034-02

### Method: 350.1 - Nitrogen, Ammonia

**Lab Sample ID: MB 680-344705/7** — Client Sample ID: Method Blank
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 344705

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.050 | U | 0.050 | 0.026 | mg/L | | | 08/18/14 16:51 | 1 |

**Lab Sample ID: LCS 680-344705/1** — Client Sample ID: Lab Control Sample
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 344705

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Ammonia | 1.00 | 1.00 | | mg/L | | 100 | 90 - 110 |

**Lab Sample ID: 680-104342-A-4 MS** — Client Sample ID: Matrix Spike
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 344705

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.040 | J | 1.00 | 1.26 | F1 | mg/L | | 122 | 90 - 110 |

**Lab Sample ID: 680-104342-A-4 MSD** — Client Sample ID: Matrix Spike Duplicate
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 344705

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.040 | J | 1.00 | 1.28 | F1 | mg/L | | 124 | 90 - 110 | 1 | 30 |

### Method: 351.2 - Nitrogen, Total Kjeldahl

**Lab Sample ID: MB 680-344865/2-A** — Client Sample ID: Method Blank
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 345036 — Prep Batch: 344865

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.20 | U | 0.20 | 0.15 | mg/L | | 08/19/14 15:32 | 08/20/14 11:41 | 1 |

**Lab Sample ID: LCS 680-344865/1-A** — Client Sample ID: Lab Control Sample
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 345036 — Prep Batch: 344865

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 2.00 | 1.96 | | mg/L | | 98 | 75 - 125 |

**Lab Sample ID: 680-104342-1 MS** — Client Sample ID: HXH0034-02
Matrix: Water — Prep Type: Total/NA
Analysis Batch: 345036 — Prep Batch: 344865

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.16 | J | 2.00 | 2.18 | | mg/L | | 101 | 75 - 125 |

## Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

Lab Sample ID: 680-104342-1 MSD
Matrix: Water
Analysis Batch: 345036
Client Sample ID: HXH0034-02
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.16 | J | 2.00 | 2.18 | | mg/L | | 101 | 75 - 125 | 0 | 40 |

Lab Sample ID: 680-104342-2 DU
Matrix: Water
Analysis Batch: 345036
Client Sample ID: HXH0034-04
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.53 | | 0.529 | | mg/L | | 0.2 | 40 |

## Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 680-344811/13
Matrix: Water
Analysis Batch: 344811
Client Sample ID: Method Blank
Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.050 | U | 0.050 | 0.010 | mg/L | | | 08/19/14 12:12 | 1 |

Lab Sample ID: LCS 680-344811/15
Matrix: Water
Analysis Batch: 344811
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 1.01 | | mg/L | | 101 | 90 - 110 |

Lab Sample ID: 640-48878-A-4 MS
Matrix: Water
Analysis Batch: 344811
Client Sample ID: Matrix Spike
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.034 | J | 1.00 | 1.03 | | mg/L | | 99 | 90 - 110 |

Lab Sample ID: 640-48878-A-4 MSD
Matrix: Water
Analysis Batch: 344811
Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.034 | J | 1.00 | 1.02 | | mg/L | | 99 | 90 - 110 | 0 | 10 |

Lab Sample ID: 640-48878-A-10 DU
Matrix: Water
Analysis Batch: 344811
Client Sample ID: Duplicate
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.20 | | 0.198 | | mg/L | | 1 | 10 |





## Method: 365.4 - Phosphorus, Total

Lab Sample ID: MB 680-344865/2-A
Matrix: Water
Analysis Batch: 345035
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.10 | U | 0.10 | 0.041 | mg/L | | 08/19/14 15:32 | 08/20/14 11:41 | 1 |

Lab Sample ID: LCS 680-344865/1-A
Matrix: Water
Analysis Batch: 345035
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Phosphorus | 2.00 | 2.08 | | mg/L | | 104 | 60 - 140 |

Lab Sample ID: 680-104342-1 MS
Matrix: Water
Analysis Batch: 345035
Client Sample ID: HXH0034-02
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.071 | J | 2.00 | 2.08 | | mg/L | | 100 | 60 - 140 |

Lab Sample ID: 680-104342-1 MSD
Matrix: Water
Analysis Batch: 345035
Client Sample ID: HXH0034-02
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.071 | J | 2.00 | 2.05 | | mg/L | | 99 | 60 - 140 | 1 | 40 |

Lab Sample ID: 680-104342-2 DU
Matrix: Water
Analysis Batch: 345035
Client Sample ID: HXH0034-04
Prep Type: Total/NA
Prep Batch: 344865

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.066 | J | 0.0923 | J | mg/L | | 33 | 40 |

## Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 440-200040/2
Matrix: Water
Analysis Batch: 200040
Client Sample ID: Method Blank
Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | ND | | 1.0 | | mg/L | | | 08/15/14 13:44 | 1 |

Lab Sample ID: LCS 440-200040/1
Matrix: Water
Analysis Batch: 200040
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 1000 | 972 | | mg/L | | 97 | 85 - 115 |

## QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

### Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

**Lab Sample ID: 440-85557-A-2 DU** — **Client Sample ID: Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 200040**

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 470 | | | 457 | | mg/L | | | | 2 | 10 |



## QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

### General Chemistry

**Analysis Batch: 200040**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-85557-A-2 DU | Duplicate | Total/NA | Water | SM 2540D | |
| HXH0034-03 | Stream | Total/NA | Water - NonPotable | SM 2540D | |
| LCS 440-200040/1 | Lab Control Sample | Total/NA | Water | SM 2540D | |
| MB 440-200040/2 | Method Blank | Total/NA | Water | SM 2540D | |

**Analysis Batch: 344705**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 680-104342-A-4 MS | Matrix Spike | Total/NA | Water | 350.1 | |
| 680-104342-A-4 MSD | Matrix Spike Duplicate | Total/NA | Water | 350.1 | |
| HXH0034-02 | Well | Total/NA | Water - NonPotable | 350.1 | |
| HXH0034-04 | Stream | Total/NA | Water - NonPotable | 350.1 | |
| LCS 680-344705/1 | Lab Control Sample | Total/NA | Water | 350.1 | |
| MB 680-344705/7 | Method Blank | Total/NA | Water | 350.1 | |

**Analysis Batch: 344811**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 640-48878-A-4 MS | Matrix Spike | Total/NA | Water | 353.2 | |
| 640-48878-A-4 MSD | Matrix Spike Duplicate | Total/NA | Water | 353.2 | |
| 640-48878-A-10 DU | Duplicate | Total/NA | Water | 353.2 | |
| HXH0034-02 | Well | Total/NA | Water - NonPotable | 353.2 | |
| HXH0034-04 | Stream | Total/NA | Water - NonPotable | 353.2 | |
| LCS 680-344811/15 | Lab Control Sample | Total/NA | Water | 353.2 | |
| MB 680-344811/13 | Method Blank | Total/NA | Water | 353.2 | |

**Prep Batch: 344865**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 680-104342-1 MS | HXH0034-02 | Total/NA | Water | Digestion | |
| 680-104342-1 MSD | HXH0034-02 | Total/NA | Water | Digestion | |
| 680-104342-2 DU | HXH0034-04 | Total/NA | Water | Digestion | |
| HXH0034-02 | Well | Total/NA | Water - NonPotable | Digestion | |
| HXH0034-04 | Stream | Total/NA | Water - NonPotable | Digestion | |
| LCS 680-344865/1-A | Lab Control Sample | Total/NA | Water | Digestion | |
| MB 680-344865/2-A | Method Blank | Total/NA | Water | Digestion | |

**Analysis Batch: 345035**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 680-104342-1 MS | HXH0034-02 | Total/NA | Water | 365.4 | 344865 |
| 680-104342-1 MSD | HXH0034-02 | Total/NA | Water | 365.4 | 344865 |
| 680-104342-2 DU | HXH0034-04 | Total/NA | Water | 365.4 | 344865 |
| HXH0034-02 | Well | Total/NA | Water - NonPotable | 365.4 | 344865 |
| HXH0034-04 | Stream | Total/NA | Water - NonPotable | 365.4 | 344865 |
| LCS 680-344865/1-A | Lab Control Sample | Total/NA | Water | 365.4 | 344865 |
| MB 680-344865/2-A | Method Blank | Total/NA | Water | 365.4 | 344865 |

# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

## General Chemistry (Continued)

### Analysis Batch: 345036

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 680-104342-1 MS | HXH0034-02 | Total/NA | Water | 351.2 | 344865 |
| 680-104342-1 MSD | HXH0034-02 | Total/NA | Water | 351.2 | 344865 |
| 680-104342-2 DU | HXH0034-04 | Total/NA | Water | 351.2 | 344865 |
| HXH0034-02 | Well | Total/NA | Water - NonPotable | 351.2 | 344865 |
| HXH0034-04 | Stream | Total/NA | Water - NonPotable | 351.2 | 344865 |
| LCS 680-344865/1-A | Lab Control Sample | Total/NA | Water | 351.2 | 344865 |
| MB 680-344865/2-A | Method Blank | Total/NA | Water | 351.2 | 344865 |

### Analysis Batch: 345299

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HXH0034-02 | Well | Total/NA | Water - NonPotable | Total Nitrogen | |
| HXH0034-04 | Stream | Total/NA | Water - NonPotable | Total Nitrogen | |



# Lab Chronicle

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

## Client Sample ID: Well — Lab Sample ID: HXH0034-02

Date Collected: 08/10/14 10:45
Date Received: 08/12/14 11:15
Matrix: Water - NonPotable

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 350.1 | | 1 | 344705 | 08/18/14 17:12 | JME | TAL SAV |
| Total/NA | Prep | Digestion | | | 344865 | 08/19/14 15:32 | ASH | TAL SAV |
| Total/NA | Analysis | 351.2 | | 1 | 345036 | 08/20/14 11:42 | AJO | TAL SAV |
| Total/NA | Analysis | 353.2 | | 1 | 344811 | 08/19/14 12:26 | GRX | TAL SAV |
| Total/NA | Prep | Digestion | | | 344865 | 08/19/14 15:32 | ASH | TAL SAV |
| Total/NA | Analysis | 365.4 | | 1 | 345035 | 08/20/14 11:42 | AJO | TAL SAV |
| Total/NA | Analysis | Total Nitrogen | | 1 | 345299 | 08/21/14 14:51 | AJO | TAL SAV |

## Client Sample ID: Stream — Lab Sample ID: HXH0034-03

Date Collected: 08/10/14 10:00
Date Received: 08/12/14 11:15
Matrix: Water - NonPotable

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 200040 | 08/15/14 13:44 | NTN | TAL IRV |

## Client Sample ID: Stream — Lab Sample ID: HXH0034-04

Date Collected: 08/10/14 10:00
Date Received: 08/12/14 11:15
Matrix: Water - NonPotable

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 350.1 | | 1 | 344705 | 08/18/14 17:12 | JME | TAL SAV |
| Total/NA | Prep | Digestion | | | 344865 | 08/19/14 15:32 | ASH | TAL SAV |
| Total/NA | Analysis | 351.2 | | 1 | 345036 | 08/20/14 11:45 | AJO | TAL SAV |
| Total/NA | Analysis | 353.2 | | 1 | 344811 | 08/19/14 12:28 | GRX | TAL SAV |
| Total/NA | Prep | Digestion | | | 344865 | 08/19/14 15:32 | ASH | TAL SAV |
| Total/NA | Analysis | 365.4 | | 1 | 345035 | 08/20/14 11:45 | AJO | TAL SAV |
| Total/NA | Analysis | Total Nitrogen | | 1 | 345299 | 08/21/14 14:51 | AJO | TAL SAV |

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

### Laboratory: TestAmerica Honolulu

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| USDA | Federal | | HON-S-206 | 01-31-15 |

### Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alaska | State Program | 10 | CA01531 | 06-30-15 |
| Arizona | State Program | 9 | AZ0671 | 10-13-14 * |
| California | LA Cty Sanitation Districts | 9 | 10256 | 01-31-15 |
| California | State Program | 9 | 2706 | 06-30-16 |
| Guam | State Program | 9 | Cert. No. 12.002r | 01-23-15 |
| Hawaii | State Program | 9 | N/A | 01-29-15 * |
| Nevada | State Program | 9 | CA015312007A | 07-31-15 |
| New Mexico | State Program | 6 | N/A | 01-29-15 |
| Northern Mariana Islands | State Program | 9 | MP0002 | 01-29-15 |
| Oregon | NELAP | 10 | 4005 | 01-29-15 |
| USDA | Federal | | P330-09-00080 | 06-06-15 |
| USEPA UCMR | Federal | 1 | CA01531 | 01-31-15 |

### Laboratory: TestAmerica Savannah

The certifications listed below are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Hawaii | State Program | 9 | N/A | 06-30-15 |

* Certification renewal pending - certification considered valid.



## Method Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-2

TestAmerica Job ID: HXH0034

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 350.1 | Nitrogen, Ammonia | MCAWW | TAL SAV |
| 351.2 | Nitrogen, Total Kjeldahl | MCAWW | TAL SAV |
| 353.2 | Nitrogen, Nitrate-Nitrite | MCAWW | TAL SAV |
| 365.4 | Phosphorus, Total | EPA | TAL SAV |
| SM 2540D | Solids, Total Suspended (TSS) | SM | TAL IRV |
| Total Nitrogen | Nitrogen, Total | EPA | TAL SAV |

**Protocol References:**

EPA = US Environmental Protection Agency
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
SM = "Standard Methods For The Examination Of Water And Wastewater",

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

1 2 3 4 5 6 7 8 9 10 11 12 **13**

TestAmerica

Rush TAT Confirmation (Initial/Date) _____

## Sample Receipt Checklist

Client Name: Surfrider Foundation Date/ Time Received: 8/12/14 1115

Received By: JL

Matrices: AQ Carrier: Fedex Airbill# :

| | | | |
|---|---|---|---|
| Shipping container/cooler in good condition? | Yes ☐ | No ☐ | Not Present ☐ |
| Chain of Custody present? | Yes ☐ | No ☐ | Not Present ☐ |
| Chain of Custody Signed when relinquished and received? | Yes ☐ | No ☐ | |
| Chain of Custody agrees with sample labels? | Yes ☐ | No ☐ | |
| Samples in proper container/bottle? | Yes ☐ | No ☐ | |
| Sample containers intact? | Yes ☐ | No ☐ | |
| Sample containers on ice? | Yes ☐ | No ☐ | Type: Wet |
| Sufficient sample volume for indicated test? | Yes ☐ | No ☐ | |
| All samples received within holding time? | Yes ☐ | No ☐ | |
| Water - VOA Vials have Zero Headspace? | Yes ☐ | No ☐ | No VOA vials present: ☑ |
| Water - pH acceptable upon receipt? | Yes ☐ | No ☐ | Not Checked: ☑ |
| pH Adjusted? | Yes ☐ | No ☐ | Final pH: |
| Encores / MI-VOC / 5035 Vials Present? | Yes ☐ | No ☐ | Location: |
| Sample Filtration Needed? | Yes ☐ | No ☐ | Filtered in Field: ☐ |
| Dry Weight Corrected Results? | Yes ☐ | No ☐ | Take Action: ☐ |
| DODQSM / QAPP Project? | Yes ☐ | No ☐ | Type: |
| Temperature Blank Present? | Yes ☐ | No ☑ | |

Sample Container Temperature: _____ °C

**Comments/ Sampling Handling Notes:**

Attachment B, page 47



1 2 3 4 5 6 7 8 9 10 11 12 **13**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Honolulu
1946 Young Street, Suite 400A • Honolulu, HI 96826
808-486-LABS (5227) • Fax 808-486-2456

LABORATORY USE ONLY
LAB JOB NO. HXH0034
☐ DOD QSM Required?
☐ Report to MDL with J Flag values?

## Chain of Custody / Analysis Request Form

Report to: Dr. Carl Berg
Company name: Surfrider Foundation - Kauai
Address: 2637 Apapane St.
City: Lihue State: HI ZIP: 96766
Phone: 808 639-2968 Fax:
Sampler: Carl Berg
# samples in shipment: 2 sites, 4 bottles

Project identification
Job name: Mahaulepu
Job number: Mahaulepu-2
PO number:
Contact email address: cberg@pixi.com
Date results needed: End of August

Indicate analyses requested

| Item no. | Client sample ID | Multi Incremental | Composite | Grab | Matrix: Water | Soil | Wastewater | Drinking water | Sludge | Liquid | Solid | Oil | Other | Preservation method | Sampling Date | Sampling Time | No. of containers | Ammonia EPA 350.3 | Nitrate-Nitrite EPA 353.2 | Nitrogen Total SM 4500-N | Phosphorus EPA 365.4 | TSS EPA 160.2 | TKN EPA 351.2 | | | | | Laboratory ID no. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Well | | | X | X | | | | | | | | | chill | 8/10/14 | | 1 | | | | | X | | | | | | HXH0034-01 |
| 2 | Well | | | X | X | | | | | | | | | acid | 8/10/14 | | 1 | X | X | X | X | | X | | | | | -02 |
| 3 | Stream | | | X | X | | | | | | | | | chill | 8/10/14 | | 1 | | | | | X | | | | | | -03 |
| 4 | Stream | | | X | X | | | | | | | | | acid | 8/10/14 | | 1 | X | X | X | X | | X | | | | | -04 |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Released by (print / sign) | Date / time released | Delivery method | Received by (print / sign) | Company / Agency affiliation | Date / time received | Condition noted |
|---|---|---|---|---|---|---|
| Carl Berg | 8/10/14 1900 | FedEx | | TA | 8/12/14 1115 | 17°C Wet wet |
| | / | | | | / | |
| | / | | | | / | |

Comments: Well water - do not include must in TSS
Per client do not analyze TSS on "Well" Sample

Please check one:
☑ Dispose by lab
☐ Return to client
☐ Archive (fee may apply)

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COC REV 11/2012 Distribution: White - TestAmerica Yellow - Client Page_____ of _____

Attachment B, page 46

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT


TestAmerica Laboratories, Inc.
TestAmerica Honolulu
4429 Malaai St. #104
Honolulu, HI 96818
Tel: 808-486-5227


TestAmerica Job ID: HXI0033
Client Project/Site: Mahaulepu-3
Client Project Description: Water Quality
Revision: 1

For:
Surfrider Foundation, Kauai Chapter
2637 Apapane St.
Lihue, HI 96766

Attn: Carl J. Berg

*Authorized for release by:*
*10/15/2014 8:47:45 AM*


Craig O. Pilialoha, Project Manager
808-486-5227
Craig.Pilialoha@testamericainc.com



LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com


*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*





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# Definitions/Glossary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

## Qualifiers

### General Chemistry

| Qualifier | Qualifier Description |
|---|---|
| F1 | MS and/or MSD Recovery exceeds the control limits |
| U | Indicates the analyte was analyzed for but not detected. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |



# Case Narrative

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

## Job ID: HXI0033

### Laboratory: TestAmerica Honolulu

**Narrative**

Revision 1: This report includes data analyzed at TestAmerica Savannah. Samples were subcontracted to Savannah for the lower limits we have been historically reporting to the client for this particular project. Data from this report supercedes the data from the previous report.

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory unless otherwise stated in the report. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample(s) analyzed.

The Chain(s) of Custody are included and are an integral part of this report. This entire report was reviewed and approved for release.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(808)486-5227

LABORATORY REPORT

At sample receipt, the cooler/sample was 8 degrees C.

TestAmerica has determined that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

### Laboratory: TestAmerica Irvine

**Narrative**

**Job Narrative**
**440-88424-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 9/18/2014 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.9º C.

**General Chemistry**
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### Laboratory: TestAmerica Savannah

**Narrative**

**CASE NARRATIVE**

**Client: TestAmerica Laboratories, Inc**

**Project: Surfrider Found., Kauai Chapt./HXI0033**

## Case Narrative

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

### Job ID: HXI0033 (Continued)

**Laboratory: TestAmerica Savannah (Continued)**

**Report Number: 680-106142-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

**RECEIPT**
The samples were received on 10/10/2014; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 1.4 C.

**AMMONIA**
Samples HXI0033-01 (680-106142-1) and HXI0033-02 (680-106142-2) were analyzed for ammonia in accordance with EPA Method 350.1. The samples were analyzed on 10/10/2014.

Ammonia recovered outside the recovery criteria for the MS/MSD of sample HXI0033-01 (680-106142-1) in batch 680-353057.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**TOTAL KJELDAHL NITROGEN (TKN)**
Samples HXI0033-01 (680-106142-1) and HXI0033-02 (680-106142-2) were analyzed for total kjeldahl nitrogen (TKN) in accordance with EPA Method 351.2. The samples were prepared on 10/10/2014 and analyzed on 10/11/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**NITRATE-NITRITE AS NITROGEN**
Samples HXI0033-01 (680-106142-1) and HXI0033-02 (680-106142-2) were analyzed for nitrate-nitrite as nitrogen in accordance with EPA Method 353.2. The samples were analyzed on 10/10/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**TOTAL NITROGEN BY CALCULATION**
Samples HXI0033-01 (680-106142-1) and HXI0033-02 (680-106142-2) were analyzed for total nitrogen by calculation in accordance with a calculated method. The samples were analyzed on 10/15/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



## Sample Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| HXI0033-01 | Well | Water - NonPotable | 09/14/14 09:08 | 09/16/14 11:38 |
| HXI0033-02 | STREAM | Water - NonPotable | 09/14/14 09:40 | 09/16/14 11:38 |

## Detection Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

### Client Sample ID: Well — Lab Sample ID: HXI0033-01

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.14 | | 0.050 | 0.026 | mg/L | 1 | | 350.1 | Total/NA |
| Nitrogen, Kjeldahl | 0.27 | | 0.20 | 0.15 | mg/L | 1 | | 351.2 | Total/NA |
| Nitrate Nitrite as N | 0.062 | | 0.050 | 0.010 | mg/L | 1 | | 353.2 | Total/NA |
| Phosphorus, Total | 0.15 | | 0.050 | 0.020 | mg/L | 1 | | 365.3 | Total/NA |
| **Analyte** | **Result** | **Qualifier** | **RL** | **RL** | **Unit** | **Dil Fac** | **D** | **Method** | **Prep Type** |
| Nitrogen, Total | 0.33 | | 0.25 | 0.25 | mg/L | 1 | | Total Nitrogen | Total/NA |

### Client Sample ID: STREAM — Lab Sample ID: HXI0033-02

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.097 | | 0.050 | 0.026 | mg/L | 1 | | 350.1 | Total/NA |
| Nitrogen, Kjeldahl | 0.44 | | 0.20 | 0.15 | mg/L | 1 | | 351.2 | Total/NA |
| Nitrate Nitrite as N | 0.052 | | 0.050 | 0.010 | mg/L | 1 | | 353.2 | Total/NA |
| Phosphorus, Total | 0.089 | | 0.050 | 0.020 | mg/L | 1 | | 365.3 | Total/NA |
| Total Suspended Solids | 32 | | 2.5 | 1.3 | mg/L | 1 | | SM 2540D | Total/NA |
| **Analyte** | **Result** | **Qualifier** | **RL** | **RL** | **Unit** | **Dil Fac** | **D** | **Method** | **Prep Type** |
| Nitrogen, Total | 0.49 | | 0.25 | 0.25 | mg/L | 1 | | Total Nitrogen | Total/NA |

This Detection Summary does not include radiochemical test results.



## Client Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

### Client Sample ID: Well — Lab Sample ID: HXI0033-01

Date Collected: 09/14/14 09:08
Date Received: 09/16/14 11:38
Matrix: Water - NonPotable

#### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.14 | | 0.050 | 0.026 | mg/L | | | 10/10/14 12:36 | 1 |
| Nitrogen, Kjeldahl | 0.27 | | 0.20 | 0.15 | mg/L | | 10/10/14 14:01 | 10/11/14 16:57 | 1 |
| Nitrate Nitrite as N | 0.062 | | 0.050 | 0.010 | mg/L | | | 10/10/14 11:49 | 1 |
| Phosphorus, Total | 0.15 | | 0.050 | 0.020 | mg/L | | 09/22/14 18:02 | 09/22/14 19:51 | 1 |
| **Analyte** | **Result** | **Qualifier** | **RL** | **RL** | **Unit** | **D** | **Prepared** | **Analyzed** | **Dil Fac** |
| Nitrogen, Total | 0.33 | | 0.25 | 0.25 | mg/L | | | 10/15/14 09:01 | 1 |

### Client Sample ID: STREAM — Lab Sample ID: HXI0033-02

Date Collected: 09/14/14 09:40
Date Received: 09/16/14 11:38
Matrix: Water - NonPotable

#### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.097 | | 0.050 | 0.026 | mg/L | | | 10/10/14 12:43 | 1 |
| Nitrogen, Kjeldahl | 0.44 | | 0.20 | 0.15 | mg/L | | 10/10/14 14:01 | 10/11/14 16:58 | 1 |
| Nitrate Nitrite as N | 0.052 | | 0.050 | 0.010 | mg/L | | | 10/10/14 11:55 | 1 |
| Phosphorus, Total | 0.089 | | 0.050 | 0.020 | mg/L | | 09/22/14 18:02 | 09/22/14 19:51 | 1 |
| Total Suspended Solids | 32 | | 2.5 | 1.3 | mg/L | | | 09/18/14 19:47 | 1 |
| **Analyte** | **Result** | **Qualifier** | **RL** | **RL** | **Unit** | **D** | **Prepared** | **Analyzed** | **Dil Fac** |
| Nitrogen, Total | 0.49 | | 0.25 | 0.25 | mg/L | | | 10/15/14 09:01 | 1 |

## Method: 350.1 - Nitrogen, Ammonia

**Lab Sample ID: MB 680-353057/2** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353057**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammol ia | 0-020 | . | 0-020 | 0-05U | m6jg | | | L0j08jL1 50:00 | L |

**Lab Sample ID: LCS 680-353057/10** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353057**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Ammol ia | L-00 | L-05 | | m6jg | | L05 | 80 M.L0 |

**Lab Sample ID: 680-106142-1 MS** — **Client Sample ID: HXI0033-01**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353057**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Ammol ia | 0-L1 | | L-00 | L-59 | dL | m6jg | | LL1 | 80 M.L0 |

**Lab Sample ID: 680-106142-1 MSD** — **Client Sample ID: HXI0033-01**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353057**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammol ia | 0-L1 | | L-00 | L-30 | dL | m6jg | | LLU | 80 M.L0 | 5 | 30 |

## Method: 351.2 - Nitrogen, Total Kjeldahl

**Lab Sample ID: MB 680-353046/2-A** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353190** — **Prep Batch: 353046**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitro6el F, ŘĈaKC | 0-50 | . | 0-50 | 0-L2 | m6jg | | L0jL0jL1 L1:0L | L0jLLjL1 LU:25 | L |

**Lab Sample ID: LCS 680-353046/1-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353190** — **Prep Batch: 353046**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitro6el F, ŘĈaKC | 5-00 | 5-05 | | m6jg | | L0L | 72 M.52 |

**Lab Sample ID: 460-83737-F-1-B MS** — **Client Sample ID: Matrix Spike**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353190** — **Prep Batch: 353046**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitro6el F, ŘĈaKC | L-3 | | 5-00 | 3-05 | | m6jg | | 99 | 72 M.52 |





## Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

**Lab Sample ID: 460-83737-F-1-C MSD** — **Client Sample ID: Matrix Spike Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353190** — **Prep Batch: 353046**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitro6el F, ŘĈaKC | L-3 | | 5-00 | 3-L7 | | m6jg | | 82 | 72 M.52 | 2 | 10 |

## Method: 353.2 - Nitrogen, Nitrate-Nitrite

**Lab Sample ID: MB 680-353034/17** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353034**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0-020 | . | 0-020 | 0-0L0 | m6jg | | | L0jL0jL1 LL:19 | L |

**Lab Sample ID: LCS 680-353034/14** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353034**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | L-00 | L-01 | | m6jg | | L01 | 80 M.L0 |

**Lab Sample ID: 160-8746-D-1 MS** — **Client Sample ID: Matrix Spike**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353034**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0-L0 | | L-00 | 0-885 | | m6jg | | 88 | 80 M.L0 |

**Lab Sample ID: 160-8746-D-1 MSD** — **Client Sample ID: Matrix Spike Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353034**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0-L0 | | L-00 | L-00 | | m6jg | | L00 | 80 M.L0 | L | L0 |

**Lab Sample ID: 680-106142-1 DU** — **Client Sample ID: HXI0033-01**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 353034**

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0-0U5 | | 0-0LL5 | | m6jg | | L | L0 |

## Method: 365.3 - Phosphorus, Total

**Lab Sample ID: MB 440-207326/1-A** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 207356** — **Prep Batch: 207326**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| pKoshKorSsFTotaC | ND | | 0-020 | 0-050 | m6jg | | 08j55jL1 L9:05 | 08j55jL1 L8:20 | L |

## Method: 365.3 - Phosphorus, Total (Continued)

**Lab Sample ID: LCS 440-207326/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 207356** — **Prep Batch: 207326**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| pKoshKorSsFTotaC | 0-200 | 0-185 | | m6jg | | 89 | 90 M-50 |

**Lab Sample ID: 440-88424-1 MS** — **Client Sample ID: HXI0033-01**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 207356** — **Prep Batch: 207326**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| pKoshKorSsFTotaC | 0-L2 | | 0-200 | 0-299 | | m6jg | | 97 | 72 M-52 |

**Lab Sample ID: 440-88424-1 MSD** — **Client Sample ID: HXI0033-01**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 207356** — **Prep Batch: 207326**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| pKoshKorSsFTotaC | 0-L2 | | 0-200 | 0-295 | | m6jg | | 9U | 72 M-52 | L | 50 |

## Method: SM 2540D - Solids, Total Suspended (TSS)

**Lab Sample ID: MB 440-206773/2** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 206773**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| TotaOnSshel f ef nodt s | ND | | L-0 | 0-20 | m6jg | | | 08jL.9jL1 L8:17 | L |

**Lab Sample ID: LCS 440-206773/1** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 206773**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| TotaOnSshel f ef nodt s | L000 | 88L | | m6jg | | 88 | 92 M-L2 |

**Lab Sample ID: 440-88381-B-1 DU** — **Client Sample ID: Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 206773**

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| TotaOnSshel f ef nodt s | 53 | | 53-2 | | m6jg | | 1 | L0 |





## General Chemistry

### Analysis Batch: 206773

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-88381-B-1 DU | Duplicate | Total/NA | Water | SM 2540D | |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | SM 2540D | |
| LCS 440-206773/1 | Lab Control Sample | Total/NA | Water | SM 2540D | |
| MB 440-206773/2 | Method Blank | Total/NA | Water | SM 2540D | |

### Prep Batch: 207326

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-88424-1 MS | HXI0033-01 | Total/NA | Water | 365.2/365.3/365 | |
| 440-88424-1 MSD | HXI0033-01 | Total/NA | Water | 365.2/365.3/365 | |
| HXI0033-01 | Well | Total/NA | Water - NonPotable | 365.2/365.3/365 | |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | 365.2/365.3/365 | |
| LCS 440-207326/2-A | Lab Control Sample | Total/NA | Water | 365.2/365.3/365 | |
| MB 440-207326/1-A | Method Blank | Total/NA | Water | 365.2/365.3/365 | |

### Analysis Batch: 207356

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-88424-1 MS | HXI0033-01 | Total/NA | Water | 365.3 | 207326 |
| 440-88424-1 MSD | HXI0033-01 | Total/NA | Water | 365.3 | 207326 |
| HXI0033-01 | Well | Total/NA | Water - NonPotable | 365.3 | 207326 |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | 365.3 | 207326 |
| LCS 440-207326/2-A | Lab Control Sample | Total/NA | Water | 365.3 | 207326 |
| MB 440-207326/1-A | Method Blank | Total/NA | Water | 365.3 | 207326 |

### Analysis Batch: 353034

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 160-8746-D-1 MS | Matrix Spike | Total/NA | Water | 353.2 | |
| 160-8746-D-1 MSD | Matrix Spike Duplicate | Total/NA | Water | 353.2 | |
| 680-106142-1 DU | HXI0033-01 | Total/NA | Water | 353.2 | |
| HXI0033-01 | Well | Total/NA | Water - NonPotable | 353.2 | |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | 353.2 | |
| LCS 680-353034/14 | Lab Control Sample | Total/NA | Water | 353.2 | |
| MB 680-353034/17 | Method Blank | Total/NA | Water | 353.2 | |

### Prep Batch: 353046

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 460-83737-F-1-B MS | Matrix Spike | Total/NA | Water | Digestion | |
| 460-83737-F-1-C MSD | Matrix Spike Duplicate | Total/NA | Water | Digestion | |
| HXI0033-01 | Well | Total/NA | Water - NonPotable | Digestion | |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | Digestion | |
| LCS 680-353046/1-A | Lab Control Sample | Total/NA | Water | Digestion | |
| MB 680-353046/2-A | Method Blank | Total/NA | Water | Digestion | |

# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

## General Chemistry (Continued)

### Analysis Batch: 353057

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 680-106142-1 MS | HXI0033-01 | Total/NA | Water | 350.1 | |
| 680-106142-1 MSD | HXI0033-01 | Total/NA | Water | 350.1 | |
| HXI0033-01 | Well | Total/NA | Water - NonPotable | 350.1 | |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | 350.1 | |
| LCS 680-353057/10 | Lab Control Sample | Total/NA | Water | 350.1 | |
| MB 680-353057/2 | Method Blank | Total/NA | Water | 350.1 | |

### Analysis Batch: 353190

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 460-83737-F-1-B MS | Matrix Spike | Total/NA | Water | 351.2 | 353046 |
| 460-83737-F-1-C MSD | Matrix Spike Duplicate | Total/NA | Water | 351.2 | 353046 |
| HXI0033-01 | Well | Total/NA | Water - NonPotable | 351.2 | 353046 |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | 351.2 | 353046 |
| LCS 680-353046/1-A | Lab Control Sample | Total/NA | Water | 351.2 | 353046 |
| MB 680-353046/2-A | Method Blank | Total/NA | Water | 351.2 | 353046 |

### Analysis Batch: 353641

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HXI0033-01 | Well | Total/NA | Water - NonPotable | Total Nitrogen | |
| HXI0033-02 | STREAM | Total/NA | Water - NonPotable | Total Nitrogen | |



# Lab Chronicle

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu-3

TestAmerica Job ID: HXI0033

## Client Sample ID: Well — Lab Sample ID: HXI0033-01

Date Collected: 09/14/14 09:08
Date Received: 09/16/14 11:38
Matrix: Water - NonPotable

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 350.1 | | 1 | 353057 | 10/10/14 12:36 | JME | TAL SAV |
| Total/NA | Prep | Digestion | | | 353046 | 10/10/14 14:01 | ASH | TAL SAV |
| Total/NA | Analysis | 351.2 | | 1 | 353190 | 10/11/14 16:57 | AJO | TAL SAV |
| Total/NA | Analysis | 353.2 | | 1 | 353034 | 10/10/14 11:49 | GRX | TAL SAV |
| Total/NA | Prep | 365.2/365.3/365 | | | 207326 | 09/22/14 18:02 | BS | TAL IRV |
| Total/NA | Analysis | 365.3 | | 1 | 207356 | 09/22/14 19:51 | BS | TAL IRV |
| Total/NA | Analysis | Total Nitrogen | | 1 | 353641 | 10/15/14 09:01 | JER | TAL SAV |

## Client Sample ID: STREAM — Lab Sample ID: HXI0033-02

Date Collected: 09/14/14 09:40
Date Received: 09/16/14 11:38
Matrix: Water - NonPotable

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 350.1 | | 1 | 353057 | 10/10/14 12:43 | JME | TAL SAV |
| Total/NA | Prep | Digestion | | | 353046 | 10/10/14 14:01 | ASH | TAL SAV |
| Total/NA | Analysis | 351.2 | | 1 | 353190 | 10/11/14 16:58 | AJO | TAL SAV |
| Total/NA | Analysis | 353.2 | | 1 | 353034 | 10/10/14 11:55 | GRX | TAL SAV |
| Total/NA | Prep | 365.2/365.3/365 | | | 207326 | 09/22/14 18:02 | BS | TAL IRV |
| Total/NA | Analysis | 365.3 | | 1 | 207356 | 09/22/14 19:51 | BS | TAL IRV |
| Total/NA | Analysis | SM 2540D | | 1 | 206773 | 09/18/14 19:47 | NTN | TAL IRV |
| Total/NA | Analysis | Total Nitrogen | | 1 | 353641 | 10/15/14 09:01 | JER | TAL SAV |

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
4 roRectjSite: / ahaulepuM3

TestAmerica Job ID: HXI0033

### Laboratory: TestAmerica Honolulu

All certifications held b- this laborator- are listed2 y ot all certifications are applicable to this report2

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| . SDA | Federal | | HNy K3NU0O | 06M36M1 |

### Laboratory: TestAmerica Irvine

All certifications held b- this laborator- are listed2 y ot all certifications are applicable to this report2

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alas5a | State 4 rokram | 60 | CA06136 | 0CM30M1 |
| Arigona | State 4 rokram | z | A90CZ6 | 60M63M7 * |
| California | LA Ct- Sanitation Districts | z | 60U1O | 06M36M1 |
| California | State 4 rokram | z | UZ0O | 0CM30M0 |
| Guam | State 4 rokram | z | Cert2y o26UZ00U- | 06M13M1 |
| Hawaii | State 4 rokram | z | y jA | 06M12M1 * |
| y evada | State 4 rokram | z | CA06136LD0ZA | 0ZM36M1 |
| y ew / exico | State 4 rokram | O | y jA | 06M12M1 |
| y orthern / ariana Islands | State 4 rokram | z | / 4000U | 06M12M1 |
| Nrekon | y ELA4 | 60 | 7001 | 06M12M1 |
| . SDA | Federal | | 4 330N0zM00080 | 0CM0CM1 |
| . SE4A . C/ R | Federal | 6 | CA06136 | 06M36M1 |

### Laboratory: TestAmerica Savannah

The certifications listed below are applicable to this report2

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Hawaii | State 4 rokram | z | y jA | 0CM30M1 |

* Certification renewal pendink Mcertification considered valid2



## Method Summary

4 0el t: nSrurif er doSl f atiol F, aSai 4 Kahter
proRectjnite: / aKaS@hSM3

TestAmerica Job ID: HXI0033

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 320W | . itro1el FAmmol ia | / 4 A- - | TAN nAg |
| 325W | . itro1el FTotaC, RetCaKC | / 4 A- - | TAN nAg |
| 323W | . itro1el F. itrateM itrite | / 4 A- - | TAN nAg |
| 3E2W | p KoshKorSsFTotaC | VpA | TAN I6 g |
| n/ L2(0D | noOrsFTotaOnSshel f ef )TnnR | n/ | TAN I6 g |
| TotaC itro1el | . itro1el FTotaC | VpA | TAN nAg |

**Protocol References:**

VpA = Un Vl virol mel taCprotectiol A1el cy

/ 4 A- - = "/ etKof s dor 4 KemicaOAl aQsis Ou- ater Al f - astes"FVpANE00j( M79N0L0F/ arcK 5983 Al f nSbseqSel t 6 evisiol sW

n/ = "ntal f arf / etKof s dor TKe Vxamil atiol Ou- ater Al f - astewater"F

**Laboratory References:**

TAN I6 g = TestAmerica Irvil eF57( E5 Derial AveFn Site 500 Flrvil eF4 A 9LE5( M2857FTVN )9( 9RLE5M0LL

TAN nAg = TestAmerica naval I aKF250L Na6 ocKe Avel SeFnaval I aKFGA 35( 0( FTVN )95LR32( M7828

TestAmerica

Rush TAT Confirmation (Initial/Date) _____

## Sample Receipt Checklist

Client Name: SURFRIDER FOUNDATION - KAUAI  Date/ Time Received: 09/16/14 11:38 AM

Received By: ELOH NUIKAM

Matrices:  Carrier:  Airbill# :

| | | | |
|---|---|---|---|
| Shipping container/cooler in good condition? | Yes ☒ | No ☐ | Not Present ☐ |
| Chain of Custody present? | Yes ☒ | No ☐ | ☐ |
| Chain of Custody Signed when relinquished and received? | Yes ☒ | No ☐ | |
| Chain of Custody agrees with sample labels? | Yes ☒ | No ☐ | |
| Samples in proper container/bottle? | Yes ☒ | No ☐ | |
| Sample containers intact? | Yes ☒ | No ☐ | |
| Sample containers on ice? | Yes ☒ | No ☐ | Type: WET ICE |
| Sufficient sample volume for indicated test? | Yes ☒ | No ☐ | |
| All samples received within holding time? | Yes ☒ | No ☐ | |
| Water - VOA Vials have Zero Headspace? | Yes ☐ | No ☐ | No VOA vials present: ☒ |
| Water - pH acceptable upon receipt? | Yes ☐ | No ☑ | Not Checked: — 9/17/14 |
| pH Adjusted? | Yes ☐ | No ☒ | Final pH: |
| Encores / MI-VOC / 5035 Vials Present? | Yes ☐ | No ☒ | Location: |
| Sample Filtration Needed? | Yes ☐ | No ☒ | Filtered in Field: ☐ |
| Dry Weight Corrected Results? | Yes ☐ | No ☒ | Take Action: ☐ |
| DODQSM / QAPP Project? | Yes ☐ | No ☒ | Type: |

Temperature Blank Present? Yes ☐ No ☒

Sample Container Temperature: 8.0 °C

**Comments/ Sampling Handling Notes:**

Per client TSS incorrectly checked on -01. TSS removed, TP added instead. Sample received unpreserved, H2SO4 added at TA HNL. JL 9/17/14

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Honolulu
1948 Young Street, Suite 400A • Honolulu, HI 96826
808-486-LABS (5227) • Fax 808-486-2456

## Chain of Custody / Analysis Request Form

Report to: Dr. Carl Berg
Company/Name: Surfrider Foundation - Kauai
Address: 2637 Kipapauhau St.
City: Lihue  State: HI  ZIP: 96766
Phone: 808 639-2968  Fax:
Sampler: Carl Berg  # samples in shipment: 2
Contact email address: cberg@hi.rr.com
Project identification: Job name: Mahaulepu  Job number: Mahaulepu-3  PO number:
Date results needed: End Sept October

LABORATORY USE ONLY
LAB JOB NO. HX10033
☐ DOD QSM Required?
☐ Report to MDL with J Flag values?

| Item no. | Client sample ID | Matrix: Multi Incremental | Composite | Grab | Water | Soil | Wastewater | Drinking water | Sludge | Liquid | Solid | Oil | Other | Preservation method | Sampling: Date | Time | No. of containers | Indicate analyses requested | Laboratory ID no. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Well | | | X | X | | | | | | | | | | | | 1 | Ammonia EPA 350.3 | HX10033-01 |
| 2 | Stream | | | X | X | | | | | | | | | Cu/H2SO4 Acid | 9/14/14 9/14/14 | | 2 | Nitrate-Nitrite EPA 353.2 | -02 |
| | | | | | | | | | | | | | | | | | | Nitrogen Total Sm 4500.N | |
| | | | | | | | | | | | | | | | | | | Phosphorus EPA 365.4 | |
| | | | | | | | | | | | | | | | | | | TSS EPA 160.2 | |
| | | | | | | | | | | | | | | | | | | TKN EPA 351.2 | |

| Released by (print / sign) | Date / time released | Delivery method | Received by (print / sign) | Company / Agency affiliation | Date / time received | Condition noted |
|---|---|---|---|---|---|---|
| [signature] | 9/14/14 | Fedex | ELOH NUIKAM | TA - HON | 09/16/14 11:38am | Intact on ice 8.0°C |
| | | | | | | |
| | | | | | | |

Comments: Well water not acid fixed at collection

Please check one:
☐ Dispose by lab
☐ Return to client
☐ Archive (fee may apply)

Page ___ of ___

Distribution: White - TestAmerica  Yellow - Client

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COC REV 11/2012



Attachment B, page 64

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Honolulu
4429 Malaai St. #104
Honolulu, HI 96818
Tel: 808-486-5227

TestAmerica Job ID: HXK0009
Client Project/Site: Mahaulepu, Mahaulepu-4
Client Project Description: Water Quality

For:
Surfrider Foundation, Kauai Chapter
2637 Apapane St.
Lihue, HI 96766

Attn: Carl J. Berg

*Authorized for release by:*
*11/13/2014 4:41:57 PM*

Craig O. Pilialoha, Project Manager
808-486-5227
Craig.Pilialoha@testamericainc.com

LINKS
Review your project results through TotalAccess
Have a Question? Ask The Expert
Visit us at: www.testamericainc.com

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*





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# Definitions/Glossary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

## Qualifiers

### General Chemistry

| Qualifier | Qualifier Description |
|---|---|
| H | Sample was prepped or analyzed beyond the specified holding time |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |



# Case Narrative

Client: Surfrider Foundation, Kauai Chapter
4roRectjSite: / ahaulepu, / ahaulepuM

TestAmerica Job ID: HXK0003

## Job ID: HXK0009

### Laboratory: TestAmerica Honolulu

**Narrative**

The results listed 2 ithin this waboratorL y eport pertain onlL to the samples tested in the laboratorL unless other2 ise stated in the reportRThe analLses contained in this report 2 ere performed in accordance 2 ith the applicable certifications as notedRAll soil samples are reported on a 2 et 2 ei. ht basis unless other2 ise noted in the reportRThis waboratorL y eport is confidential and is intended for the sole use of TestAmerica and its clientRThis report shall not be reproduced, egcept in full, 2 ithout 2 ritten permission from TestAmericaRTestAmerica AnalLtical Testin. Corporation certifies that the analLtical results contained herein applL onlL to the specific samplexs( analL) edR

The Chainxs( of CustodL are included and are an inte. ral part of this reportRThis entire report 2 as rezie2 ed and approzed for releaseR

If Lou haze anL vuestions relatin. to this analLtical report, please contact Lour waboratorL 4 roRect / ana. er at qM101(- 18N3557

wABOy ATOy Y y E4 Oy T

At sample receipt, the coolerjsample 2 as 5qR5 de. rees CR

TestAmerica has determined that samples 2 hich revuire thermal preserzation shall be considered acceptable if the arrizal temperature is 2 ithin 5 de. rees C of the revuired temperature or the method specified ran. eRFor samples 2 ith a temperature revuirement of - de. rees C, an arrizal temperature from 0 de. rees C to 8 de. rees C meets specificationsRSamples that are delizered to the laboratorL on the same daL that theL are collected maL not meet these criteriaRIn these cases, the samples are considered acceptable if there is ezidence that the chillin. process has be. un, such as arrizal on iceR

Samples 2 ere received alreadL outside of the method specific holdin. timeR

### Laboratory: TestAmerica Irvine

**Narrative**

**Job Narrative**
**440-92489-1**

**Comments**
No additional commentsR

**Receipt**
The samples 2 ere receized on qqj8j50q- 3:90 A/ ; the samples arrized in . ood condition, properlL preserzed and, 2 here revuired, on iceR
The temperature of the cooler at receipt 2 as qR3° CR

Egcept:

The follo2 in. samples 2 ere receized out of hold for TSS ananLsisRAs such, the laboratorL had insufficient time remainin. to perform the analLsis 2 ithin holdin. time: HXK0003M0q x- 0M35- 13M4(, HXK0003M05 x- 0M35- 13M5(R

**General Chemistry**
/ ethodxs( S/ 56- 0D: The follo2 in. samples 2 ere receized outside of holdin. time: HXK0003M0q x- 0M35- 13M4(, HXK0003M05 x- 0M35- 13M5(R

No additional analLtical or vualitL issues 2 ere noted, other than those described aboze or in the DefinitionsjGlossarL pa. eR

## Sample Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| HXK0009-01 | WAIOPILI STREAM SITE 2 | Water - NonPotable | 10/07/14 11:15 | 11/04/14 16:43 |
| HXK0009-02 | WAIOPILI STREAM SITE 2 | Water - NonPotable | 10/20/14 13:48 | 11/04/14 16:43 |



## Detection Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

### Client Sample ID: WAIOPILI STREAM SITE 2 — Lab Sample ID: HXK0009-01

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 230 | H | 18 | | mg/L | 1 | | SM 2540D | Total/NA |

### Client Sample ID: WAIOPILI STREAM SITE 2 — Lab Sample ID: HXK0009-02

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 100 | H | 7.1 | | mg/L | 1 | | SM 2540D | Total/NA |

This Detection Summary does not include radiochemical test results.

## Client Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

**Client Sample ID: WAIOPILI STREAM SITE 2** — **Lab Sample ID: HXK0009-01**
**Date Collected: 10/07/14 11:15** — **Matrix: Water - NonPotable**
**Date Received: 11/04/14 16:43**

General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 230 | H | 18 | | mg/L | | | 11/06/14 18:20 | 1 |

**Client Sample ID: WAIOPILI STREAM SITE 2** — **Lab Sample ID: HXK0009-02**
**Date Collected: 10/20/14 13:48** — **Matrix: Water - NonPotable**
**Date Received: 11/04/14 16:43**

General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 100 | H | 7.1 | | mg/L | | | 11/06/14 18:20 | 1 |



## QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

**Method: SM 2540D - Solids, Total Suspended (TSS)**

**Lab Sample ID: MB 440-216850/2** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 216850**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | ND | | 1.0 | | mg/L | | | 11/06/14 15:44 | 1 |

**Lab Sample ID: LCS 440-216850/1** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 216850**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | | | 1000 | 976 | | mg/L | | 98 | 85 - 115 | | |

**Lab Sample ID: 440-91975-A-1 DU** — **Client Sample ID: Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 216850**

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 76 | | | 76.0 | | mg/L | | | | 0 | 10 |

## QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

### General Chemistry

**Analysis Batch: 216850**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-91975-A-1 DU | Duplicate | Total/NA | Water | SM 2540D | |
| HXK0009-01 | WAIOPILI STREAM SITE 2 | Total/NA | Water - NonPotable | SM 2540D | |
| HXK0009-02 | WAIOPILI STREAM SITE 2 | Total/NA | Water - NonPotable | SM 2540D | |
| LCS 440-216850/1 | Lab Control Sample | Total/NA | Water | SM 2540D | |
| MB 440-216850/2 | Method Blank | Total/NA | Water | SM 2540D | |



## Lab Chronicle

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

### Client Sample ID: WAIOPILI STREAM SITE 2

**Lab Sample ID: HXK0009-01**
**Date Collected: 10/07/14 11:15**
**Matrix: Water - NonPotable**
**Date Received: 11/04/14 16:43**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 216850 | 11/06/14 18:20 | NTN | TAL IRV |

### Client Sample ID: WAIOPILI STREAM SITE 2

**Lab Sample ID: HXK0009-02**
**Date Collected: 10/20/14 13:48**
**Matrix: Water - NonPotable**
**Date Received: 11/04/14 16:43**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 216850 | 11/06/14 18:20 | NTN | TAL IRV |

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
4 roRectjSite: / ahaulepu, / ahaulepuM

TestAmerica Job ID: HXK0003

### Laboratory: TestAmerica Honolulu

All certifications held b2 this laborator2 are listedy . ot all certifications are applicable to this reporty

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| NSDA | Federal | | HU. N3M006 | 01M51Mk |

### Laboratory: TestAmerica Irvine

All certifications held b2 this laborator2 are listedy . ot all certifications are applicable to this reporty

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alasga | State 4 rozram | 10 | CA01k51 | 06M50Mk |
| Ari9ona | State 4 rozram | 3 | AZ0671 | 10M15Mk |
| California | * A Ct2 Sanitation Districts | 3 | 10Ck6 | 01M51Mk |
| California | State 4 rozram | 3 | C706 | 06M50M6 |
| L uam | State 4 rozram | 3 | Certy. oy1O00C | 01M05Mk |
| HaGaii | State 4 rozram | 3 | . jA | 01M03Mk w |
| . evada | State 4 rozram | 3 | CA01k51C007A | 07M51Mk |
| . eG / exico | State 4 rozram | 6 | . jA | 01M03Mk |
| . orthern / ariana Islands | State 4 rozram | 3 | / 4000O | 01M03Mk |
| Urezon | . E* A4 | 10 | - 00k | 01M03Mk |
| NSDA | Federal | | 4550M03M00080 | 06M06Mk |
| NSE4A NC/ R | Federal | 1 | CA01k51 | 01M51Mk |

wCertification reneGal pendinz Mcertification considered validy



## Method Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Mahaulepu, Mahaulepu-4

TestAmerica Job ID: HXK0009

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| SM 2540D | Solids, Total Suspended (TSS) | SM | TAL IRV |

**Protocol References:**

SM = "Standard Methods For The Examination Of Water And Wastewater",

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TestAmerica

Rush TAT Confirmation (Initial/Date) _____

## Sample Receipt Checklist

**Client Name:** Surfrider Foundation-Kauai **Date/ Time Received:** 11/4/14 1643

**Received By:** David Buchli

**Matrices:** AQ **Carrier:** Fed Ex **Airbill#:** 854108371956

| | | | |
|---|---|---|---|
| Shipping container/cooler in good condition? | Yes ☑ | No ☐ | Not Present ☐ |
| Chain of Custody present? | Yes ☑ | No ☐ | ☐ |
| Chain of Custody Signed when relinquished and received? | Yes ☑ | No ☐ | |
| Chain of Custody agrees with sample labels? | Yes ☑ | No ☐ | |
| Samples in proper container/bottle? | Yes ☑ | No ☐ | |
| Sample containers intact? | Yes ☑ | No ☐ | |
| Sample containers on ice? | Yes ☐ | No ☑ | Type: |
| Sufficient sample volume for indicated test? | Yes ☑ | No ☐ | |
| All samples received within holding time? | Yes ☑ cp 11-5-14 | No ☒ | |
| Water - VOA Vials have Zero Headspace? | Yes ☐ | No ☐ | No VOA vials present: ☑ |
| Water - pH acceptable upon receipt? | Yes ☐ | No ☐ | Not Checked: ☑ |
| pH Adjusted? | Yes ☐ | No ☑ | Final pH: |
| Encores / MI-VOC / 5035 Vials Present? | Yes ☐ | No ☑ | Location: |
| Sample Filtration Needed? | Yes ☐ | No ☑ | Filtered in Field: ☐ |
| Dry Weight Corrected Results? | Yes ☐ | No ☑ | Take Action: ☐ |
| DODQSM / QAPP Project? | Yes ☐ | No ☑ | Type: |

Temperature Blank Present? Yes ☐ No ☑

Sample Container Temperature: 21.2 °C

**Comments/ Sampling Handling Notes:**

TSS has a hold time of 7-days. Samples received in lab already outside of hold time. cp 11-5-14

Attachment B, page 79



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

**Honolulu**
1946 Young Street, Suite 400A • Honolulu, HI 96826
808-486-LABS (5227) • Fax 808-486-2456

## Chain of Custody / Analysis Request Form

LABORATORY USE ONLY
LAB JOB NO. HXK0009
☐ DOD QSM Required?
☐ Report to MDL with J Flag values?

Report to: Company name: Dr. Carl Berg
Address: Surfrider Foundation - Kauai
City: 2637 Aipono St. State: HI ZIP: 96766
Phone: 808-639-2966 Fax:
Sampler: Carl Berg # samples in shipment: 2

Project identification: Job name: Mahaulepu Job number: Mahaulepu-4 PO number: Contact email address: cberg@pix.com Date results needed:

Indicate analyses requested: TSS - EPA 1602

| | Item no. | Client sample ID | Multi Incremental | Composite | Grab | Matrix: Water | Soil | Wastewater | Drinking water | Sludge | Liquid | Solid | Oil | Other | Preservation method | Sampling: Date | Time | No. of containers | Laboratory ID no. | Condition noted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | Waiopili Stream Site 2 | | | ✓ | ✓ | | | | | | | | | | NaOH 10/7/14 | 11:15 | 1 | HXK0009-01 | |
| 2 | | Waiopili Stream Site 2 | | | ✓ | ✓ | | | | | | | | | | NaOH 10/20/14 | 13:48 | 1 | -02 | |
| 3 | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | |

| Released by (print / sign) | Date / time released | Delivery method | Received by (print / sign) | Company / Agency affiliation | Date / time received | Condition noted |
|---|---|---|---|---|---|---|
| Carl Berg | 11/3/14 1034 | Fed Ex | D. Buchli / D. Buchli | TA HNL | 11/4/14 1643 | intact no ice 21.2c |
| | / | | / | | / | |

Comments: ✓

Please check one: ☑ Dispose by lab ☐ Return to client ☐ Archive (fee may apply)

Page ___ of ___

Distribution: White - TestAmerica Yellow - Client

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COC REV 1/12/12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Honolulu
4429 Malaai St. #104
Honolulu, HI 96818
Tel: 808-486-5227

TestAmerica Job ID: HYA0059
Client Project/Site: MAHAULEPU-5
Client Project Description: Water Quality

For:
Surfrider Foundation, Kauai Chapter
2637 Apapane St.
Lihue, HI 96766

Attn: Carl J. Berg

*Authorized for release by:*
*2/6/2015 1:21:08 PM*

Craig O. Pilialoha, Project Manager
808-486-5227
Craig.Pilialoha@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*





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## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |





## Job ID: HYA0059

### Laboratory: TestAmerica Honolulu

**Narrative**

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory unless otherwise stated in the report. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample(s) analyzed.

The Chain(s) of Custody are included and are an integral part of this report. This entire report was reviewed and approved for release.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(808)486-5227

LABORATORY REPORT

At sample receipt, the cooler/sample was 15.2 degrees C.

TestAmerica has determined that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

### Laboratory: TestAmerica Savannah

**Narrative**

**CASE NARRATIVE**

**Client: TestAmerica Laboratories, Inc**

**Project: Surfrider Foundation, Kauai Chapter**

**Report Number: 680-109333-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

**RECEIPT**

The samples were received on 01/24/2015; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 1.1 C.

**AMMONIA**

Sample HYA0059-02 (680-109333-1) was analyzed for ammonia in accordance with EPA Method 350.1. The samples were analyzed on 01/26/2015.

Ammonia recovered outside the recovery criteria high for the MS/MSD of sample HYA0059-02 (680-109333-1) in batch 680-368449.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**TOTAL KJELDAHL NITROGEN (TKN)**

Sample HYA0059-02 (680-109333-1) was analyzed for total kjeldahl nitrogen (TKN) in accordance with EPA Method 351.2. The samples were prepared on 01/28/2015 and analyzed on 01/29/2015.

## Case Narrative

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Job ID: HYA0059 (Continued)

**Laboratory: TestAmerica Honolulu (Continued)**

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**NITRATE-NITRITE AS NITROGEN**
Sample HYA0059-02 (680-109333-1) was analyzed for nitrate-nitrite as nitrogen in accordance with EPA Method 353.2. The samples were analyzed on 01/27/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**TOTAL PHOSPHORUS**
Sample HYA0059-02 (680-109333-1) was analyzed for total phosphorus in accordance with EPA Method 365.4. The samples were prepared on 01/28/2015 and analyzed on 01/29/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**TOTAL NITROGEN BY CALCULATION**
Sample HYA0059-02 (680-109333-1) was analyzed for total nitrogen by calculation in accordance with a calculated method. The samples were analyzed on 01/29/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**Laboratory: TestAmerica Irvine**

**Narrative**

**Job Narrative**
**440-99725-1**

**Comments**
No additional comments.

**Receipt**
The sample was received on 1/23/2015 10:20 AM; the sample arrived in good condition, properly preserved and, where required, on ice.
The temperature of the cooler at receipt was 4.5º C.

**General Chemistry**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



## Sample Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| HYA0059-01 | STREAM | Water - NonPotable | 01/20/15 08:31 | 01/21/15 14:35 |
| HYA0059-02 | STREAM | Water - NonPotable | 01/20/15 08:30 | 01/21/15 14:35 |

## Detection Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Client Sample ID: STREAM — Lab Sample ID: HYA0059-01

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 15 | | 1.8 | | mg/L | 1 | | SM 2540D | Total/NA |

### Client Sample ID: STREAM — Lab Sample ID: HYA0059-02

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.13 | | 0.050 | 0.026 | mg/L | 1 | | 350.1 | Total |
| Nitrogen, Kjeldahl | 0.30 | | 0.20 | 0.10 | mg/L | 1 | | 351.2 | Total |
| Nitrate Nitrite as N | 0.10 | | 0.050 | 0.010 | mg/L | 1 | | 353.2 | Total |
| Nitrogen, Total | 0.40 | | 0.25 | 0.25 | mg/L | 1 | | Total Nitrogen | Total |

This Detection Summary does not include radiochemical test results.



## Client Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Client Sample ID: STREAM — Lab Sample ID: HYA0059-01

Date Collected: 01/20/15 08:31
Date Received: 01/21/15 14:35
Matrix: Water - NonPotable

#### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 15 | | 1.8 | | mg/L | | | 01/27/15 14:10 | 1 |

### Client Sample ID: STREAM — Lab Sample ID: HYA0059-02

Date Collected: 01/20/15 08:30
Date Received: 01/21/15 14:35
Matrix: Water - NonPotable

#### Method: 350.1 - Nitrogen, Ammonia

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 0.13 | | 0.050 | 0.026 | mg/L | | 01/26/15 17:08 | 01/26/15 17:08 | 1 |

#### Method: 351.2 - Nitrogen, Total Kjeldahl

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.30 | | 0.20 | 0.10 | mg/L | | 01/28/15 15:07 | 01/29/15 11:12 | 1 |

#### Method: 353.2 - Nitrogen, Nitrate-Nitrite

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 0.10 | | 0.050 | 0.010 | mg/L | | 01/27/15 16:10 | 01/27/15 16:10 | 1 |

#### Method: 365.4 - Phosphorus, Total

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | ND | | 0.10 | 0.041 | mg/L | | 01/28/15 15:07 | 01/29/15 11:12 | 1 |

#### Method: Total Nitrogen - Nitrogen, Total

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Total | 0.40 | | 0.25 | 0.25 | mg/L | | 01/29/15 10:12 | 01/29/15 10:12 | 1 |

## QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 440-232308/2
Matrix: Water
Analysis Batch: 232308

Client Sample ID: Method Blank
Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | ND | | 1.0 | | mg/L | | | 01/27/15 14:10 | 1 |

Lab Sample ID: LCS 440-232308/1
Matrix: Water
Analysis Batch: 232308

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 1000 | 989 | | mg/L | | 99 | 85 - 115 |

Lab Sample ID: 440-99622-B-1 DU
Matrix: Water
Analysis Batch: 232308

Client Sample ID: Duplicate
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | DU Result | DU Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 52 | | 53.3 | | mg/L | | 2 | 10 |

### Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: 368449-20
Matrix: Water
Analysis Batch: 368449

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 368449_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | ND | | 0.050 | 0.026 | mg/L | | 01/26/15 17:31 | 01/26/15 17:31 | 1 |

Lab Sample ID: 368449-24
Matrix: Water
Analysis Batch: 368449

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 368449_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Ammonia | 1.00 | 0.994 | | mg/L | | 99 | 90 - 110 |

### Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: 368846-14
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | ND | | 0.20 | 0.10 | mg/L | | 01/28/15 15:07 | 01/29/15 11:11 | 1 |

Lab Sample ID: 368846-13
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 2.00 | 2.06 | | mg/L | | 103 | 75 - 125 |



## QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

Lab Sample ID: 1093331D
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Dup Result | Matrix Spike Dup Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.30 | | 2.00 | 2.19 | | mg/L | | 95 | 75 - 125 | 6 | 40 |

Lab Sample ID: 1093331S
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Result | Matrix Spike Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | 0.30 | | 2.00 | 2.32 | | mg/L | | 101 | 75 - 125 |

Lab Sample ID: 368846-19
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Sample Result | Sample Qualifier | Duplicate Result | Duplicate Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Nitrogen, Kjeldahl | | | 1.84 | | mg/L | | 13 | 40 |

### Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: 368542-13
Matrix: Water
Analysis Batch: 368542

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 368542_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | ND | | 0.050 | 0.010 | mg/L | | 01/27/15 16:01 | 01/27/15 16:01 | 1 |

Lab Sample ID: 368542-16
Matrix: Water
Analysis Batch: 368542

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 368542_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 1.05 | | mg/L | | 105 | 90 - 110 |

### Method: 365.4 - Phosphorus, Total

Lab Sample ID: 368845-14
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Blank Result | Blank Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | ND | | 0.10 | 0.041 | mg/L | | 01/28/15 15:07 | 01/29/15 11:11 | 1 |

Lab Sample ID: 368845-13
Matrix: Water
Analysis Batch: 368695

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 368695_P

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Phosphorus | 2.00 | 2.03 | | mg/L | | 101 | 60 - 140 |

# QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

## Method: 365.4 - Phosphorus, Total (Continued)

**Lab Sample ID: 1093331D** — **Client Sample ID: Matrix Spike Duplicate**
**Matrix: Water** — **Prep Type: Total**
**Analysis Batch: 368695** — **Prep Batch: 368695_P**

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Dup Result | Matrix Spike Dup Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | ND | | 2.00 | 1.93 | | mg/L | | 96 | 60 - 140 | 1 | 40 |

**Lab Sample ID: 1093331S** — **Client Sample ID: Matrix Spike**
**Matrix: Water** — **Prep Type: Total**
**Analysis Batch: 368695** — **Prep Batch: 368695_P**

| Analyte | Sample Result | Sample Qualifier | Spike Added | Matrix Spike Result | Matrix Spike Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | ND | | 2.00 | 1.94 | | mg/L | | 97 | 60 - 140 |

**Lab Sample ID: 368845-19** — **Client Sample ID: Duplicate**
**Matrix: Water** — **Prep Type: Total**
**Analysis Batch: 368695** — **Prep Batch: 368695_P**

| Analyte | Sample Result | Sample Qualifier | Duplicate Result | Duplicate Qualifier | Unit | D | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|
| Phosphorus | | | 0.993 | | mg/L | | 3 | 40 |



# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

## General Chemistry

### Analysis Batch: 232308

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-99622-B-1 DU | Duplicate | Total/NA | Water | SM 2540D | |
| HYA0059-01 | STREAM | Total/NA | Water - NonPotable | SM 2540D | |
| LCS 440-232308/1 | Lab Control Sample | Total/NA | Water | SM 2540D | |
| MB 440-232308/2 | Method Blank | Total/NA | Water | SM 2540D | |

## TSAV

### Analysis Batch: 368449

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 368449-20 | Method Blank | Total | Water | 350.1 | 368449_P |
| 368449-24 | Lab Control Sample | Total | Water | 350.1 | 368449_P |
| HYA0059-02 | STREAM | Total | Water - NonPotable | 350.1 | 368449_P |

### Analysis Batch: 368542

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 368542-13 | Method Blank | Total | Water | 353.2 | 368542_P |
| 368542-16 | Lab Control Sample | Total | Water | 353.2 | 368542_P |
| HYA0059-02 | STREAM | Total | Water - NonPotable | 353.2 | 368542_P |

### Analysis Batch: 368695

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 1093331D | Matrix Spike Duplicate | Total | Water | 351.2 | 368695_P |
| 1093331D | Matrix Spike Duplicate | Total | Water | 365.4 | 368695_P |
| 1093331S | Matrix Spike | Total | Water | 351.2 | 368695_P |
| 1093331S | Matrix Spike | Total | Water | 365.4 | 368695_P |
| 368845-13 | Lab Control Sample | Total | Water | 365.4 | 368695_P |
| 368845-14 | Method Blank | Total | Water | 365.4 | 368695_P |
| 368845-19 | Duplicate | Total | Water | 365.4 | 368695_P |
| 368846-13 | Lab Control Sample | Total | Water | 351.2 | 368695_P |
| 368846-14 | Method Blank | Total | Water | 351.2 | 368695_P |
| 368846-19 | Duplicate | Total | Water | 351.2 | 368695_P |
| HYA0059-02 | STREAM | Total | Water - NonPotable | 351.2 | 368695_P |
| HYA0059-02 | STREAM | Total | Water - NonPotable | 365.4 | 368695_P |

### Analysis Batch: 368784

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HYA0059-02 | STREAM | Total | Water - NonPotable | Total Nitrogen | 368784_P |

### Prep Batch: 368449_P

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 368449-20 | Method Blank | Total | Water | NA | |
| 368449-24 | Lab Control Sample | Total | Water | NA | |
| HYA0059-02 | STREAM | Total | Water - NonPotable | NA | |

## QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### TSAV (Continued)

**Prep Batch: 368542_P**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 368542-13 | Method Blank | Total | Water | NA | |
| 368542-16 | Lab Control Sample | Total | Water | NA | |
| HYA0059-02 | STREAM | Total | Water - NonPotable | NA | |

**Prep Batch: 368695_P**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 1093331D | Matrix Spike Duplicate | Total | Water | Digestion | |
| 1093331S | Matrix Spike | Total | Water | Digestion | |
| 368845-13 | Lab Control Sample | Total | Water | Digestion | |
| 368845-14 | Method Blank | Total | Water | Digestion | |
| 368845-19 | Duplicate | Total | Water | Digestion | |
| 368846-13 | Lab Control Sample | Total | Water | Digestion | |
| 368846-14 | Method Blank | Total | Water | Digestion | |
| 368846-19 | Duplicate | Total | Water | Digestion | |
| HYA0059-02 | STREAM | Total | Water - NonPotable | Digestion | |

**Prep Batch: 368784_P**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| HYA0059-02 | STREAM | Total | Water - NonPotable | NA | |



## Lab Chronicle

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Client Sample ID: STREAM — Lab Sample ID: HYA0059-01

**Date Collected: 01/20/15 08:31**
**Date Received: 01/21/15 14:35**
**Matrix: Water - NonPotable**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 232308 | 01/27/15 14:10 | NTN | TAL IRV |

### Client Sample ID: STREAM — Lab Sample ID: HYA0059-02

**Date Collected: 01/20/15 08:30**
**Date Received: 01/21/15 14:35**
**Matrix: Water - NonPotable**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total | Analysis | 350.1 | | 1 | 368449 | 01/26/15 17:08 | JME | TAL SAV |
| Total | Prep | NA | | | 368449_P | 01/26/15 17:08 | | TAL SAV |
| Total | Prep | Digestion | | | 368695_P | 01/28/15 15:07 | | TAL SAV |
| Total | Analysis | 351.2 | | 1 | 368695 | 01/29/15 11:12 | VAS | TAL SAV |
| Total | Analysis | 353.2 | | 1 | 368542 | 01/27/15 16:10 | GRX | TAL SAV |
| Total | Prep | NA | | | 368542_P | 01/27/15 16:10 | | TAL SAV |
| Total | Prep | Digestion | | | 368695_P | 01/28/15 15:07 | | TAL SAV |
| Total | Analysis | 365.4 | | 1 | 368695 | 01/29/15 11:12 | VAS | TAL SAV |
| Total | Analysis | Total Nitrogen | | 1 | 368784 | 01/29/15 10:12 | JER | TAL SAV |
| Total | Prep | NA | | | 368784_P | 01/29/15 10:12 | | TAL SAV |

**Laboratory References:**

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL 912.354.7858

## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Laboratory: TestAmerica Honolulu

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| USDA | Federal | | HON-S-206 | 01-31-18 |

### Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alaska | State Program | 10 | CA01531 | 06-30-15 |
| Arizona | State Program | 9 | AZ0671 | 10-13-15 |
| California | LA Cty Sanitation Districts | 9 | 10256 | 01-31-16 * |
| California | State Program | 9 | 2706 | 06-30-16 |
| Guam | State Program | 9 | Cert. No. 12.002r | 01-23-15 * |
| Hawaii | State Program | 9 | N/A | 01-29-16 |
| Nevada | State Program | 9 | CA015312007A | 07-31-15 |
| New Mexico | State Program | 6 | N/A | 01-29-15 * |
| Northern Mariana Islands | State Program | 9 | MP0002 | 01-29-15 * |
| Oregon | NELAP | 10 | 4005 | 01-29-16 |
| USDA | Federal | | P330-09-00080 | 06-06-15 |
| USEPA UCMR | Federal | 1 | CA01531 | 01-31-15 |

### Laboratory: TestAmerica Savannah

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 399.01 | 02-28-17 |
| A2LA | ISO/IEC 17025 | | 399.01 | 02-28-17 |
| Alabama | State Program | 4 | 41450 | 06-30-15 |
| California | State Program | 9 | 2939 | 07-31-15 |
| Colorado | State Program | 8 | N/A | 12-31-15 |
| Connecticut | State Program | 1 | PH-0161 | 03-31-15 |
| Florida | NELAP | 4 | E87052 | 06-30-15 |
| GA Dept. of Agriculture | State Program | 4 | N/A | 06-12-17 |
| Georgia | State Program | 4 | N/A | 06-30-15 |
| Georgia | State Program | 4 | 803 | 06-30-15 |
| Guam | State Program | 9 | 09-005r | 04-16-15 |
| Hawaii | State Program | 9 | N/A | 06-30-15 |
| Illinois | NELAP | 5 | 200022 | 11-30-15 |
| Indiana | State Program | 5 | N/A | 06-30-15 |
| Iowa | State Program | 7 | 353 | 07-01-15 |
| Kentucky (DW) | State Program | 4 | 90084 | 12-31-15 |
| Kentucky (UST) | State Program | 4 | 18 | 06-30-15 |
| Kentucky (WW) | State Program | 4 | 90084 | 12-31-15 |
| Louisiana | NELAP | 6 | 30690 | 06-30-15 |
| Louisiana (DW) | NELAP | 6 | LA150014 | 12-31-15 |
| Maine | State Program | 1 | GA00006 | 09-24-16 |
| Maryland | State Program | 3 | 250 | 12-31-15 |
| Massachusetts | State Program | 1 | M-GA006 | 06-30-15 |
| Michigan | State Program | 5 | 9925 | 06-30-15 |
| Mississippi | State Program | 4 | N/A | 06-30-15 |
| Montana | State Program | 8 | CERT0081 | 12-31-15 |
| Nebraska | State Program | 7 | TestAmerica-Savannah | 06-30-15 |
| New Jersey | NELAP | 2 | GA769 | 06-30-15 |

* Certification renewal pending - certification considered valid.



## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

### Laboratory: TestAmerica Savannah (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| New Mexico | State Program | 6 | N/A | 06-30-15 |
| New York | NELAP | 2 | 10842 | 03-31-15 |
| North Carolina (DW) | State Program | 4 | 13701 | 07-31-15 |
| North Carolina (WW/SW) | State Program | 4 | 269 | 12-31-15 |
| Oklahoma | State Program | 6 | 9984 | 08-31-15 |
| Pennsylvania | NELAP | 3 | 68-00474 | 06-30-15 |
| Puerto Rico | State Program | 2 | GA00006 | 12-31-15 |
| South Carolina | State Program | 4 | 98001 | 06-30-15 |
| Tennessee | State Program | 4 | TN02961 | 06-30-15 |
| Texas | NELAP | 6 | T104704185-14-7 | 11-30-15 |
| USDA | Federal | | SAV 3-04 | 06-11-17 |
| Virginia | NELAP | 3 | 460161 | 06-14-15 |
| Washington | State Program | 10 | C805 | 06-10-15 |
| West Virginia (DW) | State Program | 3 | 9950C | 12-31-15 |
| West Virginia DEP | State Program | 3 | 094 | 06-30-15 |
| Wisconsin | State Program | 5 | 999819810 | 08-31-15 |
| Wyoming | State Program | 8 | 8TMS-L | 06-30-15 |

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LABORATORY USE ONLY
LAB JOB NO. HYA0059
☐ DOD QSM Required?
☐ Report to MDL with J Flag values?

# Chain of Custody / Analysis Request Form

Report to: Dr. Carl Berg
Company name: Surfrider Foundation Kauai
Address: 2637 Aganane St.
City: Lihue State: HI ZIP: 96766
Phone: 808 639-2965 Fax:
Sampler: Carl Berg # samples in shipment: 2

Project identification
Job name: Mahaulepu
Job number: Mahaulepu-4
PO number:
Contact email address: cberg@pix.com
Date results needed: 2/20/15

Indicate analyses requested

| Item no. | Client sample ID | Multi Incremental | Composite | Grab | Matrix: Water | Soil | Wastewater | Drinking water | Sludge | Liquid | Solid | Oil | Other | Preservation method | Sampling Date | Sampling Time | No. of containers | Ammonia EPA 350.3 | Nitrate-Nitrite EPA 353.2 | Nitrogen, Total SM 4500 | Phosphorus EPA 365.4 | TKN EPA 351.2 | TSS EPA 160.2 | | | | Laboratory ID no. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Stream | | | X | X | | | | | | | | | Chill | 1/20/14 | 8:31 | 1 | | | | | | X | | | | HYA0059-01 |
| 2 | Stream | | | X | X | | | | | | | | | Chill Acid | 1/20/14 | 8:30 | 1 | X | X | X | X | X | | | | | -02 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Released by (print / sign) | Date / time released | Delivery method | Received by (print / sign) | Company / Agency affiliation | Date / time received | Condition noted |
|---|---|---|---|---|---|---|
| Carl Berg | 1/21/15 12:00 | FedEx | David Buchli / [illegible] | TA HNL | 1/21/15 1435 | intact gel 15.2°C |
| | / | | | | / | |
| | / | | | | / | |

Comments:

Please check one:
☑ Dispose by lab
☐ Return to client
☐ Archive (fee may apply)

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COC REV 11/2012 Distribution: White - TestAmerica Yellow - Client

Page 1 of 1



## Method Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: MAHAULEPU-5

TestAmerica Job ID: HYA0059

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| SM 2540D | Solids, Total Suspended (TSS) | SM | TAL IRV |
| 350.1 | Nitrogen, Ammonia | | TAL SAV |
| 351.2 | Nitrogen, Total Kjeldahl | | TAL SAV |
| 353.2 | Nitrogen, Nitrate-Nitrite | | TAL SAV |
| 365.4 | Phosphorus, Total | | TAL SAV |
| Total Nitrogen | Nitrogen, Total | | TAL SAV |

**Protocol References:**
SM = "Standard Methods For The Examination Of Water And Wastewater",

**Laboratory References:**
TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL 912.354.7858

TestAmerica

Rush TAT Confirmation (Initial/Date) _____

## Sample Receipt Checklist

Client Name: Surfrider Foundation Kauai  Date/ Time Received: 1/21/15 1435

Received By: David Buchli

Matrices: AQ  Carrier: Fed Ex  Airbill#: 828454235852

| | | | |
|---|---|---|---|
| Shipping container/cooler in good condition? | Yes ☑ | No ☐ | Not Present ☐ |
| Chain of Custody present? | Yes ☑ | No ☐ | ☐ |
| Chain of Custody Signed when relinquished and received? | Yes ☑ | No ☐ | |
| Chain of Custody agrees with sample labels? | Yes ☑ | No ☐ | |
| Samples in proper container/bottle? | Yes ☑ | No ☐ | |
| Sample containers intact? | Yes ☑ | No ☐ | |
| Sample containers on ice? | Yes ☑ | No ☐ | Type: gel |
| Sufficient sample volume for indicated test? | Yes ☑ | No ☐ | |
| All samples received within holding time? | Yes ☑ | No ☐ | |
| Water - VOA Vials have Zero Headspace? | Yes ☐ | No ☐ | No VOA vials present: ☑ |
| Water - pH acceptable upon receipt? | Yes ☐ | No ☐ | Not Checked: ☑ |
| pH Adjusted? | Yes ☐ | No ☑ | Final pH: |
| Encores / MI-VOC / 5035 Vials Present? | Yes ☐ | No ☑ | Location: |
| Sample Filtration Needed? | Yes ☐ | No ☑ | Filtered in Field: ☐ |
| Dry Weight Corrected Results? | Yes ☐ | No ☑ | Take Action: ☐ |
| DODQSM / QAPP Project? | Yes ☐ | No ☑ | Type: |

Temperature Blank Present? Yes ☐ No ☑

Sample Container Temperature: 15.2 °C

**Comments/ Sampling Handling Notes:**

Attachment B, page 98

Links

Review your project results through TotalAccess

Have a Question? Ask The Expert

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# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-104319-1
Client Project/Site: Waiopili Stream

For:
Surfrider Foundation, Kauai Chapter
2637 Apapane St
Lihue, Hawaii 96766

Attn: Dr. Carl Berg

*Authorized for release by:*
*3/20/2015 6:37:42 PM*

Craig Pilialoha, Project Manager I
(808)486-5227
craig.pilialoha@testamericainc.com

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Sample Summary



| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 440-104319-1 | Waiopili Stream | Water | 03/09/15 08:20 | 03/12/15 10:20 |
| 440-104319-2 | Waiopili Stream | Water | 03/09/15 08:19 | 03/12/15 10:20 |
| 440-104319-3 | Waiopili Stream | Water | 03/09/15 08:22 | 03/12/15 10:20 |

# Case Narrative

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

## Job ID: 440-104319-1

**Laboratory: TestAmerica Irvine**

**Narrative**

**Job Narrative**
**440-104319-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 3/12/2015 10:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 3.1º C, 3.5º C and 3.8º C.

Except:

Had to split into (x2) 40ml Amber Voas w/ SOTH, from a 1lt Amber unpreserved to analysis.

PM's email note:

Surfrider Foundation - use project 44012663. The malathion request will be sent to Denver. The Glyphosate request will be done in Irvine (547). The client is located on Kauai and he did not have the proper containers for the latter two. Please note this on the NCM. For glyphosate please leave a note to preserve at the lab in the appropriate 60mL VOA.

**GC/MS Semi VOA**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**GC Semi VOA**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**General Chemistry**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**Organic Prep**
Method(s) 3510C: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP) associated with batch 268230

Method: 3510C
Analysis: 8141A/B

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# Client Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

## Client Sample ID: Waiopili Stream — Lab Sample ID: 440-104319-1

**Date Collected: 03/09/15 08:20** — **Matrix: Water**
**Date Received: 03/12/15 10:20**

### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 8.6 | | 1.3 | 0.63 | mg/L | | | 03/13/15 16:35 | 1 |

## Client Sample ID: Waiopili Stream — Lab Sample ID: 440-104319-2

**Date Collected: 03/09/15 08:19** — **Matrix: Water**
**Date Received: 03/12/15 10:20**

### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | ND | | 0.25 | 0.10 | mg/L | | 03/17/15 15:30 | 03/17/15 16:36 | 1 |
| Nitrogen, Kjeldahl | 0.40 | | 0.20 | 0.10 | mg/L | | 03/17/15 12:03 | 03/18/15 11:22 | 1 |
| Nitrate Nitrite as N | 0.069 | | 0.050 | 0.010 | mg/L | | | 03/14/15 13:46 | 1 |
| Phosphorus | 0.062 | J | 0.10 | 0.041 | mg/L | | 03/17/15 12:03 | 03/18/15 11:22 | 1 |
| Nitrogen, Total | 0.47 | | 0.25 | 0.25 | mg/L | | | 03/17/15 09:30 | 1 |

## Client Sample ID: Waiopili Stream — Lab Sample ID: 440-104319-3

**Date Collected: 03/09/15 08:22** — **Matrix: Water**
**Date Received: 03/12/15 10:20**

### Method: 8141B - Organophosphorous Compounds by Gas Chromatography, Capillary Column Technique

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Malathion | ND | | 2.1 | 0.14 | ug/L | | 03/16/15 17:55 | 03/18/15 22:12 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *Chlormefos* | *58* | | *49 - 171* | *03/16/15 17:55* | *03/18/15 22:12* | *1* |
| *Triphenylphosphate* | *68* | | *60 - 154* | *03/16/15 17:55* | *03/18/15 22:12* | *1* |

### Method: 547 - Glyphosate (DAI HPLC)

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Glyphosate | ND | | 6.0 | 3.0 | ug/L | | | 03/18/15 14:40 | 1 |

## Method Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 8141B | Organophosphorous Compounds by Gas Chromatography, Capillary Column Technique | SW846 | TAL DEN |
| 547 | Glyphosate (DAI HPLC) | EPA | TAL IRV |
| 350.1 | Nitrogen, Ammonia | MCAWW | TAL SAV |
| 351.2 | Nitrogen, Total Kjeldahl | MCAWW | TAL SAV |
| 353.2 | Nitrogen, Nitrate-Nitrite | MCAWW | TAL SAV |
| 365.4 | Phosphorus, Total | EPA | TAL SAV |
| SM 2540D | Solids, Total Suspended (TSS) | SM | TAL IRV |
| Total Nitrogen | Nitrogen, Total | EPA | TAL SAV |

**Protocol References:**

EPA = US Environmental Protection Agency
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
SM = "Standard Methods For The Examination Of Water And Wastewater",
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100
TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858



## Lab Chronicle

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

### Client Sample ID: Waiopili Stream — Lab Sample ID: 440-104319-1

Date Collected: 03/09/15 08:20
Date Received: 03/12/15 10:20
Matrix: Water

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | SM 2540D | | 1 | 800 mL | 1000 mL | 242621 | 03/13/15 16:35 | NTN | TAL IRV |

### Client Sample ID: Waiopili Stream — Lab Sample ID: 440-104319-2

Date Collected: 03/09/15 08:19
Date Received: 03/12/15 10:20
Matrix: Water

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | Distill/Ammonia | | | 6 mL | 6 mL | 375028 | 03/17/15 15:30 | JME | TAL SAV |
| Total/NA | Analysis | 350.1 | | 1 | 6 mL | 6 mL | 375073 | 03/17/15 16:36 | JME | TAL SAV |
| Total/NA | Prep | Digestion | | | 20 mL | 20 mL | 374959 | 03/17/15 12:03 | JER | TAL SAV |
| Total/NA | Analysis | 351.2 | | 1 | 20 mL | 20 mL | 375136 | 03/18/15 11:22 | JER | TAL SAV |
| Total/NA | Analysis | 353.2 | | 1 | 2 mL | 2 mL | 374669 | 03/14/15 13:46 | GRX | TAL SAV |
| Total/NA | Prep | Digestion | | | 20 mL | 20 mL | 374959 | 03/17/15 12:03 | JER | TAL SAV |
| Total/NA | Analysis | 365.4 | | 1 | 20 mL | 20 mL | 375135 | 03/18/15 11:22 | JER | TAL SAV |
| Total/NA | Analysis | Total Nitrogen | | 1 | | | 374910 | 03/17/15 09:30 | JER | TAL SAV |

### Client Sample ID: Waiopili Stream — Lab Sample ID: 440-104319-3

Date Collected: 03/09/15 08:22
Date Received: 03/12/15 10:20
Matrix: Water

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 3510C | | | 972.5 mL | 2 mL | 268230 | 03/16/15 17:55 | AH1 | TAL DEN |
| Total/NA | Analysis | 8141B | | 1 | 972.5 mL | 2 mL | 268487 | 03/18/15 22:12 | AMP | TAL DEN |
| Total/NA | Analysis | 547 | | 1 | 1 mL | | 243578 | 03/18/15 14:40 | DD | TAL IRV |

**Laboratory References:**

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100
TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

## Method: 8141B - Organophosphorous Compounds by Gas Chromatography, Capillary Column Technique

**Lab Sample ID: MB 280-268230/1-A** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 268487** — **Prep Batch: 268230**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| . alathion | 6 D | | g10 | 0L13 | u5/N | | 03/12/17 18:77 | 03/19/17 01:0g | 1 |

| Surrogate | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| Chlormefos | 58 | | 49 - 181 | 703153/618 / / | 703193/1/671 7: | 1 |
| Triphenylphosphate | 21 | | 57 - 1/ 4 | 703153/618 / / | 703193/1/671 7: | 1 |

**Lab Sample ID: LCS 280-268230/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 268487** — **Prep Batch: 268230**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| . alathion | 4L00 | g1M8 | | u5/N | | 8g | 39 - 118 |

| Surrogate | LCS %Recovery | LCS Qualifier | Limits |
|---|---|---|---|
| Chlormefos | 2/ | | 49 - 181 |
| Triphenylphosphate | 24 | | 57 - 1/ 4 |

**Lab Sample ID: LCSD 280-268230/3-A** — **Client Sample ID: Lab Control Sample Dup**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 268487** — **Prep Batch: 268230**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| . alathion | 4L00 | g1Z9 | | u5/N | | 28 | 39 - 118 | 2 | g7 |

| Surrogate | LCSD %Recovery | LCSD Qualifier | Limits |
|---|---|---|---|
| Chlormefos | 8: | | 49 - 181 |
| Triphenylphosphate | 27 | | 57 - 1/ 4 |

## Method: 547 - Glyphosate (DAI HPLC)

**Lab Sample ID: MB 440-243578/8** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 243578**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Glyphosate | 6 D | | 2L0 | 3L0 | u5/N | | | 03/1M/17 13:04 | 1 |

**Lab Sample ID: LCS 440-243578/1005** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 243578**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Glyphosate | g7L0 | g2LM | | u5/N | | 108 | 80 - 130 |





## Method: 547 - Glyphosate (DAI HPLC) (Continued)

**Lab Sample ID: LCSD 440-243578/6** — **Client Sample ID: Lab Control Sample Dup**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 243578**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Glyphosate | g7L0 | g4L8 | | u5/N | | 99 | 80 - 130 | M | 30 |

**Lab Sample ID: 550-41160-K-1 MS** — **Client Sample ID: Matrix Spike**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 243578**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Glyphosate | 6 D | | g7L0 | g7L4 | | u5/N | | 10g | 80 - 130 |

## Method: 350.1 - Nitrogen, Ammonia

**Lab Sample ID: MB 680-375028/1-A** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 375073** — **Prep Batch: 375028**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 6 D | | 0Lg7 | 0L10 | m5/N | | 03/18/17 17:30 | 03/18/17 18:1g | 1 |

**Lab Sample ID: LCS 680-375028/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 375073** — **Prep Batch: 375028**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Ammonia | 1L00 | 0L94M | | m5/N | | 97 | 90 - 110 |

**Lab Sample ID: LCSD 680-375028/3-A** — **Client Sample ID: Lab Control Sample Dup**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 375073** — **Prep Batch: 375028**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 1L00 | 1L00 | | m5/N | | 100 | 90 - 110 | 7 | 30 |

**Lab Sample ID: 680-110635-J-1-B MS** — **Client Sample ID: Matrix Spike**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 375073** — **Prep Batch: 375028**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 6 D | | 1L00 | 1L04 | | m5/N | | 104 | 90 - 110 |

**Lab Sample ID: 680-110635-J-1-C MSD** — **Client Sample ID: Matrix Spike Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 375073** — **Prep Batch: 375028**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 6 D | | 1L00 | 1L0g | | m5/N | | 10g | 90 - 110 | g | 30 |

## Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: 680-110707-N-1-B DU
Matrix: Water
Analysis Batch: 375073

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 375028

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 6D | | | 6D | | m5/N | | | | 6C | 30 |

## Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 680-374959/1-A
Matrix: Water
Analysis Batch: 375136

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 6itro5en, Kjeldahl | 6D | | 0lg0 | 0L10 | m5/N | | 03/18/17 1g:03 | 03/1M17 11:g0 | 1 |

Lab Sample ID: LCS 680-374959/2-A
Matrix: Water
Analysis Batch: 375136

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 6itro5en, Kjeldahl | gl00 | gL11 | | m5/N | | 107 | 87 - 1g7 |

Lab Sample ID: 440-104319-2 MS
Matrix: Water
Analysis Batch: 375136

Client Sample ID: Waiopili Stream
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 6itro5en, Kjeldahl | 0L40 | | gl00 | gL74 | | m5/N | | 108 | 87 - 1g7 |

Lab Sample ID: 440-104319-2 MSD
Matrix: Water
Analysis Batch: 375136

Client Sample ID: Waiopili Stream
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6itro5en, Kjeldahl | 0L40 | | gl00 | gL39 | | m5/N | | 99 | 87 - 1g7 | 2 | 40 |

Lab Sample ID: 660-65862-C-1-B DU
Matrix: Water
Analysis Batch: 375136

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6itro5en, Kjeldahl | 0L40 | | | 0L3M | | m5/N | | | | 3 | 40 |

## Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 680-374669/13
Matrix: Water
Analysis Batch: 374669

Client Sample ID: Method Blank
Prep Type: Total/NA

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 6itrate 6itrite as 6 | 6D | | 0lD70 | 0lD10 | m5/N | | | 03/14/17 13:3M | 1 |





## Method: 353.2 - Nitrogen, Nitrate-Nitrite (Continued)

Lab Sample ID: LCS 680-374669/16
Matrix: Water
Analysis Batch: 374669

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 6itrate 6itrite as 6 | 1l00 | 1l04 | | m5/N | | 104 | 90 - 110 |

Lab Sample ID: 680-110682-I-1 MS
Matrix: Water
Analysis Batch: 374669

Client Sample ID: Matrix Spike
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 6itrate 6itrite as 6 | 0L011 | J | 1l00 | 0l929 | | m5/N | | 92 | 90 - 110 |

Lab Sample ID: 680-110682-I-1 MSD
Matrix: Water
Analysis Batch: 374669

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6itrate 6itrite as 6 | 0L011 | J | 1l00 | 0l928 | | m5/N | | 92 | 90 - 110 | 0 | 10 |

## Method: 365.4 - Phosphorus, Total

Lab Sample ID: MB 680-374959/1-A
Matrix: Water
Analysis Batch: 375135

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 6D | | 0L10 | 0L041 | m5/N | | 03/18/17 1g:03 | 03/1M17 11:g0 | 1 |

Lab Sample ID: LCS 680-374959/2-A
Matrix: Water
Analysis Batch: 375135

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Phosphorus | gl00 | gl09 | | m5/N | | 104 | 20 - 140 |

Lab Sample ID: 440-104319-2 MS
Matrix: Water
Analysis Batch: 375135

Client Sample ID: Waiopili Stream
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0L02g | J | gl00 | gL13 | | m5/N | | 103 | 20 - 140 |

Lab Sample ID: 440-104319-2 MSD
Matrix: Water
Analysis Batch: 375135

Client Sample ID: Waiopili Stream
Prep Type: Total/NA
Prep Batch: 374959

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0L02g | J | gl00 | gL11 | | m5/N | | 10g | 20 - 140 | 1 | 40 |

# QC Sample Results

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

## Method: 365.4 - Phosphorus, Total (Continued)

**Lab Sample ID: 660-65862-C-1-B DU** — **Client Sample ID: Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 375135** — **Prep Batch: 374959**

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Phosphorus | 0.37 | | | 0.37 | | mg/L | | | | 1 | 40 |

## Method: SM 2540D - Solids, Total Suspended (TSS)

**Lab Sample ID: MB 440-242621/2** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 242621**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 6.0 | | 10 | 0.70 | mg/L | | | 03/13/17 12:37 | 1 |

**Lab Sample ID: LCS 440-242621/1** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 242621**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 1000 | 1090 | | mg/L | | 109 | 87 - 117 |

**Lab Sample ID: 440-104399-B-1 DU** — **Client Sample ID: Duplicate**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 242621**

| Analyte | Sample Result | Sample Qualifier | | DU Result | DU Qualifier | Unit | D | | | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Suspended Solids | 990 | | | 934 | | mg/L | | | | 4 | 10 |

Attachment B, page 110
TestAmerica Irvine



# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

## GC Semi VOA

**Prep Batch: 268230**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-3 | Waiopili Stream | Total/NA | Water | 3510C | |
| LCS 280-268230/2-A | Lab Control Sample | Total/NA | Water | 3510C | |
| LCSD 280-268230/3-A | Lab Control Sample Dup | Total/NA | Water | 3510C | |
| MB 280-268230/1-A | Method Blank | Total/NA | Water | 3510C | |

**Analysis Batch: 268487**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-3 | Waiopili Stream | Total/NA | Water | 8141B | 268230 |
| LCS 280-268230/2-A | Lab Control Sample | Total/NA | Water | 8141B | 268230 |
| LCSD 280-268230/3-A | Lab Control Sample Dup | Total/NA | Water | 8141B | 268230 |
| MB 280-268230/1-A | Method Blank | Total/NA | Water | 8141B | 268230 |

## HPLC/IC

**Analysis Batch: 243578**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-3 | Waiopili Stream | Total/NA | Water | 547 | |
| 550-41160-K-1 MS | Matrix Spike | Total/NA | Water | 547 | |
| LCS 440-243578/1005 | Lab Control Sample | Total/NA | Water | 547 | |
| LCSD 440-243578/6 | Lab Control Sample Dup | Total/NA | Water | 547 | |
| MB 440-243578/8 | Method Blank | Total/NA | Water | 547 | |

## General Chemistry

**Analysis Batch: 242621**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-1 | Waiopili Stream | Total/NA | Water | SM 2540D | |
| 440-104399-B-1 DU | Duplicate | Total/NA | Water | SM 2540D | |
| LCS 440-242621/1 | Lab Control Sample | Total/NA | Water | SM 2540D | |
| MB 440-242621/2 | Method Blank | Total/NA | Water | SM 2540D | |

**Analysis Batch: 374669**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | 353.2 | |
| 680-110682-I-1 MS | Matrix Spike | Total/NA | Water | 353.2 | |
| 680-110682-I-1 MSD | Matrix Spike Duplicate | Total/NA | Water | 353.2 | |
| LCS 680-374669/16 | Lab Control Sample | Total/NA | Water | 353.2 | |
| MB 680-374669/13 | Method Blank | Total/NA | Water | 353.2 | |

**Analysis Batch: 374910**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | Total Nitrogen | |

**Prep Batch: 374959**

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | Digestion | |
| 440-104319-2 MS | Waiopili Stream | Total/NA | Water | Digestion | |
| 440-104319-2 MSD | Waiopili Stream | Total/NA | Water | Digestion | |
| 660-65862-C-1-B DU | Duplicate | Total/NA | Water | Digestion | |
| LCS 680-374959/2-A | Lab Control Sample | Total/NA | Water | Digestion | |

Attachment B, page 111
TestAmerica Irvine

# QC Association Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

## General Chemistry (Continued)

### Prep Batch: 374959 (Continued)

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| MB 680-374959/1-A | Method Blank | Total/NA | Water | Digestion | |

### Prep Batch: 375028

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | Distill/Ammonia | |
| 680-110635-J-1-B MS | Matrix Spike | Total/NA | Water | Distill/Ammonia | |
| 680-110635-J-1-C MSD | Matrix Spike Duplicate | Total/NA | Water | Distill/Ammonia | |
| 680-110707-N-1-B DU | Duplicate | Total/NA | Water | Distill/Ammonia | |
| LCS 680-375028/2-A | Lab Control Sample | Total/NA | Water | Distill/Ammonia | |
| LCSD 680-375028/3-A | Lab Control Sample Dup | Total/NA | Water | Distill/Ammonia | |
| MB 680-375028/1-A | Method Blank | Total/NA | Water | Distill/Ammonia | |

### Analysis Batch: 375073

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | 350.1 | 375028 |
| 680-110635-J-1-B MS | Matrix Spike | Total/NA | Water | 350.1 | 375028 |
| 680-110635-J-1-C MSD | Matrix Spike Duplicate | Total/NA | Water | 350.1 | 375028 |
| 680-110707-N-1-B DU | Duplicate | Total/NA | Water | 350.1 | 375028 |
| LCS 680-375028/2-A | Lab Control Sample | Total/NA | Water | 350.1 | 375028 |
| LCSD 680-375028/3-A | Lab Control Sample Dup | Total/NA | Water | 350.1 | 375028 |
| MB 680-375028/1-A | Method Blank | Total/NA | Water | 350.1 | 375028 |

### Analysis Batch: 375135

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | 365.4 | 374959 |
| 440-104319-2 MS | Waiopili Stream | Total/NA | Water | 365.4 | 374959 |
| 440-104319-2 MSD | Waiopili Stream | Total/NA | Water | 365.4 | 374959 |
| 660-65862-C-1-B DU | Duplicate | Total/NA | Water | 365.4 | 374959 |
| LCS 680-374959/2-A | Lab Control Sample | Total/NA | Water | 365.4 | 374959 |
| MB 680-374959/1-A | Method Blank | Total/NA | Water | 365.4 | 374959 |

### Analysis Batch: 375136

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-104319-2 | Waiopili Stream | Total/NA | Water | 351.2 | 374959 |
| 440-104319-2 MS | Waiopili Stream | Total/NA | Water | 351.2 | 374959 |
| 440-104319-2 MSD | Waiopili Stream | Total/NA | Water | 351.2 | 374959 |
| 660-65862-C-1-B DU | Duplicate | Total/NA | Water | 351.2 | 374959 |
| LCS 680-374959/2-A | Lab Control Sample | Total/NA | Water | 351.2 | 374959 |
| MB 680-374959/1-A | Method Blank | Total/NA | Water | 351.2 | 374959 |



# Definitions/Glossary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

## Qualifiers

### General Chemistry

| Qualifier | Qualifier Description |
|---|---|
| J | Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

TestAmerica Job ID: 440-104319-1

### Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alaska | State Program | 10 | CA01531 | 06-30-15 |
| Arizona | State Program | 9 | AZ0671 | 10-13-15 |
| California | LA Cty Sanitation Districts | 9 | 10256 | 01-31-16 * |
| California | State Program | 9 | 2706 | 06-30-16 |
| Guam | State Program | 9 | Cert. No. 12.002r | 01-23-16 |
| Hawaii | State Program | 9 | N/A | 01-29-16 |
| Nevada | State Program | 9 | CA015312007A | 07-31-15 |
| New Mexico | State Program | 6 | N/A | 01-29-15 * |
| Northern Mariana Islands | State Program | 9 | MP0002 | 01-29-15 * |
| Oregon | NELAP | 10 | 4005 | 01-29-16 |
| USDA | Federal | | P330-09-00080 | 06-06-15 |

### Laboratory: TestAmerica Denver

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 2907.01 | 10-31-15 |
| A2LA | ISO/IEC 17025 | | 2907.01 | 10-31-15 |
| Alabama | State Program | 4 | 40730 | 09-30-12 * |
| Alaska (UST) | State Program | 10 | UST-30 | 04-05-15 * |
| Arizona | State Program | 9 | AZ0713 | 12-19-15 |
| Arkansas DEQ | State Program | 6 | 88-0687 | 06-01-15 |
| California | State Program | 9 | 2513 | 08-31-16 |
| Connecticut | State Program | 1 | PH-0686 | 09-30-16 |
| Florida | NELAP | 4 | E87667 | 06-30-15 |
| Georgia | State Program | 4 | N/A | 01-09-15 * |
| Illinois | NELAP | 5 | 200017 | 04-30-15 * |
| Iowa | State Program | 7 | 370 | 11-30-16 |
| Kansas | NELAP | 7 | E-10166 | 04-30-15 * |
| Louisiana | NELAP | 6 | 02096 | 06-30-15 |
| Maine | State Program | 1 | CO0002 | 03-03-17 |
| Minnesota | NELAP | 5 | 8-999-405 | 12-31-15 |
| Nevada | State Program | 9 | CO0026 | 07-31-15 |
| New Hampshire | NELAP | 1 | 205310 | 04-28-15 |
| New Jersey | NELAP | 2 | CO004 | 06-30-15 |
| New York | NELAP | 2 | 11964 | 03-31-15 * |
| North Carolina (WW/SW) | State Program | 4 | 358 | 12-31-15 |
| North Dakota | State Program | 8 | R-034 | 01-09-16 |
| Oklahoma | State Program | 6 | 8614 | 08-31-15 |
| Oregon | NELAP | 10 | 4025 | 01-09-16 |
| Pennsylvania | NELAP | 3 | 68-00664 | 07-30-15 |
| South Carolina | State Program | 4 | 72002001 | 06-30-15 |
| Texas | NELAP | 6 | T104704183-13-8 | 09-30-15 |
| USDA | Federal | | P330-13-00202 | 07-02-16 |
| Utah | NELAP | 8 | CO00026 | 07-31-15 |
| Virginia | NELAP | 3 | 460232 | 06-14-15 |
| Washington | State Program | 10 | C583 | 08-03-15 |
| West Virginia DEP | State Program | 3 | 354 | 11-30-15 |
| Wisconsin | State Program | 5 | 999615430 | 08-31-15 |
| Wyoming (UST) | A2LA | 8 | 2907.01 | 10-31-15 |

* Certification renewal pending - certification considered valid.



## Certification Summary

Client: Surfrider Foundation, Kauai Chapter
Project/Site: Waiopili Stream

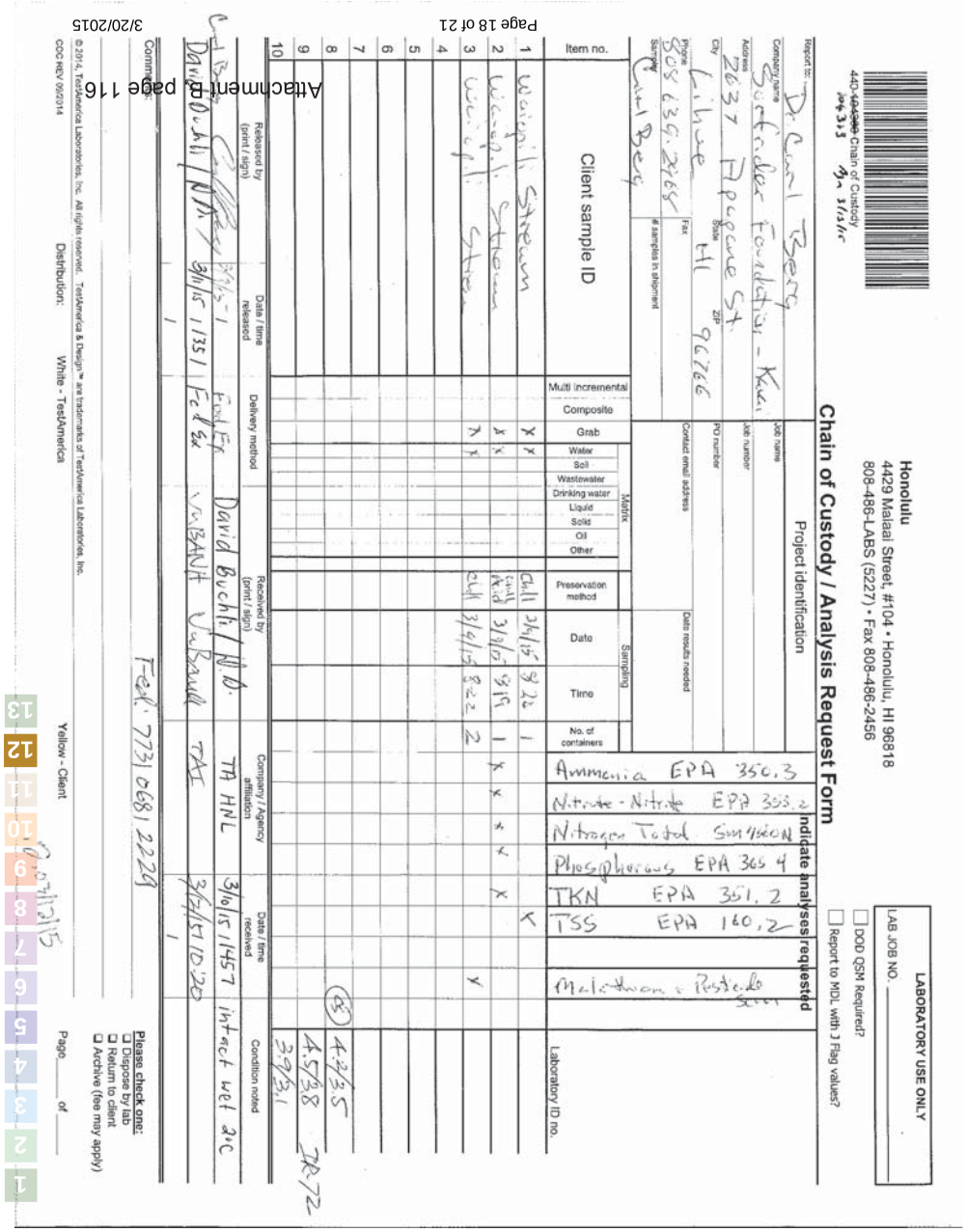
TestAmerica Job ID: 440-104319-1

### Laboratory: TestAmerica Savannah

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| | AFCEE | | SAVLAB | |
| A2LA | DoD ELAP | | 399.01 | 02-28-17 |
| A2LA | ISO/IEC 17025 | | 399.01 | 02-28-17 |
| Alabama | State Program | 4 | 41450 | 06-30-15 |
| Arkansas DEQ | State Program | 6 | 88-0692 | 01-31-16 |
| California | State Program | 9 | 2939 | 07-31-15 |
| Colorado | State Program | 8 | N/A | 12-31-15 |
| Connecticut | State Program | 1 | PH-0161 | 03-31-15 * |
| Florida | NELAP | 4 | E87052 | 06-30-15 |
| GA Dept. of Agriculture | State Program | 4 | N/A | 06-12-17 |
| Georgia | State Program | 4 | N/A | 06-30-15 |
| Georgia | State Program | 4 | 803 | 06-30-15 |
| Guam | State Program | 9 | 14-004r | 04-16-15 * |
| Hawaii | State Program | 9 | N/A | 06-30-15 |
| Illinois | NELAP | 5 | 200022 | 11-30-15 |
| Indiana | State Program | 5 | N/A | 06-30-15 |
| Iowa | State Program | 7 | 353 | 07-01-15 |
| Kentucky (DW) | State Program | 4 | 90084 | 12-31-15 |
| Kentucky (UST) | State Program | 4 | 18 | 06-30-15 |
| Kentucky (WW) | State Program | 4 | 90084 | 12-31-15 |
| Louisiana | NELAP | 6 | 30690 | 06-30-15 |
| Louisiana (DW) | NELAP | 6 | LA150014 | 12-31-15 |
| Maine | State Program | 1 | GA00006 | 09-24-16 |
| Maryland | State Program | 3 | 250 | 12-31-15 |
| Massachusetts | State Program | 1 | M-GA006 | 06-30-15 |
| Michigan | State Program | 5 | 9925 | 06-30-15 |
| Mississippi | State Program | 4 | N/A | 06-30-15 |
| Montana | State Program | 8 | CERT0081 | 12-31-15 |
| Nebraska | State Program | 7 | TestAmerica-Savannah | 06-30-15 |
| New Jersey | NELAP | 2 | GA769 | 06-30-15 |
| New Mexico | State Program | 6 | N/A | 06-30-15 |
| New York | NELAP | 2 | 10842 | 03-31-15 * |
| North Carolina (DW) | State Program | 4 | 13701 | 07-31-15 |
| North Carolina (WW/SW) | State Program | 4 | 269 | 12-31-15 |
| Oklahoma | State Program | 6 | 9984 | 08-31-15 |
| Pennsylvania | NELAP | 3 | 68-00474 | 06-30-15 |
| Puerto Rico | State Program | 2 | GA00006 | 12-31-15 |
| South Carolina | State Program | 4 | 98001 | 06-30-15 |
| Tennessee | State Program | 4 | TN02961 | 06-30-15 |
| Texas | NELAP | 6 | T104704185-14-7 | 11-30-15 |
| USDA | Federal | | SAV 3-04 | 06-11-17 |
| Virginia | NELAP | 3 | 460161 | 06-14-15 |
| Washington | State Program | 10 | C805 | 06-10-15 |
| West Virginia (DW) | State Program | 3 | 9950C | 12-31-15 |
| West Virginia DEP | State Program | 3 | 094 | 06-30-15 |
| Wisconsin | State Program | 5 | 999819810 | 08-31-15 |
| Wyoming | State Program | 8 | 8TMS-L | 06-30-15 |

* Certification renewal pending - certification considered valid.



Honolulu
4429 Maiaai Street, #104 • Honolulu, HI 96818
808-486-LABS (5227) • Fax 808-486-2456

Chain of Custody / Analysis Request Form

Report to: Dr. Carl Berg
Company name: Surfrider Foundation - Kauai
Address: 2637 Aipuane St.
City: Lihue
State: HI
ZIP: 96766
Phone: 808 639 2268
Fax:
Sampler: Carl Berg
All samples in shipment

Project identification
Job name:
Job number:
PO number:
Contact email address:
Data results needed:

Indicate analyses requested

| Item no. | Client sample ID | Multi incremental | Composite | Grab | Matrix: Water | Soil | Wastewater | Drinking water | Liquid | Solid | Oil | Other | Preservation method | Sampling: Date | Time | No. of containers | Laboratory ID no. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Waipili Stream | | | X | X | | | | | | | | Chill | 3/6/15 | 8:20 | 1 | |
| 2 | Waipili Stream | | | X | X | | | | | | | | Chill Acid | 3/6/15 | 8:19 | 1 | |
| 3 | Waipili Stream | | | X | X | | | | | | | | Chill | 3/6/15 | 8:22 | 2 | |

Ammonia EPA 350.3
Nitrate-Nitrite EPA 353.2
Nitrogen Total Summation
Phosphorous EPA 365.4
TKN EPA 351.2
TSS EPA 160.2
Malathion + Pesticide Scan

| Release by (print / sign) | Date / time released | Delivery method | Received by (print / sign) | Company / Agency affiliation | Date / time received | Condition noted |
|---|---|---|---|---|---|---|
| David Buchli / NA | 3/6/15 1351 | FedEx | David Buchli / NA | TA HNL | 3/6/15 1457 | intact wet 2°C |
| David Buchli / NA | 3/6/15 1351 | FedEx | VaBANT VaBrand | TAI | 3/7/15 10:20 | |

Comments: Test: 7731 0681 2229

LABORATORY USE ONLY
LAB JOB NO. _____
☐ DOD QSM Required?
☐ Report to MDL with J Flag values?

Please check one:
☐ Dispose by lab
☐ Return to client
☐ Archive (fee may apply)

Page ____ of ____

Distribution: White - TestAmerica Yellow - Client

COC REV 06/2014

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## Login Sample Receipt Checklist

Client: Surfrider Foundation, Kauai Chapter

Job Number: 440-104319-1

**Login Number: 104319**
**List Number: 1**
**Creator: Soderblom, Tim**

**List Source: TestAmerica Irvine**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | N/A | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | Refer to Job Narrative for details. |
| Residual Chlorine Checked. | N/A | |

## Login Sample Receipt Checklist

Client: Surfrider Foundation, Kauai Chapter

Job Number: 440-104319-1

**Login Number: 104319**
**List Number: 3**
**Creator: Conquest, Tyler W**

**List Source: TestAmerica Denver**
**List Creation: 03/14/15 01:38 PM**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | N/A | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | N/A | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |



## Login Sample Receipt Checklist

Client: Surfrider Foundation, Kauai Chapter

Job Number: 440-104319-1

**Login Number: 104319**
**List Number: 2**
**Creator: Elliot, William J**

**List Source: TestAmerica Savannah**
**List Creation: 03/14/15 10:22 AM**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | N/A | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | N/A | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

**DECLARATION OF DR. CARL J. BERG, Ph.D.**

I, Carl J. Berg, hereby declare under penalty of perjury as follows:

1. I am over the age of eighteen and am competent to make this Declaration. All topics discussed herein are based on my personal knowledge and experience. I submit this Declaration in support of the Friends of Maha'lepu's Petition to have the Waiopili Stream listed as an impaired waterway pursuant to Section 303(d) of the Clean Water Act, as well as to have the Stream immediately posted as dangerous for human health.

2. I am a professional ecologist and environmental educator. In 1971 I was awarded a Ph.D in zoology from the University of Hawaii. After receiving my doctorate, I taught as a professor at the City College of New York. I was also a research scientist at Harvard University, Marine Biological Laboratory in Woods Hole, and at the Florida Marine Research Institute. I returned to Hawaii in 1990. I was Chief Scientist for the Hanalei Watershed Hui, which was awarded an Environmental Achievement Award from the U.S. Environmental Protection Agency, received a Certificate of Recognition for its contribution to sustainably manage coral reefs by the U.S. Coral Reef Task Force and received DLNR's Hawaii's Living Reef Award for 2006.The National Resource Defense Council named me the national "Beach Hero" of the year in 2007 for outstanding efforts and leadership in combating beachwater contamination and improving beachwater monitoring in Kauai. The Kauai Group of the Sierra Club awarded me the Environmentalist of the Year for 2010. The Surfrider Foundation presented me with their 2011 Waverider Award for Distinguished Service.

3. A short biography and my resume are attached hereto.

4. I began water quality monitoring as a graduate student in Tomales Bay, CA back in 1966 and tried to correlate it to lack of reproductive success of oysters. Most of my scientific research has been on reproductive strategies of marine animals. I moved to Kauai and in 1991 found employment as an Environmental Scientist IV with the Clean Water Branch of the Hawaii Department of Health. I monitored water quality in the streams and ocean around Kauai following the protocols established by CWB. I was assigned special investigative projects dealing with submarine groundwater discharge on Maui but most of my efforts were focused on documenting water quality on Kauai. I left that position in 1993 and did not resume water testing until 1999, setting up a volunteer monitoring program in Hanalei Bay. I became the Chief Scientist of the Hanalei Watershed Hui and managed a collaborative research and monitoring program until 2007. I then began the Blue Water Task Force (BWTF) of the Kauai Chapter of the Surfrider Foundation,monitoring water quality of beaches, surfbreaks and streams around the island. I was also employed under contract from the CWB to assist in sampling beach water quality along the north shore. In addition I have advised other Surfrider chapters and community groups on how to set up water quality monitoring programs. CWB hired us in 2013-2014 to study the estuarine discharge into Hanalei Bay. I have had a long and close association with the CWB.



5. I am presently Chair of the Executive Committee of the Kaua'i Chapter of the Surfrider Foundation and head of its BWTF. In my role at Surfrider, I have been obtaining monthly water quality samples from the Waiopili Stream as part of our "Blue Water Task Force" or "BWTF," as well as additional samples with summer student interns.The purpose of this sampling is, in part, to illuminate some of the serious water quality issues that need to be addressed on the Island.

6. The BWTF includes a team of volunteers that are specially trained in water quality sampling procedures. I teach each volunteer how to obtain water samples using commonly accepted QA/QC techniques as described on the Surfrider website, http://www.surfrider.org/blue-water-task-force.

7. These volunteers – myself included –obtain water samples from waters across Kaua'i, typically on the second Saturday of each month. Samples are collected, immediately put on ice, and then delivered to one of two "runners," who deliver the sampling packages to my home.

8. Once samples arrive at my home, they are immediately placed into an ice chest. Once they arrive at my home, which also doubles as my laboratory, I record salinity values and process the samples following techniques described in the BWTF webpage and by IDEXX. Samples are placed into IDEXX Quanti-Tray 2000; after 24 hours of incubation, I remove the samples and record the number of large and small cells that grow. I then record the MNP derived from the IDEXX table, and enter that data into the BWTF QA/QC spreadsheets. I can also derive the geometric mean values for each site. All data entry is completed within two hours of recording counts.

9. After data is recorded and compiled, it is entered into the national Surfrider Foundation BWTF secure website and the Kaua'i Chapter's website. Data is usually available to the public the day after sampling.

10. The BWTF has been sampling in and near the Waiopili Stream since 2014 and reporting the data to the CWB. Based on the data that I collected and recorded, and will attest to for accuracy, the beach waters at Mahaulepu (DOH Site #847) and Waiopili Stream are both impaired. CWB stream samples confirmed that the waters were polluted, and yet CWB failed to regularly monitor the stream at the beach and, importantly, the beach waters themselves. Thus, we continued sampling throughout the year.

11. The Clean Water Branch of DOH lacks the resources or the will to collect data on impaired stream and estuarine waters, and must rely on sampling data collected by groups like the BWTF.With its limited funding and personnel, the CWB just samples the ocean water at the most popular beaches.

12. I provide monthly e-mails to DOH Clean Water Branch personnel containing the enterococcus results and, sometimes, other results obtained from the Waiopili Stream. These personnel are also aware that results are also posted on the publically available Surfrider websites. www.kauai.surfrider.org

13. Yearly summary results of the BWTF data and the CWB data for Kauai are published in Kauai's local newspaper "The Garden Island" so that the whole community can be aware of the water quality problems on Kauai. The CWB is aware of these summaries.

14. I am appalled at the water quality in Waiopili Stream. The enterococcus results we have obtained over the past year puts the Stream as by far the most contaminated water on Kauai. The results are two orders of magnitude greater than the water quality standards promulgated by the DOH for enterococcus.

15. I suffered a serious leg infection which I believe was caused by exposure to this contaminated water during a sampling event.

16. In addition to the enterococcus results, I have also obtained some nutrient and TSS concentration data from samples provided to TestAmerica. That data was previously submitted to DOH as well.

17. I have previously requested that this stream be posted as dangerous to human health, as well as listed on the State's 303(d) impaired waters list. I frequently witness families, including small children, recreating in and near this Stream where it discharges into the ocean near Gillin's House. Absent immediate posting, DOH is putting human health at risk by continuing to allow individuals to come into contact with this highly polluted waterway. BWTF has offered to purchase and post signs for the CWB.

I DECLARE UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

DATED THIS 27th DAY OF APRIL, 2015, IN LIHUE, HAWAII.

Dr. Carl J. Berg



## Dr. Carl J. Berg, Jr.

Dr. Carl J. Berg, Jr. is a professional ecologist, environmental educator and wildlife tour leader. He was awarded a Ph.D. in zoology from the University of Hawaii (1971) and was a university professor (City College of New York) and research scientist (Harvard University, Marine Biological Laboratory in Woods Hole, and Florida Marine Research Inst.) before returning to Hawaii in 1990. He worked for the Hawaii Dept. of Health, monitoring water quality in the ocean and streams from 1991 to1993, before establishing Hawaiian Wildlife Tours. In addition to tours, the company does research, environmental education projects (*e.g.*, website development, computerized bibliographies, videos), classroom teaching, water quality monitoring, and contract bird surveys.

He was Chief Scientist for the Hanalei Watershed Hui, which was awarded an Environmental Achievement Award from the U.S. Environmental Protection Agency, received a Certificate of Recognition for its contribution to sustainably manage coral reefs by the U.S. Coral Reef Task Force and received DLNR's Hawaii's Living Reef Award for 2006. The Hanalei Watershed Hui was a recipient of an E.P.A. Targeted Watershed Initiative grant to implement changes in the watershed to improve water quality in the streams, estuaries and on the coral reefs. It was a recipient of an American Heritage Rivers Initiative grant from the U. S. Forest Service for work in the forested upper watershed and a grant from the National Oceanographic Atmospheric Administration for a community based fisheries habitat restoration grant to improve stream habitat for endemic Hawaiian fishes and to rebuild an estuarine Hawaiian fishpond as nursery habitat for coastal fishes. The National Fish and Wildlife Foundation funded a Watershed Approach to Pollution Mitigation in Hanalei Bay. The Okolehao Trail Restoration Program was funded by the Hawaii Tourism Authority, NOAA, EPA Environmental Education Program, and Kilauea Point Natural History Association. He has numerous scientific publications resulting from all of this work.

His work on coral reef protection through taro field discharge management was initially funded by NOAA, NRCS, Castle Foundation, and Tesoro Hawaii Corp., through a National Fish and Wildlife Foundation grant. It was later funded by NOAA through the Coral Reef Local Action Strategy Program. He participated in the 2008 NOAA national workshop "Responding to Climate Change: A workshop for Coral Reef Managers".

He is currently involved in a USFWS grant for fish habitat restoration, a grant from Hawaii Community Foundation for mangrove removal in Niumalu, an EPA/DOH grant to monitor pollution discharge from all streams entering Hanalei Bay and a DOH/NOAA/DLNR grant to monitor and remove Japanese tsunami marine debris. Through Surfrider Foundation's Blue Water Task Force volunteers he monitors water quality at beaches and streams throughout Kauai.

He has been a volunteer officer on the board of directors of Kilauea Point Natural History Association, Kilauea Neighborhood Association, 1000 Friends of Kauai, Surfrider Foundation-Kauai Chapter, and Princeville Agricultural Community Association. He has over 500 hours as a volunteer at Kilauea Pt. National Wildlife Refuge. He was a founding member of the Hawaiian Island Humpback Whale Sanctuary Advisory Council. He is a member of professional organizations (Ecological Society of America, The Explorers Club), birding associations (American Birding Assoc., National Audubon Society) and local organizations (Hawaii Audubon Society, Hui o Laka, and KAHEA).

He was nominated for Hawaii's Governor Cayetano's Kilohana Award for Outstanding Volunteerism, and Mayor Baptiste's Pu'uwai Aloha. Gov. Lingle twice appointed him to the state's Legacy Land Conservation Commission (2007-2009, 2009-2013). The National Resource Defense Council named him the national "Beach Hero" of the year in 2007 for his outstanding efforts and leadership in combating beachwater contamination and improving beachwater monitoring in Kauai. The Kauai Group of the Sierra Club awarded him the Environmentalist of the Year for 2010. The Surfrider Foundation presented him with their 2011 Waverider Award for Distinguished Service.

**From:** Carl Berg <cberg@pixi.com>
**Subject:** FWD email correspondence with DOH #1
**Date:** April 20, 2015 6:15:23 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**FW: Koloa Dairy Farm
**Date:**Wed, 5 Mar 2014 13:47:19 -1000
**From:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>
**To:**<cberg@pixi.com>
**CC:**Ueunten, Gary R. <gary.ueunten@doh.hawaii.gov>

Carl,

We cannot force someone to take an NPDES permit when there is no discharge but if a discharge occurs then the person is facing enforcement action. So it would be smart to get a permit to cover his ass. But this has not happened. This will be interesting.

Watson

---

**From:** Ueunten, Gary R.
**Sent:** Wednesday, March 05, 2014 12:15 PM
**To:** Okubo, Watson T
**Subject:** FW: Koloa Dairy Farm

---

**From:** Robert Zelkovsky [mailto:Robert@bamboomoonvideo.com]
**Sent:** Tuesday, March 04, 2014 5:18 PM
**To:** Gill, Gary L.
**Cc:** Ueunten, Gary R.
**Subject:** Koloa Dairy Farm

Aloha Gary -

Two members of the Executive Committee of the Kaua`i Chapter of The Surfrider Foundation, Dr. Carl Berg and myself, attended the recent presentation by the Hawai`i Dairy Farm at the Kaua`i Community College organized by Kaua`i Planning and Action Alliance. Both of us came away with more questions than were answered and both of us saw the potential for severe environmental damage due to the large nature of this project and the poor planning that has gone into this project.



The dairy will consist of 1800 "small" cows on over 500 acres at Maha`ulepu, the most pristine accessible area on Kaua`i and possibly in the State. It is based on dairy farm techniques currently being done in New Zealand.

It has been estimated that this type of cow will produce 80lbs of manure and 6-8 gallons of urine per day which results in 144,000 pounds of manure and around 11,000 gallons of urine every day deposited on the 500 acres. Hawai`i Dairy says that 8% will be deposited on their cemented area while the cows are being milked. This will be washed into holding pens which they say are built to with stand 25 year rain events. They don't know the rain! The remaining 92% onto the fields. When asked by Carl what is the soil percolation and permeability and the groundwater flow direction they said they did not know. They have worked on this project as "farmers" for 5 years and they do not know their own soil! The showed a map of the area with an arrow marking the prevailing winds. They showed the wind coming from the north with the smells going straight out to sea. The prevailing wind comes from the east-north-east blowing smells towards Maha`ulepu Beach, the Hyattt and residential areas. They don't know their wind!

This mono-crop model for agriculture is not environmentally friendly. The last dairy on Kaua`i was at Moloa`a. It closed several years ago for several reasons. One reason, and the straw that broke the cows back, was the constant urine and fecal smells that were present in the stream on a neighboring estate property (two miles away). The New Zealand Parliament recently said about dairy farms and their environment:

*"There are now numerous reports over a long period of time by government agencies and regional statutory bodies that have identified the adverse environmental effects of agriculture, and especially intensive dairy farming.*
*These reports all point to the fact that agriculture in general, and dairy farming in particular, has failed to meet the intent of Parliament as established by the requirements of ss.15 and 17 of the RMA. The issue has now progressed to the point where public opinion surveys have established that water quality is now perceived as New Zealand's most significant environmental issue and that intensive agriculture is perceived to be the primary cause of the problem".*

The Executive Committee of the Surfrider Foundation Kaua`i Chapter is asking The State to require a NPDES permit with public hearings before the dairy farm is allowed to operate. We believe their is great potential here environmental damage to the ground water and close by ocean, coral, reef and marine life.

Sincerely.
Dr Robert A. Zelkovsky
Surfrider Kauai Chair

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #2
**Date:** April 20, 2015 6:15:52 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Re: FW: Koloa Dairy Farm
**Date:**Wed, 05 Mar 2014 18:32:40 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>

I am strongly advising their consultants that they have the Dairy come in and apply for an NPDES, with public meetings.

On 3/5/2014 1:47 PM, Okubo, Watson T wrote:

Carl,

We cannot force someone to take an NPDES permit when there is no discharge but if a discharge occurs then the person is facing enforcement action. So it would be smart to get a permit to cover his ass. But this has not happened. This will be interesting.

Watson

---

**From:** Ueunten, Gary R.
**Sent:** Wednesday, March 05, 2014 12:15 PM
**To:** Okubo, Watson T
**Subject:** FW: Koloa Dairy Farm

---

**From:** Robert Zelkovsky [mailto:Robert@bamboomoonvideo.com]
**Sent:** Tuesday, March 04, 2014 5:18 PM
**To:** Gill, Gary L.
**Cc:** Ueunten, Gary R.
**Subject:** Koloa Dairy Farm

Aloha Gary -

Two members of the Executive Committee of the Kaua`i Chapter of The Surfrider Foundation, Dr. Carl Berg and myself, attended the recent presentation by the Hawai`i Dairy Farm at the Kaua`i Community College organized by Kaua`i Planning and Action Alliance. Both of us came away with more questions than were answered and both of us saw the



potential for severe environmental damage due to the large nature of this project and the poor planning that has gone into this project.
The dairy will consist of 1800 "small" cows on over 500 acres at Maha`ulepu, the most pristine accessible area on Kaua`i and possibly in the State. It is based on dairy farm techniques currently being done in New Zealand.

It has been estimated that this type of cow will produce 80lbs of manure and 6-8 gallons of urine per day which results in 144,000 pounds of manure and around 11,000 gallons of urine every day deposited on the 500 acres. Hawai`i Dairy says that 8% will be deposited on their cemented area while the cows are being milked. This will be washed into holding pens which they say are built to with stand 25 year rain events. They don't know the rain! The remaining 92% onto the fields. When asked by Carl what is the soil percolation and permeability and the groundwater flow direction they said they did not know. They have worked on this project as "farmers" for 5 years and they do not know their own soil! The showed a map of the area with an arrow marking the prevailing winds. They showed the wind coming from the north with the smells going straight out to sea. The prevailing wind comes from the east-north-east blowing smells towards Maha`ulepu Beach, the Hyattt and residential areas. They don't know their wind!

This mono-crop model for agriculture is not environmentally friendly. The last dairy on Kaua`i was at Moloa`a. It closed several years ago for several reasons. One reason, and the straw that broke the cows back, was the constant urine and fecal smells that were present in the stream on a neighboring estate property (two miles away). The New Zealand Parliament recently said about dairy farms and their environment:

*"There are now numerous reports over a long period of time by government agencies and regional statutory bodies that have identified the adverse environmental effects of agriculture, and especially intensive dairy farming.*
*These reports all point to the fact that agriculture in general, and dairy farming in particular, has failed to meet the intent of Parliament as established by the requirements of ss.15 and 17 of the RMA. The issue has now progressed to the point where public opinion surveys have established that water quality is now perceived as New Zealand's most significant environmental issue and that intensive agriculture is perceived to be the primary cause of the problem".*

The Executive Committee of the Surfrider Foundation Kaua`i Chapter is asking The State to require a NPDES permit with public hearings before the dairy farm is allowed to operate. We believe their is great potential here environmental damage to the ground water and close by ocean, coral, reef and marine life.
Sincerely.
Dr Robert A. Zelkovsky
Surfrider Kauai Chair

From: Carl Berg <cberg@pixi.com>
Subject: #42 repeat?
Date: April 20, 2015 8:50:53 PM PDT
To: Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 26 KB

-------- Original Message --------
**Subject:**Surfrider results
**Date:**Sun, 09 Mar 2014 13:34:55 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Watson <watson.okubo@doh.hawaii.gov>, Gary Ueunten <gary.ueunten@doh.hawaii.gov>

It had been raining quite a bit and the influence of stream runoff was quite obvious.
Remember, if there is brown runoff, it is polluted.
Special thanks to new samplers Kim Exon and John Strom for getting Kaha Lani and Hanamaulu samples, respectively.
Thanks also for Phil, for going out to Mahaulepu to get a sample near Gillin's house, before the dairy goes in. Counts were way high by the stream!

| Surfrider Kauai Blue Water Task Force | | | | |
|---|---|---|---|---|
| March 8, 2013 | | | | |
| Enterococcus bacterial concentration per 100 ml | | | | |
| Site | | | Single day | Last 5 month's |
| | | | results | geomean |
| Waiohai | | | <10 | 2.3 |
| PK's | | | <10 | 3.1 |
| Salt Pond | | | <10 | 9.0 |
| Waikoko | | | <10 | 15.7 |
| Kalihiwai | | | <10 | 23.2 |
| Kealia | | | 10 | 5.2 |
| Anahola | | | 10 | 17.3 |
| Kapa'a County Beach Park | | | 10 | 19 |
| Bowl | | | 10 | 29.8 |
| Kaha Lani | | | 20 | na |
| Pinetrees | | | 31 | 26.0 |
| Kalapaki Bay | | | 52 | 46.1 |



| | | | | |
|---|---|---|---|---|
| Middles | | | 63 | 56.4 |
| Rock Quarry | | | 110 | 46.2 |
| Moloa'a | | | 110 | 74.4 |
| Wainiha Stream | | | 364 | 224.9 |
| Nawiliwili Stream | | | 1043 | 781.9 |
| Hanamaulu Stream | | | 1043 | 922.4 |
| Waimea River | | | 1211 | 1046.3 |
| Pakalas - stream area | | | 1455 | 448.3 |
| Niumalu County Beach Park | | | 1670 | 3134.7 |
| Koloa Landing | | | 3076 | 1719.8 |
| Mahalulepu - Gillin's | | | 3255 | na |
| Single day sample should be <104 | | | | |
| Geomean of samples should be <35 | | | | |

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #3
**Date:** April 20, 2015 6:20:22 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

## Note Mahaulepu stream and Gillins beach sample mention and # given

-------- Original Message --------
**Subject:**BWTF results
**Date:**Sun, 13 Apr 2014 12:14:46 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Watson <watson.okubo@doh.hawaii.gov>, Gary Ueunten <gary.ueunten@doh.hawaii.gov>

Little rain, high wind, and some surf made for clean ocean water in most places.
Streams still filthy, including the one out at Mahaulepu.
Remember to wash off after coming out of the water!
Mahalo to everyone for going out and getting the samples!

Surfrider Kauai Blue Water Task Force

April 12, 2013

Enterococcus bacterial concentration per 100 ml

| Site | Single day results | Last 5 month's geomean |
|---|---|---|
| Waikoko | nt | 15.7 |
| Kalapaki Bay | nt | 46.1 |
| Middles | nt | 56.4 |
| Waiohai | <10 | 2.3 |
| PK's | <10 | 2.9 |
| Kealia | <10 | 4.5 |
| Kaha Lani | <10 | 6.8 |
| Salt Pond | <10 | 7.2 |
| Anahola | <10 | 10.5 |
| Kapa'a County Beach Park | <10 | 13.4 |
| Rock Quarry | <10 | 25.3 |
| Moloa'a | <10 | 31.2 |
| Kalihiwai | 10 | 20.2 |



| | | |
|---|---|---|
| Pinetrees | 20 | 24.9 |
| Waimea River | 20 | 541.6 |
| Bowl | 52 | 33.3 |
| Wainiha Stream | 63 | 181.9 |
| Nawiliwili Stream | 315 | 671.9 |
| Pakalas - stream area | 465 | 451.1 |
| Niumalu County Beach Park | 520 | 2323.6 |
| Mahalulepu - Gillin's Beach | 520 | 1301.0 |
| Hanamaulu Stream | 738 | 888.7 |
| Koloa Landing | 910 | 1546.7 |
| Mahalulepu Stream | 5794 | |

Single day sample should be <104

Geomean of samples should be <35

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #4
**Date:** April 20, 2015 6:34:17 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:** Mahaulepu samples?
**Date:** Thu, 10 Jul 2014 16:35:34 -1000
**From:** Carl Berg <cberg@pixi.com>
**To:** Gary Ueunten <gary.ueunten@doh.hawaii.gov>

Surfrider is sampling weekly in front of the Gillin's house and at the little bridge over the stream at the Cave Reserve. Geometric mean count for Enterococcus at bridge is 9074 and in front of Gillin's it is 679. Gillin's is a vacation rental and they have a very shallow (10') cesspool just mauka of the house.

If I collect a sample from each location can you have the Lihue lab run tests for Entero and Clostridium? I will sample whatever day is most convenient for the lab.
Or, you are invited to come out and sample.

Carl



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #5
**Date:** April 20, 2015 6:35:42 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:** Mahaulepu sampling
**Date:** Wed, 23 Jul 2014 14:16:31 -1000
**From:** Carl Berg <cberg@pixi.com>
**To:** Gary Ueunten <gary.ueunten@doh.hawaii.gov>, Watson <watson.okubo@doh.hawaii.gov>, Jan Ishibashi <Jan.Ishibashi@doh.hawaii.gov>

Aloha everyone,
My enterococcus counts for Waiopili stream at Mahulepu on Sunday were 24,196 and >24,196. This is at the bridge at the Makauwahi cave reserve. My counts for in front of Gillin's DOH Site# 847 was 2613. The geomean for the past 8 samples is 695

Can Jan to Entero and Clostridium on samples from those 2 sites? I can collect and deliver whichever day is most convenient, or Gary can go out there.
Mahalo, Carl

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #6
**Date:** April 20, 2015 6:36:20 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: Mahaulepu sampling
**Date:**Wed, 23 Jul 2014 14:52:12 -1000
**From:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>, Ueunten, Gary R. <gary.ueunten@doh.hawaii.gov>, Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>

Carl,

Can you collect the samples and drop off?

Watson

-----Original Message-----
From: Carl Berg [mailto:cberg@pixi.com]
Sent: Wednesday, July 23, 2014 2:17 PM
To: Ueunten, Gary R.; Okubo, Watson T; Ishibashi, Jan M.
Subject: Mahaulepu sampling

Aloha everyone,
My enterococcus counts for Waiopili stream at Mahulepu on Sunday were 24,196 and >24,196. This is at the bridge at the Makauwahi cave reserve.
My counts for in front of Gillin's DOH Site# 847 was 2613. The geomean for the past 8 samples is 695

Can Jan to Entero and Clostridium on samples from those 2 sites? I can collect and deliver whichever day is most convenient, or Gary can go out there.
Mahalo, Carl



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #7
**Date:** April 20, 2015 6:36:53 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Re: Mahaulepu sampling
**Date:**Wed, 23 Jul 2014 15:00:44 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>

Definitely, Jan and I just wanted to make sure of your approval to do so. I will coordinate with her for day.

I am afraid the cesspool, which is shallow and just 100 yds back from water, and is used for vacation rental, may be contaminating the water right in front. Probably all of the Entero is coming from the stream, but not positive.

On 7/23/2014 2:52 PM, Okubo, Watson T wrote:
> Carl,
>
> Can you collect the samples and drop off?
>
> Watson
>
>
> -----Original Message-----
> From: Carl Berg [mailto:cberg@pixi.com]
> Sent: Wednesday, July 23, 2014 2:17 PM
> To: Ueunten, Gary R.; Okubo, Watson T; Ishibashi, Jan M.
> Subject: Mahaulepu sampling
>
> Aloha everyone,
> My enterococcus counts for Waiopili stream at Mahulepu on Sunday were
> 24,196 and>24,196. This is at the bridge at the Makauwahi cave
> reserve.
> My counts for in front of Gillin's DOH Site# 847 was 2613. The geomean
> for the past 8 samples is 695
>
> Can Jan to Entero and Clostridium on samples from those 2 sites? I can
> collect and deliver whichever day is most convenient, or Gary can go out
> there.
> Mahalo, Carl
>
>

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #7
**Date:** April 20, 2015 6:37:39 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: Mahaulepu
**Date:**Mon, 28 Jul 2014 06:56:37 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

Hi Carl,

How about this Wednesday, 7/30/14.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone)  (808) 241-3480 (Fax)

-----Original Message-----
From: Carl Berg [mailto:cberg@pixi.com]
Sent: Friday, July 25, 2014 6:34 AM
To: Ishibashi, Jan M.
Subject: Mahaulepu

Which day next week would be best to bring you 2 samples from Mahaulepu
for Ent and Cp testing ?
Carl

Sent from my iPad



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #8
**Date:** April 20, 2015 8:23:58 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

On 7/28/2014 1:11 PM, Carl Berg wrote:

> Thanks Jan,
> Some other stuff has come up so I can't do this Wed., so how about
> next Monday or Wed.?
> Carl
>
> On 7/28/2014 6:56 AM, Ishibashi, Jan M. wrote:
>
> > Hi Carl,
> >
> > How about this Wednesday, 7/30/14.
> >
> > Jan Ishibashi
> > Hawaii Department of Health
> > Kauai District Health Laboratory
> > 3040 Umi Street
> > Lihue, HI 96766
> > (808) 241-3353 (Phone)  (808) 241-3480 (Fax)
> >
> > -----Original Message-----
> > From: Carl Berg [mailto:cberg@pixi.com]
> > Sent: Friday, July 25, 2014 6:34 AM
> > To: Ishibashi, Jan M.
> > Subject: Mahaulepu
> >
> > Which day next week would be best to bring you 2 samples from Mahaulepu
> > for Ent and Cp testing ?
> > Carl
> >
> > Sent from my iPad

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #10
**Date:** April 20, 2015 6:38:40 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Re: Mahaulepu
**Date:**Mon, 28 Jul 2014 14:56:11 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>

Yes, thank you. I will stop by and get bottles beforehand. I will get
the 2 samples to you, with TB, TE, early

On 7/28/2014 2:11 PM, Ishibashi, Jan M. wrote:
> How about next week Wednesday,August 6th.
>
> Jan Ishibashi
> Hawaii Department of Health
> Kauai District Health Laboratory
> 3040 Umi Street
> Lihue, HI 96766
> (808) 241-3353 (Phone)  (808) 241-3480 (Fax)
>
> -----Original Message-----
> From: Carl Berg [mailto:cberg@pixi.com]
> Sent: Monday, July 28, 2014 1:12 PM
> To: Ishibashi, Jan M.
> Subject: Re: Mahaulepu
>
> Thanks Jan,
> Some other stuff has come up so I can't do this Wed., so how about next
> Monday or Wed.?
> Carl
>
>
>
>
>
> On 7/28/2014 6:56 AM, Ishibashi, Jan M. wrote:
>
>> Hi Carl,
>>
>> How about this Wednesday, 7/30/14.
>>
>> Jan Ishibashi
>> Hawaii Department of Health
>> Kauai District Health Laboratory



>> 3040 Umi Street
>> Lihue, HI 96766
>> (808) 241-3353 (Phone)  (808) 241-3480 (Fax)
>>
>>
>> -----Original Message-----
>> From: Carl Berg [mailto:cberg@pixi.com]
>> Sent: Friday, July 25, 2014 6:34 AM
>> To: Ishibashi, Jan M.
>> Subject: Mahaulepu
>>
>> Which day next week would be best to bring you 2 samples from
>>
> Mahaulepu
>
>> for Ent and Cp testing ?
>> Carl
>>
>> Sent from my iPad
>>
>>
>>
>>
>
>
>

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #11
**Date:** April 20, 2015 8:24:38 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

On 8/5/2014 5:51 PM, Carl Berg wrote:

> Thanks for reminding me.
>
> On 8/5/2014 2:49 PM, Ishibashi, Jan M. wrote:
>
> > Hi Carl,
> >
> > If you remember, please bring two of your quanti-trays.
> >
> > Jan Ishibashi
> > Hawaii Department of Health
> > Kauai District Health Laboratory
> > 3040 Umi Street
> > Lihue, HI 96766
> > (808) 241-3353 (Phone) (808) 241-3480 (Fax)



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #12
**Date:** April 20, 2015 6:41:13 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

Mistake it is #12

-------- Original Message --------
**Subject:**Quanti-tray insert snf MPN Table
**Date:**Wed, 6 Aug 2014 11:24:08 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

Hi Carl,

Please bring the Quanti-tray insert and MPN Table.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #13
**Date:** April 20, 2015 6:42:06 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Re: Quanti-tray insert snf MPN Table
**Date:**Wed, 06 Aug 2014 20:37:19 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>

Was out in the field all day and just got your message. Were you able to seal the tray ?
What time will the samples be finished? I can come by with the MPN tables.

On 8/6/2014 11:24 AM, Ishibashi, Jan M. wrote:

> Hi Carl,
>
> Please bring the Quanti-tray insert and MPN Table.
>
> Jan Ishibashi
> Hawaii Department of Health
> Kauai District Health Laboratory
> 3040 Umi Street
> Lihue, HI 96766
> (808) 241-3353 (Phone) (808) 241-3480 (Fax)



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #14
**Date:** April 20, 2015 6:42:29 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Non potable results
**Date:**Thu, 7 Aug 2014 11:43:55 -1000
**From:**Oshiro, Carlene K. <carlene.oshiro@doh.hawaii.gov>
**To:**<cberg@pixi.com>

Hi Carl,

Following are the results for waters collected 8/6/14

| mLs | Clostridium perfringens MF/100 Enterococcus/100 mL |
|---|---|
| Stream | > 50 |
| | 3,320 |
| Gillin's | |
| 14 | 100 |

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #15
**Date:** April 20, 2015 6:42:48 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: *****SPAM***** Mahaulepu
**Date:**Thu, 7 Aug 2014 14:46:41 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

The Clostridia count is 105/100mL.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Thursday, August 07, 2014 1:53 PM
**To:** Ishibashi, Jan M.
**Subject:** *****SPAM***** Mahaulepu

You have a more accurate Cp count than >50? How bad is it?

-------- Original Message --------
**Subject:**Non potable results
**Date:**Thu, 7 Aug 2014 11:43:55 -1000
**From:**Oshiro, Carlene K. <carlene.oshiro@doh.hawaii.gov>
**To:**<cberg@pixi.com>

Hi Carl,

Following are the results for waters collected 8/6/14

| | Clostridium perfringens MF/100 mLs | Enterococcus/100 mL |
|---|---|---|
| Stream | > 50 | 3,320 |
| Gillin's 14 | 100 | |

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #16
**Date:** April 20, 2015 6:43:09 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Re: *****SPAM***** Mahaulepu
**Date:**Thu, 07 Aug 2014 15:37:38 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>

Thought you were out sick! Thanks

On 8/7/2014 2:46 PM, Ishibashi, Jan M. wrote:

> The Clostridia count is 105/100mL.
>
> Jan Ishibashi
> Hawaii Department of Health
> Kauai District Health Laboratory
> 3040 Umi Street
> Lihue, HI 96766
> (808) 241-3353 (Phone) (808) 241-3480 (Fax)
>
> ---
>
> **From:** Carl Berg [mailto:cberg@pixi.com]
> **Sent:** Thursday, August 07, 2014 1:53 PM
> **To:** Ishibashi, Jan M.
> **Subject:** *****SPAM***** Mahaulepu
>
> You have a more accurate Cp count than >50? How bad is it?
>
> -------- Original Message --------
> **Subject:**Non potable results
> **Date:**Thu, 7 Aug 2014 11:43:55 -1000
> **From:**Oshiro, Carlene K. <carlene.oshiro@doh.hawaii.gov>
> **To:**<cberg@pixi.com>
>
> Hi Carl,
>
> Following are the results for waters collected 8/6/14



| | Clostridium perfringens MF/100 mLs | Enterococcus/100 mL |
|---|---|---|
| Stream | > 50 | 3,320 |
| Gillin's 14 | 100 | |

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #17
**Date:** April 20, 2015 6:43:29 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: *****SPAM***** Re: *****SPAM***** Mahaulepu
**Date:**Thu, 7 Aug 2014 16:23:50 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

Hey,
I was. I am , but too much is happening in preparation for the storms, so I dragged myself in.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Thursday, August 07, 2014 3:38 PM
**To:** Ishibashi, Jan M.
**Subject:** *****SPAM***** Re: *****SPAM***** Mahaulepu

Thought you were out sick! Thanks

On 8/7/2014 2:46 PM, Ishibashi, Jan M. wrote:
The Clostridia count is 105/100mL.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Thursday, August 07, 2014 1:53 PM
**To:** Ishibashi, Jan M.
**Subject:** *****SPAM***** Mahaulepu



You have a more accurate Cp count than >50? How bad is it?

-------- Original Message --------
**Subject:**Non potable results
**Date:**Thu, 7 Aug 2014 11:43:55 -1000
**From:**Oshiro, Carlene K. <carlene.oshiro@doh.hawaii.gov>
**To:**<cberg@pixi.com>

Hi Carl,

Following are the results for waters collected 8/6/14

| | Clostridium perfringens MF/100 mLs | Enterococcus/100 mL |
|---|---|---|
| Stream | > 50 | 3,320 |
| Gillin's 14 | 100 | |

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #18
**Date:** April 20, 2015 6:45:50 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

2 Attachments, 2.4 MB

-------- Original Message --------
**Subject:**Nutrient results
**Date:**Wed, 27 Aug 2014 19:06:33 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Watson <watson.okubo@doh.hawaii.gov>, sina.pruder@doh.hawaii.gov

Attached are the results of testing the stream water (Waiopili Stream)
and well water at the Gillin's House in Mahaulepu.

Mahaulepu...s.pdf (1.1 MB) Mahaulepu...s.pdf (1.3 MB)



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #18
**Date:** April 20, 2015 6:48:35 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 26 KB

-------- Original Message --------
**Subject:**Surfrider results
**Date:**Mon, 15 Sep 2014 13:32:57 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Watson <watson.okubo@doh.hawaii.gov>, Gary Ueunten <gary.ueunten@doh.hawaii.gov>

Everything in ocean real clear and clean. Streams are yucky. Still no warning signs. Remember to rinse off after coming out of the water!

| Surfrider Kauai Blue Water Task Force | | | | |
|---|---|---|---|---|
| September 13, 2014 | | | | |
| Enterococcus bacterial concentration per 100 ml | | | | |
| Site | | | Single day | Site Year |
| | | | results | geomean |
| Waikoko | | | na | 20.0 |
| Moloa'a | | | na | 28.2 |
| Waiohai | | | <10 | 2.8 |
| PK's | | | <10 | 2.8 |
| Kealia | | | <10 | 3.9 |
| Salt Pond | | | <10 | 4.5 |
| Kapa'a County Beach Park | | | <10 | 5.2 |
| Kaha Lani | | | <10 | 5.4 |
| Rock Quarry | | | <10 | 6.1 |
| Kalihiwai | | | <10 | 6.5 |
| Pinetrees | | | <10 | 6.6 |
| Anahola | | | <10 | 7.6 |
| Horner's | | | <10 | na |

| | | | | |
|---|---|---|---|---|
| Bowl | | | 10 | 19.2 |
| Waimea River | | | 10 | 236.4 |
| Middles | | | 20 | 23.8 |
| Kalapaki Bay | | | 20 | 33.3 |
| Wainiha Stream | | | 31 | 88.6 |
| Pakalas - stream area | | | 292 | 513.6 |
| Nawiliwili Stream | | | 294 | 290.2 |
| Koloa Landing | | | 496 | 1565.3 |
| Hanamaulu Stream | | | 771 | 650.6 |
| Niumalu County Beach Park | | | 836 | 1063.0 |
| Single day sample should be <104 | | | | |
| Geomean of samples should be <35 | | | | |



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #19
**Date:** April 20, 2015 6:49:28 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**FW: 7/23/2014
**Date:**Wed, 17 Sep 2014 13:48:17 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

Hi Carl,
Here's Gary's explanation.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Ueunten, Gary R.
**Sent:** Wednesday, September 17, 2014 11:35 AM
**To:** Ishibashi, Jan M.
**Subject:** RE: 7/23/2014

Two samples, one in the stream upstream of Gillin's House (Waiopili Stream) and the other near Gillin's House on the beach. The sample at Gillin's House was taken from the stream as it flowed on the beach. Since the sample was taken close to Gillin's House the site was called Gillin's House Storet Number 847.

---

**From:** Ishibashi, Jan M.
**Sent:** Wednesday, September 17, 2014 11:11 AM
**To:** Ueunten, Gary R.
**Subject:** FW: 7/23/2014

Hi Gary,

Two samples, two different sites, one the stream and the other the beach?
The both results are Clostridia per 100 mL.

Jan Ishibashi

Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Wednesday, September 17, 2014 9:22 AM
**To:** Ishibashi, Jan M.
**Subject:** Re: 7/23/2014

I am confused.
On DOH website there is a record for 7/23/14 that says Gillin's Beach in Stream .
So are your two readings of Cp for the same stream sample at the beach, at different dilutions?
They both at 100 ml. Salinity says that beach sample must have been stream sample.

On 9/17/2014 8:56 AM, Ishibashi, Jan M. wrote:
Hi Carl,

On 7/23/14 Clostridia Counts for:

Waiopili Stream 62/100mL Salinity=0.07

Gillin's Beach 111/10mL Salinity=0.07

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)



**From:** Carl Berg <cberg@pixi.com>
**Subject:** Fwd: RE: FW: 7/23/2014
**Date:** April 20, 2015 6:49:46 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

#20

-------- Original Message --------
**Subject:**RE: FW: 7/23/2014
**Date:**Thu, 18 Sep 2014 06:35:16 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

That is correct.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Wednesday, September 17, 2014 6:37 PM
**To:** Ishibashi, Jan M.
**Subject:** Re: FW: 7/23/2014

Thanks and both had Ent >2005/100 ml ?

On 9/17/2014 1:48 PM, Ishibashi, Jan M. wrote:
Hi Carl,
Here's Gary's explanation.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Ueunten, Gary R.
**Sent:** Wednesday, September 17, 2014 11:35 AM
**To:** Ishibashi, Jan M.
**Subject:** RE: 7/23/2014

Two samples, one in the stream upstream of Gillin's House (Waiopili Stream) and the other near Gillin's House on the beach. The sample at Gillin's House was taken from the stream as it flowed on the beach. Since the sample was taken close to Gillin's House the site was called Gillin's House Storet Number 847.

---

**From:** Ishibashi, Jan M.
**Sent:** Wednesday, September 17, 2014 11:11 AM
**To:** Ueunten, Gary R.
**Subject:** FW: 7/23/2014

Hi Gary,

Two samples, two different sites, one the stream and the other the beach?
The both results are Clostridia per 100 mL.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Wednesday, September 17, 2014 9:22 AM
**To:** Ishibashi, Jan M.
**Subject:** Re: 7/23/2014

I am confused.
On DOH website there is a record for 7/23/14 that says Gillin's Beach in Stream .
So are your two readings of Cp for the same stream sample at the beach, at different dilutions?
They both at 100 ml. Salinity says that beach sample must have been stream sample.

On 9/17/2014 8:56 AM, Ishibashi, Jan M. wrote:
Hi Carl,

On 7/23/14 Clostridia Counts for:

Waiopili Stream 62/100mL Salinity=0.07

Gillin's Beach 111/10mL Salinity=0.07

Jan Ishibashi



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #21
**Date:** April 20, 2015 6:51:06 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 38 KB

-------- Original Message --------
**Subject:**FW: summary of results from last samples sent
**Date:**Tue, 23 Sep 2014 07:09:28 -1000
**From:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>
**To:**<cberg@pixi.com>

Carl,

We had two samples taken at Mahaulepu and they showed human and ruminant feces. See below. Do not sh
are at this time.

Watson

-----Original Message-----
From: ali.boehm@gmail.com [mailto:ali.boehm@gmail.com] On Behalf Of Alexandria Boehm
Sent: Thursday, September 11, 2014 9:00 AM
To: Okubo, Watson T; Kevan Yamahara
Subject: summary of results from last samples sent

Hi Watson -
The samples from Maui were run for enterococci by QPCR as well as two human markers *Bachum* and *HF183
*. The human markers were negative (not detected). The enterococci by QPCR was detected as follows (the
first number is the measurement and the second is the standard deviation). Units are cell equivalents
per filter and can be changed to cell equivalents per volume by dividing by the volume filtered:
RA06091415 Black Rock 5708 239
RA06091416 Wahikuli 945 1005
RA06091405 North Seep 252 436
RA06091408 South Seep ND NA
RA060914FB ND NA
No enterococci was found in the south seep or the field blanks.

For the two samples from CO (names below), we ran them for enterococci by QPCR the two human markers, a
s well as two ruminant markers.

The blank (7/23/14 Blank CO) was negative for everything which is good. The results for the other sampl
es is attached. Both had high levels of ENT by QPCR. sample 1 had high levels of 1 human marker
(HF183) and low levels of the other (BacHum); the other sample had low, but detectable levels of both h
uman markers. One sample had low but detectable levels of both ruminant markers (Rum2Bac and BacR), whi
le the other sample had low but detectable levels BacR but no detectable Rum2Bac. SO I would say these
samples had both human and ruminant feces present in them.

Let me know if you have any questions,

Ali

--
Alexandria Boehm, PhD
Associate Professor
Dept. of Civil & Environmental Engineering Jerry Yang & Akiko Yamazaki Environment & Energy Building
473 Via Ortega
Room 189  MC: 4020
Stanford, CA  94305
tel: 650 724-9128
fax: 650 723-7058
http://www.stanford.edu/~aboehm

CO-Samples...xlsx (38 KB)



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #22
**Date:** April 20, 2015 6:51:49 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Mahaulepu
**Date:**Thu, 25 Sep 2014 15:26:08 -1000
**From:**Stoddard, Lilian (Libby) <lilian.stoddard@doh.hawaii.gov>
**To:**Berg, Carl <cberg@pixi.com>
**CC:**Pruder, Sina L <sina.pruder@doh.hawaii.gov>, Tomomitsu, Mark S <mark.tomomitsu@doh.hawaii.gov>, Vetter, Lori <lori.vetter@doh.hawaii.gov>, Okubo, Watson T <watson.okubo@doh.hawaii.gov>

Aloha Dr. Berg;

Your complaint was forwarded to me because I oversee the sludge treatment facilities. I can confirm that Poipu Kai Resort WWTP (WWM Permit No. HI07WWIP424) is currently sending their Class B biosolids to the Mahaulepu land application site. This is a legal, permitted activity which is not considered "dumping sewage sludge." Nationwide, over half of the sludge from wastewater treatment plants is applied to agricultural land to improve soil quality and productivity. Both the WWTP and the Mahaulepu land application site are operated by Aqua Engineers.

I have sludge hauling reports from Poipu Kai Resort WWTP which show how much sludge was taken to the Mahaulepu land application site and who hauled it.

I have not received any data or reports of land applying untreated sewage.

I have not received reports of any other companies which may be involved.

The Department of Health (Wastewater and Clean Water Branches) are investigating the source of the apparent high bacteria counts in the Waiopili Stream samples

Sincerely,
Libby Stoddard
Sludge Program Manager
Wastewater Branch
State of Hawaii Department of Health
Phone: (808) 586-4294

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**From:** Carl Berg <cberg@pixi.com>
**Subject:** #23
**Date:** April 20, 2015 6:52:22 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: Mahaulepu
**Date:**Tue, 30 Sep 2014 01:41:41 -1000
**From:**Wong, Alec Y <alec.wong@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>
**CC:**Lum, Darryl C <darryl.lum@doh.hawaii.gov>, Okubo, Watson T <watson.okubo@doh.hawaii.gov>

Hi Carl,

I am out of state and will return to work on October 3, 2014. You may talk to Watson Okubo or Darryl Lum during my absence.

Thanks.

Alec Wong
Clean Water Branch
State of Hawaii Department of Health
Phone: (808) 586 - 4309
Fax: (808) 586-4352

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-----Original Message-----
From: Carl Berg [mailto:cberg@pixi.com]
Sent: Mon 9/29/2014 5:19 PM
To: Wong, Alec Y
Subject: Mahaulepu

Aloha Alec,
Will you be able to participate in the meeting about sewage sludge disposal, cow manure, and public health risk in the waters of Mahaulepu on October 1, 2014?
I am particularly interested in seeing the data that CWB has collected on bacteria in Waiopili Stream and hearing about what progress CWB has made in identifying the source of the pollutants and in posting warning signs on that highly polluted stream.
As always, I look forward to seeing you and CWB friends again.
Carl



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #24 IMPORTANT
**Date:** April 20, 2015 6:54:12 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 69 KB

---

-------- Original Message --------
**Subject:**Fwd: Urgent pollution problem at Mahaulepu
**Date:**Wed, 01 Oct 2014 06:58:43 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Watson <watson.okubo@doh.hawaii.gov>

FYI sent Monday

-------- Original Message --------
**Subject:**Urgent pollution problem at Mahaulepu
**Date:**Mon, 29 Sep 2014 08:41:21 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Gary Gill <gary.gill@doh.hawaii.gov>

Aloha Gary,
Please see attached letter concerning pollution in Waiopili stream and a nearby biosolids dumping facility.
Carl

Letter Gary....docx (69 KB)

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #25
**Date:** April 20, 2015 6:55:07 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 36 KB

-------- Original Message --------
**Subject:** RE: Mahaulepu
**Date:** Wed, 8 Oct 2014 11:03:40 -1000
**From:** Stoddard, Lilian (Libby) <lilian.stoddard@doh.hawaii.gov>
**To:** Berg, Carl <cberg@pixi.com>
**CC:** Tomomitsu, Mark S <mark.tomomitsu@doh.hawaii.gov>, Vetter, Lori <lori.vetter@doh.hawaii.gov>, Okubo, Watson T <watson.okubo@doh.hawaii.gov>, Pruder, Sina L <sina.pruder@doh.hawaii.gov>

Aloha Dr. Berg;

The national standard unit for wastewater sludge is "dry metric tons (DMT)": All sludge generation, reuse, and disposal is reported in dry metric tons. The four wastewater treatment plants that sent wastewater sludge to Aqua Engineer's Mahaulepu land application site during 2012 and 2013 are Poipu Kai Resort WWTP, Poipu Water Reclamation Facility, Princeville Resort WWTP, and Lihue-Puhi WWTP. The four plants together sent an average of 260 DMT/year to the Mahaulepu land application site (2012-13).

In response to your 9/28/14 email:
"Aloha,
Attached is the report on the concentrations of pesticides and metals in mud collected from Waiopili Stream.
No pesticide residues were detected. Metals were detected and reported in PPB concentrations.
How do these compare to allowable levels in biosolids?
Carl"

I compared the stream sediment analytical test results to our state pollutant ceiling concentration limits. These values are in Table IV of HAR 11-62, Appendix F (attached). The limits are expressed in mg/kg on a dry weight basis. mg/kg is equivalent to ppm. The National Science Laboratories "Report of Analytical Test Results" reported the metals in ppb rather than ppm. It is not clear whether these values were expressed on a dry weight basis. If not, the result must be divided by the % solids (expressed decimally) to calculate the value on a dry weight basis.

Comparing the test results to the ceiling concentration limits (all values in ppm):

| Pollutant | Limit | Result |
|---|---|---|
| As | 20 | <0.28 |
| Cd | 15 | <0.02 |
| Cr | 200 | 215 |
| Cu | 1,500 | 52 |
| Ni | 100 | 198 |
| Pb | 300 | <120 |
| Se | 25 | <200 |
| Zn | 2,000 | 48 |

The results with "<" indicate that the lab was not able to detect the pollutant because it was below their limit of detection (LOD). I don't know why they use ND for non-detect on some parameters and "<LOD" for others.

Sincerely,
Libby Stoddard
Sludge Program Manager
Wastewater Branch
State of Hawaii Department of Health
Phone: (808) 586-4294

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---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Thu 9/25/2014 5:18 PM
**To:** Stoddard, Lilian (Libby)
**Cc:** Pruder, Sina L; Tomomitsu, Mark S; Vetter, Lori; Okubo, Watson T; diann.hartman@hyatt.com; Bridget Hammerquist; greg@malama-mahaulepu.org
**Subject:** Re: Mahaulepu

Mahalo Lilian, for your very quick and detailed response to the community's concerns.
Can you please tell me the amount (tons or cubic feet, etc) of biosolids that are applied annually to the soils at the Mahaulepu site?
Also, which companies, besides Aqua Enginners, are allowed to haul sludge to that site?
I will pass the information on to the community and see how it relates to what they are seeing.
I personally do not believe that biosolids legally applied at that site are responsible for the chronic extremely high bacteria counts in Waiopili Stream, but waste management and ground water hydrology are not my areas of expertise.

Sincerely,
Carl J. Berg, Ph.D.
Blue Water Task Force
The Surfrider Foundation - Kauai Chapter
Phone (808) 639-2968

On 9/25/2014 3:26 PM, Stoddard, Lilian (Libby) wrote:

> Aloha Dr. Berg;
>
> Your complaint was forwarded to me because I oversee the sludge treatment facilities. I can confirm that Poipu Kai Resort WWTP (WWM Permit No. HI07WWIP424) is currently sending their Class B biosolids to the Mahaulepu land application site. This is a legal, permitted activity which is not considered "dumping sewage sludge." Nationwide, over half of the sludge from wastewater treatment plants is applied to agricultural land to improve soil quality and productivity. Both the WWTP and the Mahaulepu land application site are operated by Aqua Engineers.
>
> I have sludge hauling reports from Poipu Kai Resort WWTP which show how much sludge was taken to the Mahaulepu land application site and who hauled it.
>
> I have not received any data or reports of land applying untreated sewage.
>
> I have not received reports of any other companies which may be involved.
>
> The Department of Health (Wastewater and Clean Water Branches) are investigating the source of the apparent high bacteria counts in the Waiopili Stream samples
>
> Sincerely,
> Libby Stoddard
> Sludge Program Manager
> Wastewater Branch
> State of Hawaii Department of Health
> Phone: (808) 586-4294
>
> Notice: This information and attachments are intended only for the use of the individual(s) or entity to which it is addressed and may contain information that is privileged and/or confidential. If the reader of this message is not the intended recipient, any dissemination, distribution, or copying of this communication is strictly prohibited and may be punishable under state and federal law. If you received this communication and/or attachments in error, please notify the sender via email immediately and destroy all electronic and paper copies.

CHAPTER 11-62 APPENDIX F

TABLE IV
April 15, 1997

| Pollutant | Pollutant Ceiling Concentration Limit (dry weight basis, mg/kg) |
|---|---|
| Arsenic | 20 |
| Cadmium | 15 |
| Chromium | 200 |
| Copper | 1500 |
| Lead | 300 |
| Mercury | 10 |
| Molybdenum | 15 |
| Nickel | 100 |
| Selenium | 25 |
| Zinc | 2000 |

TABLE V
April 15, 1997

| Amount of Wastewater Sludge (Metric Ton per 365 day period, dry weight basis) | Frequency |
|---|---|
| Greater than zero but less than 290 | Once per year |
| Equal to or greater than 290 but less than 1500 | Once per quarter |
| Equal to or greater than 1500 but less than 15,000 | Once per 60 days |
| Equal to or greater than 15,000 | Once per month |
| | |
| Amount of Wastewater Sludge (English Ton per 365 day period, dry weight basis) | Frequency |
| Greater than zero but less than 320 | Once per year |
| Equal to or greater than 320 but less than 1650 | Once per quarter |
| Equal to or greater than 1650 but less than 16,500 | Once per 60 days |
| Equal to or greater than 16,500 | Once per month |

62-F-4



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #26
**Date:** April 20, 2015 6:56:04 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 28 KB

-------- Original Message --------
**Subject:**Surfrider BWTF results
**Date:**Sun, 12 Oct 2014 14:52:49 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Watson <watson.okubo@doh.hawaii.gov>, Gary Ueunten <gary.ueunten@doh.hawaii.gov>

All of the stream sites are really bad again.

I added here Waiopili Stream, which is the stream that enters the ocean near Gillin House and Cave Reserve down in Mahaulepu. That value is the geometric mean of 14 samples taken since April 2014. It is always about 250 TIMES the State standard. Doesn't know what the source is, but the stream comes from Grove Farm properties, including Hawaii Dairy Farm. Dept. of Health also did a sampling and found similar high value, plus indications that it was human sewage. I got a bad leg infection after sampling there. It has more than 2x all the other places combined!!! There must be a "caution sign" at the stream mouth so that families and tourists stay out. Need signs at least on the worst 5-6 places!

| Surfrider Kauai Blue Water Task Force | | | | |
|---|---|---|---|---|
| October 11, 2014 | | | | |
| Enterococcus bacterial concentration per 100 ml | | | | |
| Site | | | Single day | Site Year |
| | | | results | geomean |
| Salt Pond | | | na | 2.7 |
| Kaha Lani | | | na | 5.4 |
| Bowl | | | na | 19.2 |
| Waikoko | | | na | 20.0 |
| Moloa'a | | | na | 26.2 |
| Wainiha Stream | | | na | 88.6 |
| PK's | | | <10 | 2.7 |
| Waiohai | | | <10 | 2.8 |
| Kealia | | | <10 | 3.6 |
| Pinetrees | | | <10 | 5.8 |

| | | | | |
|---|---|---|---|---|
| Pinetrees | | | <10 | 5.8 |
| Anahola | | | <10 | 8.7 |
| Kalihiwai | | | 10 | 6.8 |
| Kapa'a County Beach Park | | | 20 | 6.1 |
| Kalapaki Bay | | | 20 | 31.2 |
| Rock Quarry | | | 31 | 7.5 |
| Middles | | | 63 | 26.6 |
| Waimea River | | | 145 | 223.9 |
| Pakalas - stream area | | | 197 | 461.7 |
| Koloa Landing | | | 910 | 1473.8 |
| Hanamaulu Stream | | | 1010 | 683.2 |
| Niumalu County Beach Park | | | 1314 | 1088.3 |
| Nawiliwili Stream | | | 2382 | 366.6 |
| Waiopili Stream - Mahaulepu | | | | 8806.0 |
| Single day sample should be <104 | | | | |
| Geomean of samples should be <35 | | | | |



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #27 IMPORTANT
**Date:** April 20, 2015 6:58:01 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: *****SPAM***** Mahaulepu
**Date:**Tue, 21 Oct 2014 09:31:47 -1000
**From:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>, Hudson <Slay.Hudson@epamail.epa.gov>, Wendy Wiltse <Wiltse.Wendy@epamail.epa.gov>

Carl,

Simply put, if we post signs and someone asks us what we posted signs for and we say that the entero and clostridium were elevated. Then we are asked why is it elevated? I don't know. What is the source of the elevated numbers? I think background. Is there a smoking gun? I see no smoking gun. So Why did we post when there is no human fecal concerns? Let us do the sanitary survey to answer the unanswerable questions. If we post here, then we will have to post most streams in the State just because entero and clostridium numbers were elevated due to background numbers. Sorry Carl, we will do the sanitary survey first. We have received permission go onto Grove Farm lands. Checking our dates.

Watson

-----Original Message-----
From: Carl Berg [mailto:cberg@pixi.com]
Sent: Tuesday, October 21, 2014 8:05 AM
To: Okubo, Watson T; Hudson; Wendy Wiltse
Subject: *****SPAM***** Mahaulepu

http://thegardenisland.com/news/local/pollution-in-mahaulepu/article_9f6
9f058-58dd-11e4-8350-cb213541d22e.html

I have a meeting with Grove Farm today at 10:00. I already spoke with the CEO, Mike Tresler, asking him to put up signs at the mouth of the river.
He asked to see my data and talk to his lawyers. I will show him all of the Enterococcus data that I have collected on the stream. I will provide signs similar to those at Hanalei River.

I went out yesterday and measured stream flow and turbidity because of the recent light rain we had (Ana).
Turbidity was 149, flow 21.2 cfs (10x summer average). From a few TSS and NTU measurements for that stream I calculated 90.7 mg/L TSS.

This estimates 10, 367 lbs of sediment from that stream for 24 hour period on day after the heavier rainfall.
Significant erosion and soil runoff is occurring from HDF.

Carl



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #28
**Date:** April 20, 2015 7:00:58 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 26 KB

-------- Original Message --------
**Subject:**Surfrider results
**Date:**Sun, 09 Nov 2014 13:19:22 -0800
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>

Thanks everyone for going out and getting the samples.
Heavy rains in the mountains the night before caused muddy river water flowing into the ocean on the north and east sides, especially in Hanalei. This is why the Department of Health issues Brown Water Advisories!! This is the first winter storm that we caught on our monthly sampling, so all of the mean values are going to be high. Remember to stay out of the brown water or rinse off well when you get in.
Niumalu, Koloa Landing, and Hanamaulu are still badly polluted, with no warning signs. No signs at Mahaulepu either, even though Grove Farms knows how badly polluted the stream is there!

| Surfrider Kauai Blue Water Task Force | | | | |
|---|---|---|---|---|
| November 8, 2014 | | | | |
| Enterococcus bacterial concentration per 100 ml | | | | |
| Site | | | Single day | Site Year |
| | | | results | geomean |
| PK's | | | <10 | 2.7 |
| Waiohai | | | <10 | 2.8 |
| Salt Pond | | | <10 | 4.2 |
| Kealia | | | <10 | 4.5 |
| Anahola | | | <10 | 7.4 |
| Kapa'a County Beach Park | | | 10 | 6.4 |
| Moloa'a | | | 20 | 24.8 |
| Waimea River | | | 30 | 183.1 |
| Rock Quarry | | | 63 | 9.5 |
| Nawiliwili Stream | | | 108 | 324.5 |

| | | | | |
|---|---|---|---|---|
| Waikoko | | | 350 | 32.2 |
| Pakalas - stream area | | | 480 | 463.5 |
| Kalapaki Bay | | | 512 | 42.6 |
| Pinetrees | | | 520 | 9.1 |
| Middles | | | 529 | 38.6 |
| Kalihiwai | | | 644 | 10.7 |
| Hanamaulu Stream | | | 1334 | 730.5 |
| Wainiha Stream | | | 1989 | 130.7 |
| Koloa Landing | | | 2143 | 1530 |
| Niumalu County Beach Park | | | 9804 | 1355.9 |
| Bowl | | | 12997 | 48.7 |
| Single day sample should be <104 | | | | |
| Geomean of samples should be <35 | | | | |



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #29
**Date:** April 20, 2015 7:02:34 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**testing
**Date:**Wed, 19 Nov 2014 08:29:26 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>

What a mess I dragged everyone in to! You still there? I thought last day was first of December.

I am offering you more of the large QuantiTrays so that with 1:10 dilution you can get entero counts >24,000 for Mahaulepu.

Also I will suggest to Watson that you give to me a split of the sample to be taken on Monday. But since I have concerns of the toxicity of your repeatedly sterilized plastic sample bottles, I would like a sample in our clear plastic ones. Not sure Watson wants me anywhere near this however.

Carl

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #30
**Date:** April 20, 2015 7:02:57 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**51-well Quantitrays
**Date:**Wed, 19 Nov 2014 14:16:59 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

Carl,

I would like to use your trays side by side our trays using a 1:10 dilution. Can you spare 13 trays? A retirement gift, please.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #31
**Date:** April 20, 2015 7:03:14 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: *****SPAM***** Re: 51-well Quantitrays
**Date:**Wed, 19 Nov 2014 14:30:32 -1000
**From:**Ishibashi, Jan M. <jan.ishibashi@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>

Ok, around 9am.

Jan Ishibashi
Hawaii Department of Health
Kauai District Health Laboratory
3040 Umi Street
Lihue, HI 96766
(808) 241-3353 (Phone) (808) 241-3480 (Fax)

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**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Wednesday, November 19, 2014 2:24 PM
**To:** Ishibashi, Jan M.
**Subject:** *****SPAM***** Re: 51-well Quantitrays

Yup, will bring over tomorrow.
What time is your coffee break?

Sent from my iPad

On Nov 19, 2014, at 2:16 PM, "Ishibashi, Jan M." <jan.ishibashi@doh.hawaii.gov> wrote:

> Carl,
>
> I would like to use your trays side by side our trays using a 1:10 dilution. Can you spare 13 trays? A retirement gift, please.
>
> Jan Ishibashi
> Hawaii Department of Health
> Kauai District Health Laboratory
> 3040 Umi Street
> Lihue, HI 96766
> (808) 241-3353 (Phone) (808) 241-3480 (Fax)

**From:** Carl Berg <cberg@pixi.com>
**Subject:** Fwd: cows
**Date:** April 20, 2015 7:03:53 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

#32

-------- Original Message --------
**Subject:**cows
**Date:**Sat, 22 Nov 2014 16:35:11 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**McIntyre, Laura <Laura.McIntyre@doh.hawaii.gov>

The latest in my efforts to get the stream at Mahaulepu posted and the dairy to get an NPDES permit for past pollution and do an EIS.
They have not done anything yet according to the AG office.

--

See if this link allows you to download a study by Jeff Soller. If not, I can send it as an attachment.

http://scholar.google.com/scholar_url?hl=en&q=http://www.researchgate.net/publication/45287240_Estimated_human_health_risks_from_exposure_to_recreational_waters_impacted_by_human_and_non-human_sources_of_faecal_contamination/file/9fcfd50a281475e739.pdf&sa=X&scisig=AAGBfm1g-JVbYbtJudhFO0IHcq1K5_S9Gq&oi=scholarr

They evaluated the relative pathogenicity of non-human sources of FIB and concluded that FIB from cattle feces had comparable risk to FIB from human feces, but the health from gull, chicken and pig fecal matter had less risk (at least two orders of magnitude lower). Here are the discussion and conclusion sections of the paper:

"**Our analysis indicates that the GI illness risks associated with human exposure to recreational waters impacted by fresh cattle manure may not be substantially different from those impacted by human sources: the distributions of risk effectively span the same range.** This finding is in part due to the unknown proportion of human-infectious species/ strains in cattle manure-impacted waters. In the absence of effective management practices that would significantly reduce these risks or new knowledge on infectivity, less stringent or alternative water quality standards for cattleimpacted waters do not seem appropriate at this time.
Moreover, a suite of pathogens appears to be present in cattle-impacted waters (C. jejuni, Cryptosporidium and Giardia spp., in addition to E. coli O157:H7), any one of which may be present at a level that could be of concern. Within this context, E. coli O157:H7 and similar Shiga-toxin-producing strains are of particular concern because several are known to cause adverse health outcomes that are substantially more serious than self limiting GI illness (Bettelheim, 2007). Furthermore, this situation is more complex than presented



here, as some strains of E. coli O157:H7 are not human pathogens (Bettelheim, 2007) and adult cattle largely excrete oocysts (of Cryptosporidium brevis and Cryptosporidium andersoni) that are much less likely to be human pathogens than from calves (excreting C. parvum) (Chalmers and Giles, 2010).

**In contrast, the water-related risks associated with gull, chicken, and pig faeces are estimated to be substantially lower than those impacted from human faecal sources at the indicator densities assessed; median risks from these sources are at least two orders of magnitude lower than the human-based benchmark. Based on these results, the potential for developing alternative water quality standards (or guidelines) for gull, chicken, and pig-impacted waters should not be ruled out.**
One caveat however, is the emerging risk from pig hepatitis E virus genogroup C in human disease (Rutjes et al., 2009).
There are a number of important considerations to the work presented here. First, the analysis relied on a review of the readily available scientific literature. Additional data may refine the relative risk estimates presented here. Second, super shedding exposure scenarios were not considered in this analysis (Arthur et al., 2009; Chase-Topping et al., 2008). Risks to human health would increase if super shedding cattle (or calves) were present due to the increased levels of pathogens in faeces (Bryan et al., 2009; Chase-Topping et al., 2008).
Third, chicken pathogen data are based on fresh faeces, whereas the FIB data are from chicken litter. This causes an additional level of uncertainty which could result in over or underestimated levels of risk due to potential differential dieoff of indicator bacteria as compared to pathogens. Fourth, the analyses presented here are based on the assumption that the contamination is recent and from relatively fresh faeces. As the contamination becomes less fresh, both FIB and pathogens will decay, however they may not decay at the same rate (Anderson et al., 2005). Thus, differential persistence over time could yield results that differ from those summarized here because many pathogens are more persistent than FIB while others are less persistent. These effects could be particularly important for chicken litter and pig faecal slurries, both of which are subject to widely variable storage times and handling practices. Our future work includes investigating the impacts of differential persistence on recreational water risks.
Fifth, the analyses for pig-impacted waters were based on FIB and pathogens in pig manure. However, pig manure is commonly land-applied as slurry, yet, the literature review indicated that sufficient data were not available to conduct this analysis directly for pig manure slurry. The potential impact of differential persistence of FIB and pathogens in pig slurry relative to pig manure was not identified.
Finally, the occurrence of pathogens in recreational waters is a function of both spatial and temporal variability. Thus, the actual risks to human health present in any specific location at a particular time could vary substantially from the estimates presented here. This finding is particularly relevant to cattle, for which there are known and significant seasonal

variations in shedding rates for all of the representative pathogens, as well as in rain-induced run-off that may drive manure-related pathogens into waterbodies.

The analysis presented here is an initial step toward understanding whether or not the relative risks from exposure to recreational waters impacted by gulls, chickens, pigs, and/or cattle are substantially different from those associated with human (sewage)-impacted waters. **The QMRA results are consistent with the findings from epidemiology studies. In particular, illness risk associated with non-sewage impacted beaches appears to depend on the source of contamination, i.e. some animals show relatively lower risks than others, which could account for the conflicting epidemiology findings (Till et al., 2008).**

**The principal findings from this work are that the GI illness risks associatedwith exposure to recreational waters impacted by fresh cattle faeces may not be substantially different from those impacted by human sources, whereas the risks associated with exposure to recreational waters impacted by gull, chicken, and pig wastes appear to be substantially lower than those impacted by human sources.** There are a number of important limitations to the work presented here. Nevertheless, these results suggest that careful consideration may be needed in the future for the management of recreational waters not impacted by human sources."

Rick Wilson
Senior Staff Scientist
Surfrider Foundation
949-581-0292



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #39
**Date:** April 20, 2015 8:40:55 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Fwd: Re: animal sources of entero
**Date:**Wed, 26 Nov 2014 10:28:15 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Pruder, Sina L <sina.pruder@doh.hawaii.gov>
**CC:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>, Wiltse, Wendy <Wiltse.Wendy@epa.gov>, Slay, Hudson <SLAY.HUDSON@EPA.GOV>

Aloha Sina,

Thank you for all of your efforts with the Hawaii Dairy Farm. I am please that it only took 9 months for them to respond to our request for an EIS. In the meantime they continue to pollute state waters and the ocean. That is unacceptable.

Below is an email trail and scientific paper that was used as guidance for EPA that shows that cow manure is as much a public health risk as human manure. Manure from other animals is not as much of a risk, but at the extremely high FIB levels found in Waiopili stream the effective health risk is far greater than what the public should be exposed to. DOH should post streams with high concentrations of FIB.

This information will useful in DOH's review of the EIS.

Mahalo for all of your work in protecting public health and the environment.
Carl

Carl J. Berg, Ph.D.
Blue Water Task Force
The Surfrider Foundation - Kauai

> http://scholar.google.com/scholar_url?hl=en&q=http://www.researchgate.net/publication/45287240_Estimated_human_health_risks_from_exposure_to_recreational_waters_impacted_by_human_and_non-human_sources_of_faecal_contamination/file/9fcfd50a281475e739.pdf&sa=X&scisig=AAGBfm1g-JVbYbtJudhFO0lHcq1K5_S9Gg&oi=scholarr
>
> Here are the discussion and conclusion sections of the paper:

> They evaluated the relative pathogenicity of non-human sources of FIB and concluded that FIB from cattle feces had comparable risk to FIB from human feces, but the health from gull, chicken and pig fecal matter had less risk (at least two orders of magnitude lower).
>
> "**Our analysis indicates that the GI illness risks associated**

**with human exposure to recreational waters impacted by fresh cattle manure may not be substantially different from those impacted by human sources: the distributions of risk effectively span the same range.** This finding is in part due to the unknown proportion of human-infectious species/ strains in cattle manure-impacted waters. In the absence of effective management practices that would significantly reduce these risks or new knowledge on infectivity, less stringent or alternative water quality standards for cattleimpacted waters do not seem appropriate at this time.
Moreover, a suite of pathogens appears to be present in cattle-impacted waters (C. jejuni, Cryptosporidium and Giardia spp., in addition to E. coli O157:H7), any one of which may be present at a level that could be of concern. Within this context, E. coli O157:H7 and similar Shiga-toxin-producing strains are of particular concern because several are known to cause adverse health outcomes that are substantially more serious than self limiting GI illness (Bettelheim, 2007). Furthermore, this situation is more complex than presented here, as some strains of E. coli O157:H7 are not human pathogens (Bettelheim, 2007) and adult cattle largely excrete oocysts (of Cryptosporidium brevis and Cryptosporidium andersoni) that are much less likely to be human pathogens than from calves (excreting C. parvum) (Chalmers and Giles, 2010).

**In contrast, the water-related risks associated with gull, chicken, and pig faeces are estimated to be substantially lower than those impacted from human faecal sources at the indicator densities assessed; median risks from these sources are at least two orders of magnitude lower than the human-based benchmark. Based on these results, the potential for developing alternative water quality standards (or guidelines) for gull, chicken, and pig-impacted waters should not be ruled out.**
One caveat however, is the emerging risk from pig hepatitis E virus genogroup C in human disease (Rutjes et al., 2009).
There are a number of important considerations to the work presented here. First, the analysis relied on a review of the readily available scientific literature. Additional data may refine the relative risk estimates presented here. Second, super shedding exposure scenarios were not considered in this analysis (Arthur et al., 2009; Chase-Topping et al., 2008). Risks to human health would increase if super shedding cattle (or calves) were present due to the increased levels of pathogens in faeces (Bryan et al., 2009; Chase-Topping et al., 2008).
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here because many pathogens are more persistent than FIB while others are less persistent. These effects could be particularly important for chicken litter and pig faecal slurries, both of which are subject to widely variable storage times and handling practices. Our future work includes investigating the impacts of differential persistence on recreational water risks.
Fifth, the analyses for pig-impacted waters were based on FIB and pathogens in pig manure. However, pig manure is commonly land-applied as slurry, yet, the literature review indicated that sufficient data were not available to conduct this analysis directly for pig manure slurry. The potential impact of differential persistence of FIB and pathogens in pig slurry relative to pig manure was not identified.
Finally, the occurrence of pathogens in recreational waters is a function of both spatial and temporal variability. Thus, the actual risks to human health present in any specific location at a particular time could vary substantially from the estimates presented here. This finding is particularly relevant to cattle, for which there are known and significant seasonal variations in shedding rates for all of the representative pathogens, as well as in rain-induced run-off that may drive manure-related pathogens into waterbodies.

The analysis presented here is an initial step toward understanding whether or not the relative risks from exposure to recreational waters impacted by gulls, chickens, pigs, and/or cattle are substantially different from those associated with human (sewage)-impacted waters. **The QMRA results are consistent with the findings from epidemiology studies. In particular, illness risk associated with non-sewage impacted beaches appears to depend on the source of contamination, i.e. some animals show relatively lower risks than others, which could account for the conflicting epidemiology findings (Till et al., 2008).**

**The principal findings from this work are that the GI illness risks associatedwith exposure to recreational waters impacted by fresh cattle faeces may not be substantially different from those impacted by human sources, whereas the risks associated with exposure to recreational waters impacted by gull, chicken, and pig wastes appear to be substantially lower than those impacted by human sources.** There are a number of important limitations to the work presented here. Nevertheless, these results suggest that careful consideration may be needed in the future for the management of recreational waters not impacted by human sources."

Rick Wilson
Senior Staff Scientist
Surfrider Foundation
949-581-0292

Officially EPA does not differentiate between sources when health criteria are surpassed. there is still a

requirement for public notice. The new criteria and revised beach grant guidance docs do allow a state to conduct their own QMRA study to determine site-specific variability in health risk due to local sources, but if a state does not go through this process to determine an alternative criteria then the normal 35/104 or either of the new 30/110 or 35/130 criteria apply.

The revised beach guidance is available here: http://www2.epa.gov/beach-tech/national-beach-guidance-and-required-performance-criteria-grants

**To view the Criteria document and info on epi studies on animal sources go here:**

**http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm**

Criteria documents tab: Criteria document

Excerpt below:

***Because there have been few epidemiological studies, with mixed findings, in waters impacted by nonhuman sources and QMRA shows that risks from some animals may be comparable to humans, EPA is not developing separate national criteria for nonhuman sources. However, since some studies have site-specifically shown less risk in waters impacted by nonhuman sources, states interested in addressing the potential human health risk differences from different sources of fecal contamination on a site-specific basis should refer to section 6.2.2 of this document for suggestions on approaches.***

Click on Research tab: for study report from epi study on animal sources conducted to support the criteria development and two related literature review.

1) Conduct QMRA (based on measurements of pathogenic organisms and indicators) to estimate illness at a freshwater beach impacted by agricultural animal sources of fecal contamination (location to be determined) (P4) Download full report above or Exec summary available here:
http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/CN-P4_FINAL.pdf

This epi study suggests cattle & pig sources of fecal bacteria present a lower health risk than human sources, but not on the order of 250 times lower that would be necessary to justify ignoring entero counts of 8,800. Chicken sources might actually be that much less harmful.

2) two literature reviews available that describe the existing knowledgebase available to characterize the relative risks of human illness from various sources of fecal contamination in recreational waters & provide a summary of information on waterborne zoonotic pathogens that come primarily from warm-blooded animals. Download above.



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #33
**Date:** April 20, 2015 8:49:17 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**RE: *****SPAM***** Fwd: Re: animal sources of entero
**Date:**Wed, 26 Nov 2014 11:12:48 -1000
**From:**Pruder, Sina L <sina.pruder@doh.hawaii.gov>
**To:**Carl Berg <cberg@pixi.com>
**CC:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>, Wiltse, Wendy <Wiltse.Wendy@epa.gov>, Slay, Hudson <SLAY.HUDSON@EPA.GOV>, Wong, Alec Y <alec.wong@doh.hawaii.gov>

Hi Carl,

Thanks for the information.

Sina

---

**From:** Carl Berg [mailto:cberg@pixi.com]
**Sent:** Wednesday, November 26, 2014 10:28 AM
**To:** Pruder, Sina L
**Cc:** Okubo, Watson T; Wiltse, Wendy; Slay, Hudson
**Subject:** *****SPAM***** Fwd: Re: animal sources of entero

Aloha Sina,

Thank you for all of your efforts with the Hawaii Dairy Farm. I am please that it only took 9 months for them to respond to our request for an EIS. In the meantime they continue to pollute state waters and the ocean. That is unacceptable.

Below is an email trail and scientific paper that was used as guidance for EPA that shows that cow manure is as much a public health risk as human manure. Manure from other animals is not as much of a risk, but at the extremely high FIB levels found in Waiopili stream the effective health risk is far greater than what the public should be exposed to. DOH should post streams with high concentrations of FIB.

This information will useful in DOH's review of the EIS.

Mahalo for all of your work in protecting public health and the environment.
Carl

Carl J. Berg, Ph.D.
Blue Water Task Force
The Surfrider Foundation - Kauai

http://scholar.google.com/scholar_url?hl=en&q=http://www.researchgate.net/publication/45287240_Estimated_human_health_risks_from_exposure_to_recreational_waters_impacted_by_human_and_non-human_sources_of_faecal_contamination/file/9fcfd50a281475e739.pdf&sa=X&scisig=AAGBfm1g-JVbYbtJudhFO0IHcq1K5_S9Gg&oi=scholarr

Here are the discussion and conclusion sections of the paper:

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"**Our analysis indicates that the GI illness risks associated with human exposure to recreational waters impacted by fresh cattle manure may not be substantially different from those impacted by human sources: the distributions of risk effectively span the same range.** This finding is in part due to the unknown proportion of human-infectious species/ strains in cattle manure-impacted waters. In the absence of effective management practices that would significantly reduce these risks or new knowledge on infectivity, less stringent or alternative water quality standards for cattleimpacted waters do not seem appropriate at this time.
Moreover, a suite of pathogens appears to be present in cattle-impacted waters (C. jejuni, Cryptosporidium and Giardia spp., in addition to E. coli O157:H7), any one of which may be present at a level that could be of concern. Within this context, E. coli O157:H7 and similar Shiga-toxin-producing strains are of particular concern because several are known to cause adverse health outcomes that are substantially more serious than self limiting GI illness (Bettelheim, 2007). Furthermore, this situation is more complex than presented



here, as some strains of E. coli O157:H7 are not human pathogens (Bettelheim, 2007) and adult cattle largely excrete oocysts (of Cryptosporidium brevis and Cryptosporidium andersoni) that are much less likely to be human pathogens than from calves (excreting C. parvum) (Chalmers and Giles, 2010).

**In contrast, the water-related risks associated with gull, chicken, and pig faeces are estimated to be substantially lower than those impacted from human faecal sources at the indicator densities assessed; median risks from these sources are at least two orders of magnitude lower than the human-based benchmark. Based on these results, the potential for developing alternative water quality standards (or guidelines) for gull, chicken, and pig-impacted waters should not be ruled out.** One caveat however, is the emerging risk from pig hepatitis E virus genogroup C in human disease (Rutjes et al., 2009). There are a number of important considerations to the work presented here. First, the analysis relied on a review of the readily available scientific literature. Additional data may refine the relative risk estimates presented here. Second, super shedding exposure scenarios were not considered in this analysis (Arthur et al., 2009; Chase-Topping et al., 2008). Risks to human health would increase if super shedding cattle (or calves) were present due to the increased levels of pathogens in faeces (Bryan et al., 2009; Chase-Topping et al., 2008). Third, chicken pathogen data are based on fresh faeces, whereas the FIB data are from chicken litter. This causes an additional level of uncertainty which could result in over or underestimated levels of risk due to potential differential dieoff of indicator bacteria as compared to pathogens. Fourth, the analyses presented here are based on the assumption that the contamination is recent and from relatively fresh faeces. As the contamination becomes less fresh, both FIB and pathogens will decay, however they may not decay at the same rate (Anderson et al., 2005). Thus, differential persistence over time could yield results that differ from those summarized here because many pathogens are more persistent than FIB while others are less persistent. These effects could be particularly important for chicken litter and pig faecal slurries, both of which are subject to widely variable storage times and handling practices. Our future work includes investigating the impacts of differential persistence on recreational water risks. Fifth, the analyses for pig-impacted waters were based on FIB

and pathogens in pig manure. However, pig manure is commonly land-applied as slurry, yet, the literature review indicated that sufficient data were not available to conduct this analysis directly for pig manure slurry. The potential impact of differential persistence of FIB and pathogens in pig slurry relative to pig manure was not identified.
Finally, the occurrence of pathogens in recreational waters is a function of both spatial and temporal variability. Thus, the actual risks to human health present in any specific location at a particular time could vary substantially from the estimates presented here. This finding is particularly relevant to cattle, for which there are known and significant seasonal variations in shedding rates for all of the representative pathogens, as well as in rain-induced run-off that may drive manure-related pathogens into waterbodies.

The analysis presented here is an initial step toward understanding whether or not the relative risks from exposure to recreational waters impacted by gulls, chickens, pigs, and/or cattle are substantially different from those associated with human (sewage)-impacted waters. **The QMRA results are consistent with the findings from epidemiology studies. In particular, illness risk associated with non-sewage impacted beaches appears to depend on the source of contamination, i.e. some animals show relatively lower risks than others, which could account for the conflicting epidemiology findings (Till et al., 2008).**

**The principal findings from this work are that the GI illness risks associatedwith exposure to recreational waters impacted by fresh cattle faeces may not be substantially different from those impacted by human sources, whereas the risks associated with exposure to recreational waters impacted by gull, chicken, and pig wastes appear to be substantially lower than those impacted by human sources.** There are a number of important limitations to the work presented here. Nevertheless, these results suggest that careful consideration may be needed in the future for the management of recreational waters not impacted by human sources."

Rick Wilson
Senior Staff Scientist
Surfrider Foundation



949-581-0292

Officially EPA does not differentiate between sources when health criteria are surpassed. there is still a requirement for public notice. The new criteria and revised beach grant guidance docs do allow a state to conduct their own QMRA study to determine site-specific variability in health risk due to local sources, but if a state does not go through this process to determine an alternative criteria then the normal 35/104 or either of the new 30/110 or 35/130 criteria apply.

The revised beach guidance is available here: http://www2.epa.gov/beach-tech/national-beach-guidance-and-required-performance-criteria-grants

**To view the Criteria document and info on epi studies on animal sources go here:**

**http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm**

Criteria documents tab: Criteria document

Excerpt below:

***Because there have been few epidemiological studies, with mixed findings, in waters impacted by nonhuman sources and QMRA shows that risks from some animals may be comparable to humans, EPA is not developing separate national criteria for nonhuman sources. However, since some studies have site-specifically shown less risk in waters impacted by nonhuman sources, states interested in addressing the potential human health risk differences from different sources of fecal contamination on a site-specific basis should refer to section 6.2.2 of this document for suggestions on approaches.***

Click on Research tab: for study report from epi study on animal sources

conducted to support the criteria development and two related literature review.

1) Conduct QMRA (based on measurements of pathogenic organisms and indicators) to estimate illness at a freshwater beach impacted by agricultural animal sources of fecal contamination (location to be determined) (P4) Download full report above or Exec summary available here:
http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/CN-P4_FINAL.pdf

This epi study suggests cattle & pig sources of fecal bacteria present a lower health risk than human sources, but not on the order of 250 times lower that would be necessary to justify ignoring entero counts of 8,800. Chicken sources might actually be that much less harmful.

2) two literature reviews available that describe the existing knowledgebase available to characterize the relative risks of human illness from various sources of fecal contamination in recreational waters & provide a summary of information on waterborne zoonotic pathogens that come primarily from warm-blooded animals. Download above.



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #34
**Date:** April 20, 2015 8:30:55 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Mahaulepu results from 11/24/14?
**Date:**Tue, 02 Dec 2014 18:07:37 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>

What were the Ent and Cp counts for last week Mahaulepu? Mine were 14,136 stream on beach and 1850 ocean in front of Gillins. What were the ones at the cave site bridge?

Saw at Kahaluu really high Cp counts and fish present.
Is anyone feeding the fish?? Way back I discovered that fish food is made up of chicken , guts and all, and was not pasteurized, so it had tons of bacteria.

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #35
**Date:** April 20, 2015 8:31:30 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Re: *****SPAM***** Re: released results
**Date:**Wed, 03 Dec 2014 13:20:14 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Oshiro, Carlene K. <carlene.oshiro@doh.hawaii.gov>

Please check, only sample sites 1-5a for 11/24/14 are one website when I sort for "special"

On 12/3/2014 8:37 AM, Oshiro, Carlene K. wrote:

> Released results from 11/6 and 11/24, Eleven collection points each
> Good luck
>
> ---
>
> **From:** Carl Berg [mailto:cberg@pixi.com]
> **Sent:** Tuesday, December 02, 2014 3:02 PM
> **To:** Oshiro, Carlene K.
> **Subject:** *****SPAM***** Re: released results
>
> Not posted on web yet.
> can you tell me what you posted?
>
> On 12/2/2014 2:43 PM, Oshiro, Carlene K. wrote:



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #36
**Date:** April 20, 2015 8:32:26 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**please post special sampling #6-#12 on to DOH website
**Date:**Thu, 04 Dec 2014 17:52:26 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #40 Grove Farm
**Date:** April 20, 2015 8:41:46 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:** Post Waiopili Stream? Right of Entry permit?
**Date:** Thu, 04 Dec 2014 13:55:27 -1000
**From:** Carl Berg <cberg@pixi.com>
**To:** Michael Tresler <mtresler@grovefarm.com>, Arryl Kaneshiro <akaneshiro@grovefarm.com>, Marissa Sandblom <msandblom@grovefarm.com>

Aloha Mike, Arryl and Marissa,

In light of the Department of Health's repeated finding of fecal indicating bacteria at levels hundreds of times above those dictated by state law, and because of the suspicions of human contamination, I again ask that Grove Farm goes the high road and does the morally correct thing by posting the mouth of Waiopili Stream with warning signs. We have known of this contamination by animal wastes since March, yet the community has not been warned. I will provide you with the signs which are similar to the ones used by the DOH and posted on polluted waters on Oahu. They can be put on the trees on Grove Farm property at the mouth of the stream, where people who might potentially play in the waters will see them.

I also ask that Grove Farm provide Surfrider with right of entry so that we might easily sample from the mouth of the river and the beach. We are not trying to find the source of contamination and we are not doing microbial source tracking, that is DOH's responsibility. We are simply monitoring levels in state waters and at state beaches, as we do all around the island. You have had insurance papers from Surfrider since the first of November, so I hope that you can give us the right of entry permit as soon as possible.

Carl J. Berg, Ph.D.
Blue Water Task Force
Kauai Chapter - The Surfrider Foundation



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #41 Grove Farm
**Date:** April 20, 2015 8:42:35 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

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-------- Original Message --------
**Subject:** Post Waiopili Stream? Right of Entry permit?
**Date:** Thu, 11 Dec 2014 07:50:12 -1000
**From:** Carl Berg <cberg@pixi.com>
**To:** Michael Tresler <mtresler@grovefarm.com>, Arryl Kaneshiro <akaneshiro@grovefarm.com>, Marissa Sandblom <msandblom@grovefarm.com>

Aloha,
I am re-sending the email of December 4, 2014 (below) as I have not gotten a response from any of you. I will be speaking at the meeting this evening at the Koloa Community Center and will be brining the community up to date on the pollution levels in Waiopili stream and Surfrider's efforts to get the stream posted.

You may call me at 639-2968.

Carl J. Berg, Ph.D.
Blue Water Task Force
Kauai Chapter - The Surfrider Foundation

12/4/2014
Aloha Mike, Arryl and Marissa,

In light of the Department of Health's repeated finding of fecal indicating bacteria at levels hundreds of times above those dictated by state law, and because of the suspicions of human contamination, I again ask that Grove Farm goes the high road and does the morally correct thing by posting the mouth of Waiopili Stream with warning signs. We have known of this contamination by animal wastes since March, yet the community has not been warned. I will provide you with the signs which are similar to the ones used by the DOH and posted on polluted waters on Oahu. They can be put on the trees on Grove Farm property at the mouth of the stream, where people who might potentially play in the waters will see them.

I also ask that Grove Farm provide Surfrider with right of entry so that we might easily sample from the mouth of the river and the beach. We are not trying to find the source of contamination and we are not doing

microbial source tracking, that is DOH's responsibility. We are simply monitoring levels in  state waters and at state beaches, as we do all around the island.  You have had insurance papers from Surfrider since the first of November, so I hope that you can give us the right of entry permit as soon as possible.

Carl J. Berg, Ph.D.
Blue Water Task Force
Kauai Chapter - The Surfrider Foundation



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #36
**Date:** April 20, 2015 8:33:37 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

---

-------- Original Message --------
**Subject:**Ent
**Date:**Tue, 16 Dec 2014 10:59:25 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Ueunten, Gary R. <gary.ueunten@doh.hawaii.gov>, Okubo, Watson T <watson.okubo@doh.hawaii.gov>

12/15/14
Gillin's Beach  480
Stream on beach  4884

**From:** Carl Berg <cberg@pixi.com>
**Subject:** #37
**Date:** April 20, 2015 8:36:06 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

-------- Original Message --------
**Subject:**Can Surfing in Polluted Water Kill You? - MensJournal.com
**Date:**Fri, 09 Jan 2015 15:08:26 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>, Ueunten, Gary R. <gary.ueunten@doh.hawaii.gov>

-------- Original Message --------
**Subject:**Check out Can Surfing in Polluted Water Kill You? - MensJournal.com
**Date:**Fri, 9 Jan 2015 19:51:37 -0500
**From:**Rorajohn@aol.com
**To:**backonisland@gmail.com
**CC:**bridgethammerquist@hawaiiantel.net, cberg@pixi.com

F YI

Click here: Can Surfing in Polluted Water Kill You? - MensJournal.com



**From:** Carl Berg <cberg@pixi.com>
**Subject:** #38
**Date:** April 20, 2015 8:37:17 PM PDT
**To:** Daniel Snyder <Dan@tebbuttlaw.com>

1 Attachment, 28 KB

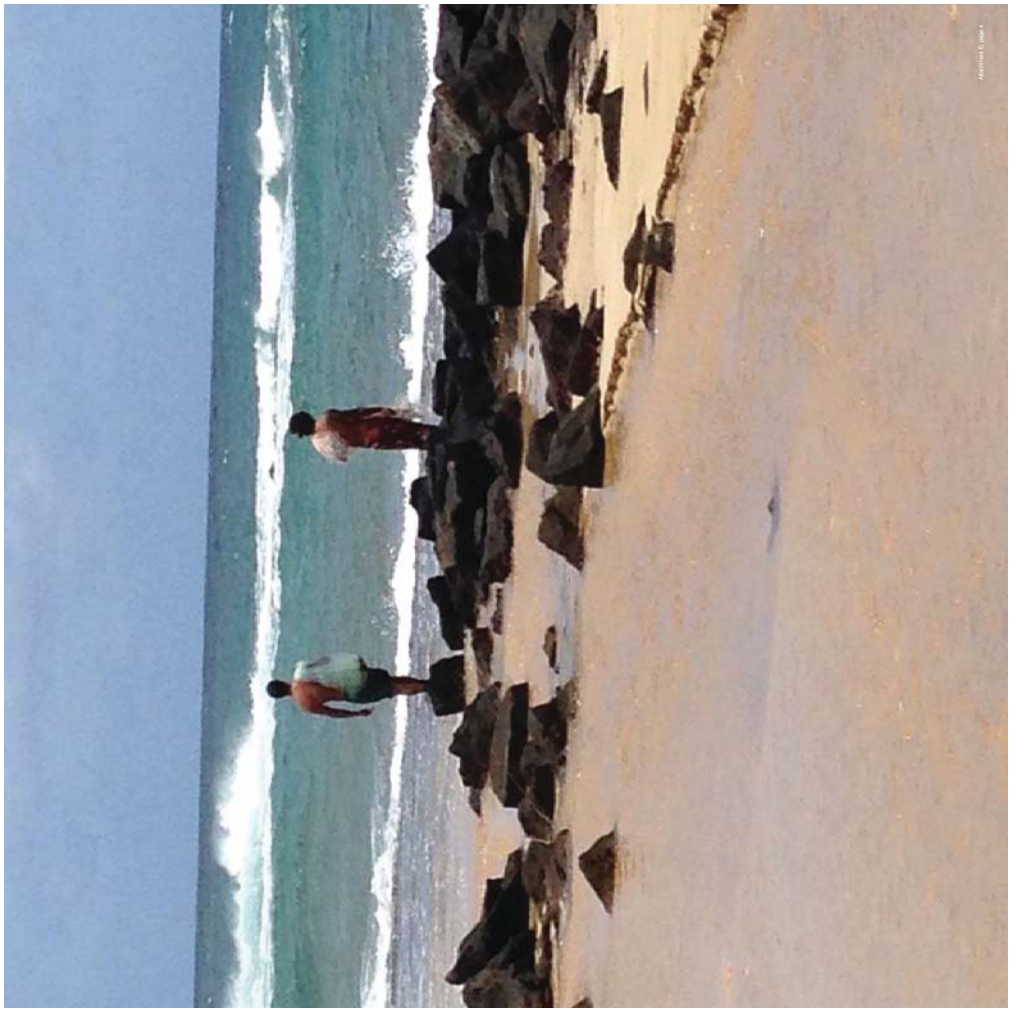
-------- Original Message --------
**Subject:**Fwd: Fwd: February BWTF results
**Date:**Sun, 15 Feb 2015 13:54:08 -1000
**From:**Carl Berg <cberg@pixi.com>
**To:**Okubo, Watson T <watson.okubo@doh.hawaii.gov>, Ueunten, Gary R. <gary.ueunten@doh.hawaii.gov>

Thanks everyone, especially those who swam out in that rough and windy surf!

Cold front came through overnight with rain and high winds. BWTF samplers went out anyway.
Because of the rains we got some really high counts in the streams and at the mouth of the streams.
Outrageously high concentrations of bacteria at Niumalu, Pakalas and Mahaulepu. Warning signs should be up.
That is what Brown Water Advisories are all about.

| Surfrider Kauai Blue Water Task Force | | | | |
|---|---|---|---|---|
| February 14, 2015 | | | | |
| Enterococcus bacterial concentration per 100 ml | | | | |
| Site | | | Single day | Winter |
| | | | results | geomean |
| Kealia | | | nt | 5.1 |
| Rock Quarry | | | nt | 19.6 |
| The Bowl | | | <10 | 172.9 |
| Moloaa | | | <10 | 4.7 |
| Kapa'a County Beach Park | | | <10 | 3.3 |
| Waiohai | | | <10 | 2.3 |
| PK's | | | <10 | 2.3 |
| Salt Pond | | | <10 | 8.1 |
| Waikoko | | | 10 | 11.7 |
| Middles | | | 10 | 72.7 |
| Kalihiwai | | | 10 | 19.6 |
| Anahola Bay | | | 20 | 5.7 |

| | | | | |
|---|---|---|---|---|
| Kaha Lani | | | 20 | 7.7 |
| Pinetrees | | | 31 | 24.7 |
| Horner's | | | 73 | 7.3 |
| Kalapaki Bay | | | 226 | 110.1 |
| Gillin's | | | 512 | 1,269.7 |
| Wainiha Stream | | | 1,483 | 428.9 |
| Waimea | | | 2,481 | 139.3 |
| Waia'kea Canal | | | 2,481 | 1,266.2 |
| Waikomo Stream | | | 3,076 | 1,598.9 |
| Hanamaulu Stream | | | 5,172 | 2,298.7 |
| Moikeha Canal | | | 5,475 | 600.6 |
| Nawiliwili Stream | | | 6,867 | 574.1 |
| Uhelekawawa Canal | | | 6,867 | 1,367.7 |
| Niumalu County Beach Park | | | 15,531 | 4,137.0 |
| Pakalas | | | 17,329 | 1,046.5 |
| Waiopili Stream | | | 24,196 | 15,346.6 |
| <10 = below detection limit of 10 | | | | |
| Single day sample should be <104 | | | | |
| Geomean of samples should be <35 | | | | |



| Location Identifier | Location Name | CP | CP Result | Ent | Ent Results | Sample No | Date | Time | Temperature | Salinity | Dissolved Oxygen | Dissolved Oxygen Saturation | pH | Turbidity | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Special | Mahaulepu 01 | | | | | GU11241401 | 11/24/14 | | | | | | | | No sample taken |
| Special | Mahaulepu 02 | < | 1 | | 207 | GU11241402 | 11/24/14 | 8:07 AM | 21.06 | 0.12 | 7.19 | 80.8 | 7.75 | 2.36 | Special Run, low flow |
| Special | Mahaulepu 4 | | 2 | | 111 | GU11241403 | 11/24/14 | 8:16 AM | 22.96 | 0.12 | 6.67 | 77.6 | 7.42 | 1.41 | Special Run, low flow |
| Special | Mahaulepu 3 | | 60 | | 42 | GU11241404 | 11/24/14 | 8:28 AM | 21.72 | 0.19 | 5.72 | 65.1 | 7.71 | 7.81 | Special Run |
| Special | Mahaulepu 5 | | 240 | | 207 | GU11241405 | 11/24/14 | 8:45 AM | 22.89 | 0.23 | 3.04 | 35.5 | 7.57 | 108 | Special Run |
| Special | Mahaulepu 5a | | 40 | | 782 | GU11241406 | 11/24/14 | 9:23 AM | 22.66 | 0.13 | 7.01 | 81.2 | 7.71 | 5.48 | Special Run |
| Special | Mahaulepu 07 | | 310 | | 178 | WK11241401 | 11/24/14 | 8:49 AM | 22 | 0.09 | 4.95 | 56.6 | 7.71 | 2.07 | Special Run. low flow |
| Special | Mahaulepu 08 | | 48 | | 478 | WK11241402 | 11/24/14 | 9:00 AM | 22.33 | 0.06 | 7.72 | 88.8 | 7.81 | 18.1 | Special Run |
| Special | Mahaulepu 09 | | 190 | | 306 | WK11241403 | 11/24/14 | 9:06 AM | 22.29 | 0.07 | 7.21 | 82.9 | 7.67 | 75.7 | Special Run |
| Special | Mahaulepu 10 | | 46 | | 1013 | WK11241404 | 11/24/14 | 9:12 AM | 22.31 | 0.13 | 7.65 | 88.2 | 7.58 | 8.78 | Special Run |
| Special | Mahaulepu 11 | | 340 | > | 2005 | WK11241405 | 11/24/14 | 9:37 AM | 22.41 | 0.09 | 7.43 | 85.6 | 7.98 | 28.5 | Special Run |
| Special | Mahaulepu 12 | | 175 | > | 2005 | WK11241406 | 11/24/14 | 9:45 AM | 22.34 | 0.09 | 7.77 | 89.3 | 8.01 | 22.1 | Special Run |
| Special | Mahaulepu 01 | | | | | GU12151401 | 12/15/14 | | | | | | | | No sample taken |
| Special | Mahaulepu 02 | | | | | GU12151402 | 12/15/14 | | | | | | | | No sample taken |
| Special | Mahaulepu 04 | < | 1 | | 429 | GU12151403 | 12/15/14 | 7:42 AM | 22.04 | 0.12 | 6.17 | 70.6 | 7.22 | 1.97 | Special Run, springwater |
| Special | Mahaulepu 03 | | | | | GU12151404 | 12/15/14 | | | | | | | | No sample taken |



| Location Identifier | Location Name | CP | CP Result | Ent | Ent Results | Sample No | Date | Time | Temperature | Salinity | Dissolved Oxygen | Dissolved Oxygen Saturation | pH | Turbidity | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Special | Mahaulepu 01 | | 2 | | 697 | GU11061401 | 11/6/14 | 8:25 AM | 22.8 | 0.13 | 7.76 | 90.3 | 7.49 | 8.15 | Special Run |
| Special | Mahaulepu 02 | < | 1 | | 429 | GU11061402 | 11/6/14 | 8:40 AM | 22.8 | 0.08 | 7.98 | 93.7 | 7.48 | 2.45 | Special Run |
| Special | Mahaulepu 03 | | 58 | | 164 | GU11061403 | 11/6/14 | 8:58 AM | 24.15 | 0.19 | 6.13 | 73.2 | 7.46 | 5.35 | Special Run |
| Special | Mahaulepu 04 | | 6 | | 344 | GU11061404 | 11/6/14 | 8:45 AM | 23.62 | 0.12 | 7.44 | 88 | 7.37 | 5.17 | Special Run, shallow, near well |
| Special | Mahaulepu 05 | | 600 | | 453 | GU11061405 | 11/6/14 | 9:07 AM | 23.7 | 0.17 | 3.77 | 44.7 | 7.28 | 580 | Special Run, murky |
| Special | Mahaulepu 05a | | 32 | | 429 | GU11061406 | 11/6/14 | 9:43 AM | 23.89 | 0.12 | 6.88 | 82 | 7.87 | 6.76 | Special Run |
| Special | Mahaulepu 07 | | 24 | | 406 | WK11061401 | 11/6/14 | 9:22 AM | 24.12 | 0.06 | 7.91 | 94.3 | 7.52 | 17 | Special Run, by Taro patch |
| Special | Mahaulepu 08 | | 900 | | 178 | WK11061402 | 11/6/14 | 9:15 AM | 24.37 | 0.11 | 2.95 | 35.4 | 7.33 | 295 | Special Run |
| Special | Mahaulepu 09 | | 90 | | 560 | WK11061403 | 11/6/14 | 9:30 AM | 24.25 | 0.07 | 7.16 | 85.4 | 7.44 | 123 | Special Run |
| Special | Mahaulepu 10 | | 30 | | 560 | WK11061404 | 11/6/14 | 9:35 AM | 23.77 | 0.13 | 6.95 | 82.4 | 7.43 | 12.3 | Special Run |
| Special | Mahaulepu 11 | | 80 | > | 2005 | WK11061405 | 11/6/14 | 9:55 AM | 23.97 | 0.1 | 7.26 | 86.3 | 7.69 | 36.5 | Special Run, guard shack |
| Special | Mahaulepu 12 | | 74 | | 2005 | WK11061406 | 11/6/14 | 10:10 AM | 23.9 | 0.1 | 7.83 | 92.9 | 7.65 | 37.6 | Special Run, cave reserve bridge |
| Special | Waita Ditch | | 8 | | 406 | GU11121403 | 11/12/14 | 9:30 AM | 23.83 | 0.07 | 7.69 | 91.3 | 8.82 | 20.2 | Special Run |
| Special | Waiopili Mouth | | 12 | | 1652 | GU11131402 | 11/13/14 | 8:30 AM | 26 | 28.33 | 6.1 | 89.4 | 8.05 | 29 | Special Run |
| Special | Waiopili Stream | | 30 | | 2005 | GU11131403 | 11/13/14 | 8:39 AM | 23.47 | 0.08 | 7.67 | 90.3 | 9.21 | 10.4 | Special Run |

| Location Identifier | Location Name | CP | CP Result | Ent | Ent Results | Sample No | Date | Time | Temperature | Salinity | Dissolved Oxygen | Dissolved Oxygen Saturation | pH | Turbidity | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Special | Mahaulepu 09 | | 210 | | 1652 | GU03031509 | 3/3/15 | 8:34 AM | 22.01 | 0.07 | 6.52 | 74.7 | 7.26 | 58.4 | Special Run |
| Special | Mahaulepu 10 | | 54 | | 591 | GU03031510 | 3/3/15 | 8:42 AM | 21.27 | 0.08 | 6.98 | 78.7 | 7.37 | 25.4 | Special Run, sediment sample collected |
| Special | Mahaulepu 11 | | 115 | | 885 | GU03031511 | 3/3/15 | 9:05 AM | 21.75 | 0.07 | 7.51 | 85.5 | 7.36 | 38.8 | Special Run |
| Special | Mahaulepu 12 | | 110 | | 1184 | GU03031512 | 3/3/15 | 9:32 AM | 21.86 | 0.07 | 7.72 | 88.1 | 7.4 | 43.7 | Special Run, bridge |



| Location Identifier | Location Name | CP | CP Result | Ent | Ent Results | Sample No | Date | Time | Temperature | Salinity | Dissolved Oxygen | Dissolved Oxygen Saturation | pH | Turbidity | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Special | Mahaulepu 05 | | 380 | | 831 | GU12151405 | 12/15/14 | 8:07 AM | 19.86 | 0.2 | 4.21 | 46.2 | 7.36 | 254 | Special Run |
| Special | Mahaulepu 05a | | 36 | | 591 | GU12151406 | 12/15/14 | 8:47 AM | 20.62 | 0.14 | 7.21 | 80.3 | 7.54 | 5.29 | Special Run |
| Special | Mahaulepu 07 | | 55 | | 831 | WK12151401 | 12/15/14 | 8:21 AM | 19.73 | 0.06 | 8.27 | 90.5 | 7.54 | 27.8 | Special Run |
| Special | Mahaulepu 08 | | 230 | | 137 | WK12151402 | 12/15/14 | 8:16 AM | 19.31 | 0.09 | 6.25 | 67.8 | 7.35 | 256 | Special Run |
| Special | Mahaulepu 09 | | 100 | | 945 | WK12151403 | 12/15/14 | 8:32 AM | 19.72 | 0.07 | 7.82 | 85.6 | 7.54 | 71.3 | Special Run |
| Special | Mahaulepu 10 | | 66 | | 478 | WK12151404 | 12/15/14 | 8:39 AM | 20.19 | 0.14 | 7.27 | 80.4 | 7.52 | 9.32 | Special Run |
| Special | Mahaulepu 11 | | 210 | > | 2005 | WK12151405 | 12/15/14 | 8:59 AM | 20.09 | 0.08 | 7.69 | 84.8 | 7.64 | 40.4 | Special Run |
| Special | Mahaulepu 12 | | 130 | | 2005 | WK12151406 | 12/15/14 | 9:12 AM | 20 | 0.08 | 7.92 | 87.2 | 7.68 | 38.8 | Special Run |
| Special | Mahaulepu 01 | | | | | GU03031501 | 3/3/15 | | | | | | | | No sample taken |
| Special | Mahaulepu 02 | | | | | GU03031502 | 3/3/15 | | | | | | | | No sample taken |
| Special | Mahaulepu 04 | | | | | GU03031503 | 3/3/15 | | | | | | | | No sample taken |
| Special | Mahaulepu 03 | | | | | GU03031504 | 3/3/15 | | | | | | | | No sample taken |
| Special | Mahaulepu 05 | | 150 | | 75 | GU03031505 | 3/3/15 | 8:09 AM | 22.4 | 0.09 | 5.28 | 61 | 7.83 | 131 | Special Run |
| Special | Mahaulepu 5a | | 46 | | 624 | GU03031506 | 3/3/15 | 8:52 AM | 22.18 | 0.07 | 7.53 | 86.5 | 7.42 | 22.8 | Special Run |
| Special | Mahaulepu 08 | | 400 | | 1091 | GU03031507 | 3/3/15 | 8:18 AM | 22.21 | 0.08 | 5.16 | 59.4 | 7.38 | 88.5 | Special Run, dead Cattle Egret |
| Special | Mahaulepu 07 | | 28 | | 591 | GU03031508 | 3/3/15 | 8:24 AM | 21.67 | 0.07 | 8 | 91 | 7.41 | 45.9 | Special Run, Waita Reservoir |

# Appendix 9

Hawai'i Dairy Farms

MAHA'ULEPU, KAUA'I

*Grass farmers with a passion for dairy.*

August 14, 2015

Ms. Jiaping Fouse
Engineering Section, Clean Water Branch
State of Hawai'i Department of Health
PO Box 3378
Honolulu, HI 96801-3378

Dear Ms. Fouse:

Hawai'i Dairy Farms (HDF) wishes to clarify its responses to the comments provided on our NOI Application (e-Permitting Submission #: 26C-DWXA-VBZ8) via a letter received from the State of Hawai'i Department of Health (DOH), Clean Water Branch (CWB), on July 16, 2015:

1. ***Please provide the Owner's street address information. CWB does not accept a P.O. Box as the Owner's street address.***

   The address of the owner has been included in our NOI application.

2. ***Clarify if any land disturbance associated with this project has commenced, including but not limited to preliminary site construction, such as installation of fence and irrigation system etc. that is mentioned in the following report: http://thegardenisland.com/news/local/hdf-faces-lawsuit/article 603afbae-150d-5463-a27a-ffb6bb7fd575.html***

   Land disturbance associated with this project as listed in the NOI has not commenced, including but not limited to, preliminary site construction such as installation of fencing and irrigation systems.

   While HDF has in good faith temporarily postponed construction activities while a voluntary Environmental Impact Statement (EIS) is being conducted, HDF reserves the right to proceed with preliminary agricultural-related site construction activities that are allowed without an NPDES permit so long as it is covered under a National Resource Conservation Service (NRCS)-reviewed Conservation Plan, which the project currently has in place. This includes and is not limited to the installation of irrigation and pivot systems and fencing.

   As such, HDF has prepared plans to begin installing fencing. As the fence posts are put into place using a ram and not through excavating and grading, an NPDES permit for this particular activity is not required. Gate posts, which will require excavation, will not be installed at this time until the NOI is approved and an NPDES General Permit for Construction Activities is granted to cover these improvements.



3. ***Clarify if any activities in the NOI have already commenced.***

   One particular activity indicated in the NOI had been partially completed but has been halted since the beginning of 2014. Some drinking water trough facilities, along with the accompanying water piping, were installed. HDF installed these facilities, following consultation with DOH in early 2014, on NPDES permitting requirements. Notes from that meeting indicated that the watering facilities, intended for agricultural and livestock consumption only, did not require NPDES permitting and would be covered under HDF's Conservation Plan, reviewed by NRCS. Some troughs and pipes were subsequently installed and the trenches were backfilled and the areas stabilized.

   DOH has since clarified that the watering facilities should be covered under the NPDES General Permit. The remaining troughs to be installed have been listed in this NOI application.

4. ***Clarify if the county grading permit exemption ~~Figure 10~~ [now Figure 11A] applies to all activities provided in the NOI.***

   The county grading permit exemption applies to all the activities provided in the NOI; the NRCS-reviewed and West Kaua'i Soil and Water Conservation District-approved Conservation Plan on which the exemption is based covers in general terms all those activities.

5. ***The Storm Water Pollution Prevention Plan (SWPPP) does not meet the requirements in Hawaii Administrative Rules (HAR), Chapter 11-55, Appendix C (NPDES General Permit for Construction Storm Water). Please revise your SWPPP by ensuring all of the required information from Section 7 of HAR, Chapter 11-55, Appendix C, is included. Please submit the revised SWPPP.***

   ***The following information is missing in your SWPPP as required by Section 7 of Appendix C.***

   a. ***The intended sequence and estimated dates of construction activities information as required by Section 7.2.5.***

      The general contractor, when selected, will amend or update this section of the SWPPP as required with specific dates prior to the start of construction. The following sequence and estimated dates of general construction phases or activities are estimated:

      1. Notice to Proceed — 6/1/2016
      2. Mobilization and Installation of Stormwater Controls — 6/2/2016
      3. Clearing, grubbing, grading, and site preparation and construction
         a. Duration = 6 months — 6/15/2016
      4. Temporary Stabilization of Required Areas — As Needed
      5. Final Stabilization — 1/1/2017
      6. Removal of Temporary Stormwater Controls — 6/1/2017
      7. Removal of Construction Equipment and Vehicles — 6/1/2017

   b. ***A map or drawing showing the approximate slopes before and after major grading activities and drainage patterns as required by Section 7.2.6.1.***
      Figures depicting pre-construction, during construction, and post-construction topography for the dairy facility are included. Approximate slopes are added to the figures.

Figures depicting pre-construction topography for the extents of the entire farm are also included. Construction of the roadways, raceways, fencing, irrigation systems, water infrastructure and watering troughs, will not significantly impact the existing topography. Construction plans will be provided to include the farm improvements beyond the extent of the facility at a later date when completed, and will provide further detail.

Additionally, the NOI application does not cover grading and excavation within pasture, field, and crop areas, as these activities are exempt from NPDES permitting requirements in conjunction with an NRCS-reviewed Conservation Plan and if the improvement is for the purpose of growing crops.

The project will not be phased. However, construction will commence first on the dairy facility while the overall farm improvements will follow.

c. ***A map or drawing showing the locations of the project site's construction entrance/exit(s), areas used for storage and for disposal of wash water as required by Section 7.2.6.1.***

Figures 6A and 6B have been revised to show the project site's construction entrance/exit and area used for storage and for disposal of wash water as required.

d. ***Locations of any contaminated soil or contaminated soil stockpiles as required by Section 7 .2.6.1.***

No contaminated soils or soil stockpiles have been identified on the project site at this time. No contaminated soils are anticipated at this time.

e. ***Locations of any crossings of state waters as required by Section 7.2.6.1.***

Crossings of Maha'ulepu Ditch are indicated on Figure 6B. Crossings will be constructed per applicable NRCS conservation practice standards.

f. ***Locations of all potential pollutant-generating activities identified in Section 7.2.7.***

Locations of potential pollutant-generating activities will be determined by the general contractor, once selected. Tentative locations of specific activities that may generate pollutants, from both stormwater and non-stormwater sources, are identified on Figures 5 and 6, A and B. These activities thus far include:

1. Soil erosion from disturbed areas **[from activities identified on Figures 5 and 6]**
2. Soil erosion from soil stockpiles **[from activities identified on Figures 5 and 6]**
3. Storage of construction debris, green waste, and general litter **[primarily at facility]**
4. Application of fertilizers **[primarily on farm areas disturbed and to be planted]**
5. Application of pesticides **[primarily on farm areas disturbed and to be planted]**
6. Application of paints, solvents, etc. **[primarily at facility]**
7. Operation and Maintenance of equipment such as oils, fuel, and hydraulic fluid **[offsite]**
8. Asphalt paving operations **[primarily at facility]**
9. Concrete operations **[primarily at facility]**
10. Storage and/or disposal of hazardous materials/waste **[primarily at facility]**
11. Storage of metals **[primarily at facility]**



12. Application of dust control water **[primarily at facility]**
13. Application of concrete truck water **[primarily at facility]**
14. Application of construction exit wash waters **[primarily at entry to farm on Figure 6]**

g. ***In your SWPPP Item No.2.5, you identified the project site non-storm water sources. Please see the bullet list below. However, Section 7.2.8 requires you to provide information on the design, installation, maintenance, and location(s) of the control measures to prevent discharges of your identified non-storm water. Please provide this information.***

- *Discharges from emergency fire-fighting activities;*
- *Landscape irrigation;*
- *Water used to wash vehicles and equipment;*
- *Water used to control dust;*
- *Potable water including uncontaminated water line flushings;*
- *Routine external building wash down;*
- *Pavement wash waters;*
- *Uncontaminated air conditioning or compressor condensate;*
- *Uncontaminated, non-turbid discharges of ground water or spring water;*
- *Foundation or footing drains; and*
- *Construction dewatering water.*

Discharges from the following non-stormwater sources and the information on design, installation, maintenance, and, if applicable, tentative location(s), of the best management practices (BMPs) used to control and prevent discharges of potential pollution are described in Section 5 of the SWPPP.

Additional design and installation of the BMPs are further described below:

| | |
|---|---|
| *Discharges from emergency fire-fighting activities;* | While unlikely to be present at the site, contain liquid waste from emergency firefighting activities (should the need arise) and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Landscape irrigation;* | Landscape irrigation will be minimized and controlled to prevent excess watering and excess water runoff. Sophisticated irrigation controllers and the installed pivot system are designed to apply irrigation at levels to prevent erosion and runoff of water and pollutants. Shut off water to broken water lines or valves to prevent excess flow, and pump or bail water from trenches excavated to repair water lines. |

| | |
|---|---|
| *Water used to wash vehicles and equipment;* | Generally, vehicular wash down will occur offsite. Equipment will be washed and runoff from the wash down area will be controlled using a sediment trap or basin. Soaps must be phosphate free and biodegradable. Cleaning of equipment with soaps should not occur on site unless wastes are fully contained.<br><br>If a vehicle must be cleaned on site, locate the wash area away from watercourses and utilize a wash area that is paved and bermed, collect the wash water, and dispose of properly and not to a watercourse. Use only when necessary. Use as little water as possible and discharge wash racks to sanitary sewer. |
| *Water used to control dust;* | Dust control waters will be applied at rates that prevent excess watering and excess water runoff. |
| *Potable water including uncontaminated water line flushings;* | Flushings of water lines will not be disposed of directly into storm drains, open ditches, or streams. Re-use for irrigation where feasible. |
| *Routine external building wash down;* | External building wash down water will not be disposed of directly into storm drains, open ditches, or streams prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Pavement wash waters;* | Minimize waste material by collecting waste by dry methods. Pavement wash water shall be disposed of in designated facilities, located a minimum of 50 feet away from watercourses. Locate washout areas into a temporary pit or bermed area. Dispose of concrete in a designated area and allow concrete to set, so it can be broken up and disposed. Line the washout facility. |
| *Uncontaminated air conditioning or compressor condensate;* | Contain liquid waste and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |



| | |
|---|---|
| *Uncontaminated, non-turbid discharges of ground water or spring water;* | Contain liquid waste and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Foundation or footing drains; and* | Contain liquid waste and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Construction dewatering water.* | Waters may be run through a sediment trap or dewatering filter before discharge. The discharge point shall be protected from erosion from the discharge of dewatering effluent. |

***h. Please provide the pollution prevention procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where spills and leaks etc. occur as required by Section 7.2.11.1.***

Spills will be cleaned up immediately or as soon as reasonably-able depending on the type of spill (if the spill is hazardous or significant such that it cannot be controlled by personnel in the immediate vicinity). Notification and reporting will be as follows:

1. Minor Spills (such as small quantities of oil, gasoline, paint, etc.)
   a. Contain the spread of the spill
   b. Recover the spilled materials using absorbent materials
   c. Clean the contaminated area and properly dispose of contaminated materials

2. Semi-Significant Spills
   a. Contain the spread of the spill
   b. Notify the project foreman immediately
   c. If the spill occurs on paved or impervious area, clean up using "dry" methods such as absorbent materials. Contain the spill by encircling it with absorbent materials.
   d. If the spill occurs on dirt areas, contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soils.
   e. If the spill occurs during rain, cover the spill with tarps to prevent contaminating runoff.

3. Significant / Hazardous Spills
   a. Notify the local emergency response (Dial 911). Report significant spills to the fire department.

b. Contractor to notify the proper County of Kaua'i officials, including but not limited to the public works department and building department. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
c. Notify the State of Hawai'i, Department of Health, Hazard Evaluation and Emergency Response (HEER) Office for spills of State reportable quantities:
   i. A listed substance designated under Hawai'i Administrative Rules (HAR) section 11-451-5(b), in quantities equal to or exceeding the reportable quantity criteria in section 11-451-6(b) in any 24-hour period; or
   ii. An unlisted substance designated under section 11-451-5(c), in quantities equal to or exceeding the reportable quantity criteria in section 11-451-6(c) in any 24-hour period.
d. Notify the National Response Center at (800) 424-8802 for spills of Federal reportable quantities, in conformance with the requirements in 40 CFR Parts 110, 119, and 302.
e. Notification shall be made first by telephone, and followed up with a written report.
f. The services of a Hazmat team should be obtained immediately, and construction personnel should not attempt clean up until the appropriate and qualified personnel have arrived at the job site.

Please contact Ryan Char, PE, LEED AP, Group 70 International, if you have any questions, at rchar@group70int.com and 808-441-2174.

This letter is also made part of the online submission and resubmittal of our NOI Application (e-Permitting Submission #: 26C-DWXA-VBZ8) through the e-Permitting Portal website.

Sincerely,

Jim Garmatz
Farm Manager

# Appendix 10

Mahaulepu Rd
Image © 2016 DigitalGlobe
© 2016 Google
Google earth
2004
Imagery Date: 12/16/2013 21°54'29.40" N 159°25'00.35" W elev 69 ft eye alt 7349 ft

8/15/2014
2003
2014
Image © 2016 DigitalGlobe
Mahaulepu Rd
Google earth
2004
Imagery Date: 8/15/2014 21°54'17.72" N 159°25'12.36" W elev 66 ft eye alt 4370 ft

# Appendix 11

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File: EPO 15-005

RECEIVED
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OFC. OF ENVIRONMENTA
QUALITY CONTROL

January 9, 2015

FILE COPY
JAN 23 2015

TO: JESSICA WOOLEY, Director
Office of Environmental Quality Control, Department of Health

FROM: VIRGINIA PRESSLER, M.D., Director
Department of Health

Virginia Pressler

SUBJECT: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

The Department of Health has received notice from Hawaii Dairy Farms indicating that the proposed project may have significant impacts and therefore offering voluntarily to prepare an environmental impact statement pursuant to Chapter 343, Hawai'i Revised Statutes.

Please publish the enclosed environmental impact statement preparation notice (EISPN) in the next available issue of The Environmental Notice. In addition, please find the enclosed publication form, the EISPN, and compact disc containing the required electronic files for the EISPN and publication form.

Feel free to contact Laura McIntyre at (808) 586-4337 if you have any questions regarding this matter.

Thank you.

copy: Hawai'i Dairy Farms, LLC
Jeff Overton, Group 70 International, Inc.

## APPLICANT ACTIONS
## SECTION 343-5(C), HRS
## PUBLICATION FORM (JANUARY 2013 REVISION)

**Project Name:** Hawai'i Dairy Farms

**Island:** Kaua'i

**District:** Poipu

**TMK:** (4) 2-9-003:001 (portion); 006 (portion)
(4) 2-9-001:001 (portion)

**Permits:** USDA NRCS Conservation Plan; DOH National Pollutant Discharge Elimination System Construction Stormwater General Permit; DOH Review of Animal Feeding Operation/Large Concentrated Animal Feeding Operation; DLNR Chapter 6E-42 Historic Preservation Review; County of Kaua'i Building Permit

**Approving Agency:** State of Hawai'i, Department of Health
1250 Punchbowl Street, Honolulu, HI 96813
Virginia Pressler, M.D., Director
Laura McIntyre, Environmental Planning Office (808) 586-4337

**Applicant:** Hawai'i Dairy Farms, LLC.
P.O. Box 1690
Koloa, Hawai'i 96756-1690

**Consultant:** Group 70 International, Inc.
925 Bethel Street, 5th Floor, Honolulu, HI 96813
Jeff Overton, Principal Planner (808) 523-5866
HDF@Group70int.com

**Status (check one only):**

__DEA-AFNSI — Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.

__FEA-FONSI — Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__FEA-EISPN — Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.

_X_ Act 172-12 EISPN — Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.

__DEIS — The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__FEIS — The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.

__ Section 11-200-23 Determination

The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.

__Section 11-200-27 Determination

The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

__Withdrawal (explain)

**Summary** (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page)**:**

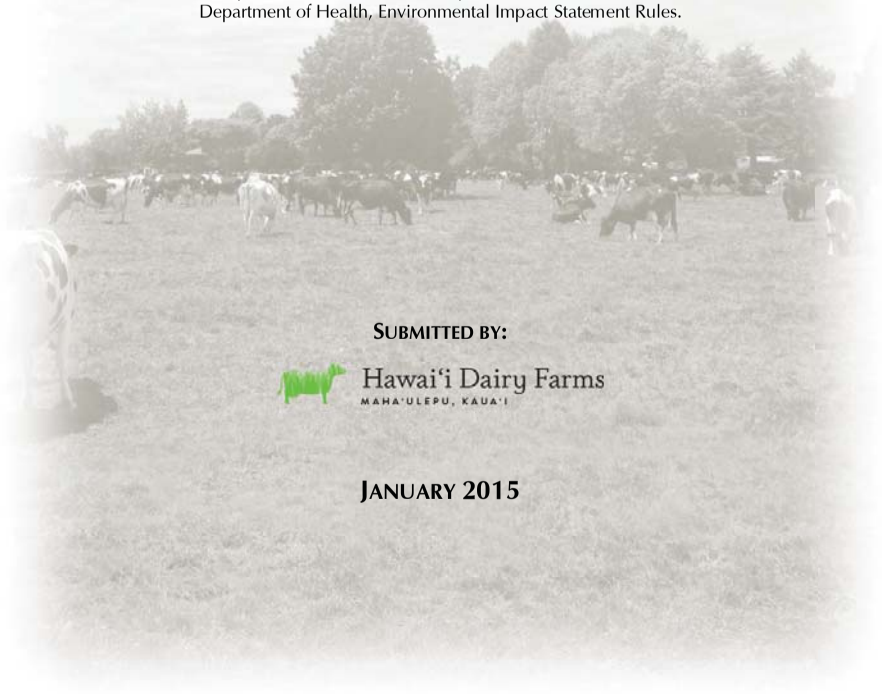
Establish and operate the first zero-discharge, grass-fed dairy in Hawai'i, utilizing a sustainable, pasture-based rotational grazing system on an approximately 578-acre farm at Maha'ulepu, island of Kaua'i. The pasture-based dairy focuses on growing grass as a local food source for cows' health and quality milk production.

Hawai'i Dairy Farms, LLC (HDF) will construct commercial dairy facilities, including barns, milking parlor, cow walkways, farm roads, waste management ponds, livestock water distribution system, pasture irrigation pivots, storage tanks, operations building and office. Limited support infrastructure will include water supply, individual wastewater system (utilizing a septic system), electrical power, and communications. Buildings roofs will be equipped with photovoltaic panels for solar power generation. Approximately 118 fenced paddocks (about 4.5 - 5.0 acres each) will be established and monitored for effective grass growth, nutrient application and cow grazing. HDF will establish the herd of dairy cows over several years guided by the results of the nutrient analysis, potentially reaching full-scale capacity of 2,000 cows. At full-scale operations, the dairy could produce up to 3.7 million gallons of fresh milk annually for Hawai'i's families, which is double the current volume produced in the state.

# HAWAI'I DAIRY FARMS

## ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

This environmental document is prepared pursuant to Hawai'i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.



**SUBMITTED BY:**

Hawai'i Dairy Farms
MAHA'ULEPU, KAUA'I

**JANUARY 2015**

# HAWAI'I DAIRY FARMS

## ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

This environmental document is prepared pursuant to Hawai'i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

**SUBMITTED BY:**

Hawai'i Dairy Farms
MAHA'ULEPU, KAUA'I

**PREPARED BY:**

GROUP 70 INTERNATIONAL

Architecture • Planning & Environmental Services • Interior Design • Civil Engineering
925 Bethel Street, 5th Floor, Honolulu, HI 96813 (808) 523-5866

**JANUARY 2015**



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# 1.0 INTRODUCTION

This Environmental Impact Statement Preparation Notice (EISPN) was prepared in accordance with Hawai'i Administrative Rules Title 11 Chapter 200, implementing Hawai'i Revised Statutes (HRS) Chapter 343. An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to disclose the potential environmental impacts and mitigation measures associated with agricultural operations at Hawai'i Dairy Farms (HDF) at Māhā'ulepū, Kaua'i. The purpose of this EISPN is to inform interested parties of the project and to seek agency and public input on issues and resources of concern. Input relevant to the Proposed Action received in response to this EISPN will help to define the evaluation conducted in the Environmental Impact Statement.

## 1.1 PROPOSED PROJECT SUMMARY

| | |
|---|---|
| **Type of Report:** | Environmental Impact Statement Preparation Notice |
| **Project Name:** | Hawai'i Dairy Farms |
| **EIS Trigger:** | Voluntary |
| **Applicant:** | Hawai'i Dairy Farms, LLC<br>P.O. Box 1690<br>Kōloa, Hawai'i 96756-1690 |
| **Planning Consultant:** | Group 70 International, Inc.<br>925 Bethel Street, Fifth Floor<br>Honolulu, Hawai'i 96813<br>Jeff Overton, Principal Planner<br>Telephone: 808-523-5866<br>Email: HDF@Group70int.com |
| **Approving Agency:** | State of Hawai'i Department of Health<br>Contact: Laura McIntyre, Environmental Planning Office<br>Telephone: 808-586-4337<br>Email: Laura.McIntyre@doh.hawaii.gov |
| **Project Location:** | Māhā'ulepū Road<br>Kaua'i, Hawai'i *(Figure 1-1)* |
| **Tax Map Key:** | (4) 2-9-003: 001 portion and 006 portion<br>(4) 2-9-001: 001 portion (*Figure 1-2*) |
| **Land Owner:** | Māhā'ulepū Farms, LLC<br>3-1850 Kaumuali'i Highway<br>Līhu'e, Hawai'i 96766 |

| | |
|---|---|
| **Project Area:** | 578 acres |
| **Kaua'i County Zoning:** | Agriculture |
| **State Land Use District:** | Agricultural District |
| **Proposed Use:** | Agriculture (Dairy) |
| **County of Kaua'i General Plan:** | Kōloa-Po'ipū-Kalāheo Planning District |
| **Special Management Area:** | No |
| **Flood Zone Designation:** | Zone X |
| **Required Reviews/Permits:** | County of Kaua'i<br>- Building Permit<br>State of Hawai'i Department of Health<br>- Animal Feeding Operation/ Large Concentrated Animal Feeding Operation/ Waste Management Plan<br>- National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit<br>- Milk Producer Permit<br>State of Hawai'i Department of Land and Natural Resources, State Historic Preservation Division<br>- Hawai'i Revised Statutes, Chapter 6E - Historic Preservation Review<br>U.S. Department of Agriculture<br>- Natural Resources Conservation Service Conservation Plan |
| **Proposed Action:** | Establish and operate the first zero-discharge, grass-fed dairy in Hawai'i, utilizing a sustainable, pasture-based rotational grazing system. Produce fresh, locally-available nutritious milk for Hawai'i families. |





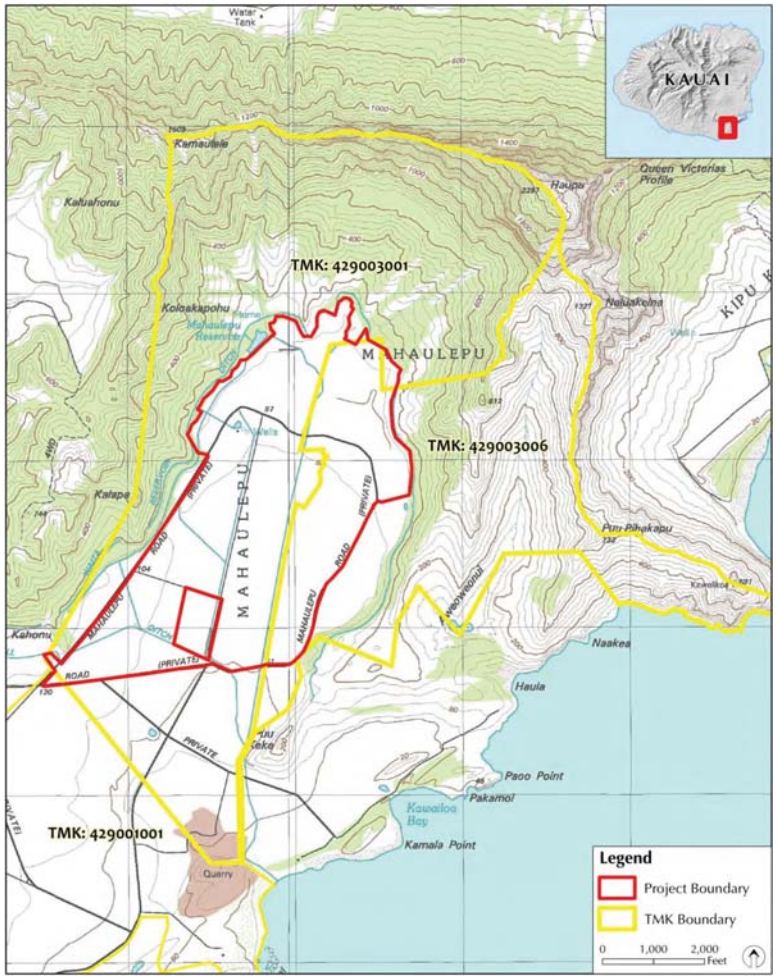


**Figure 1.1 Project Location Map**

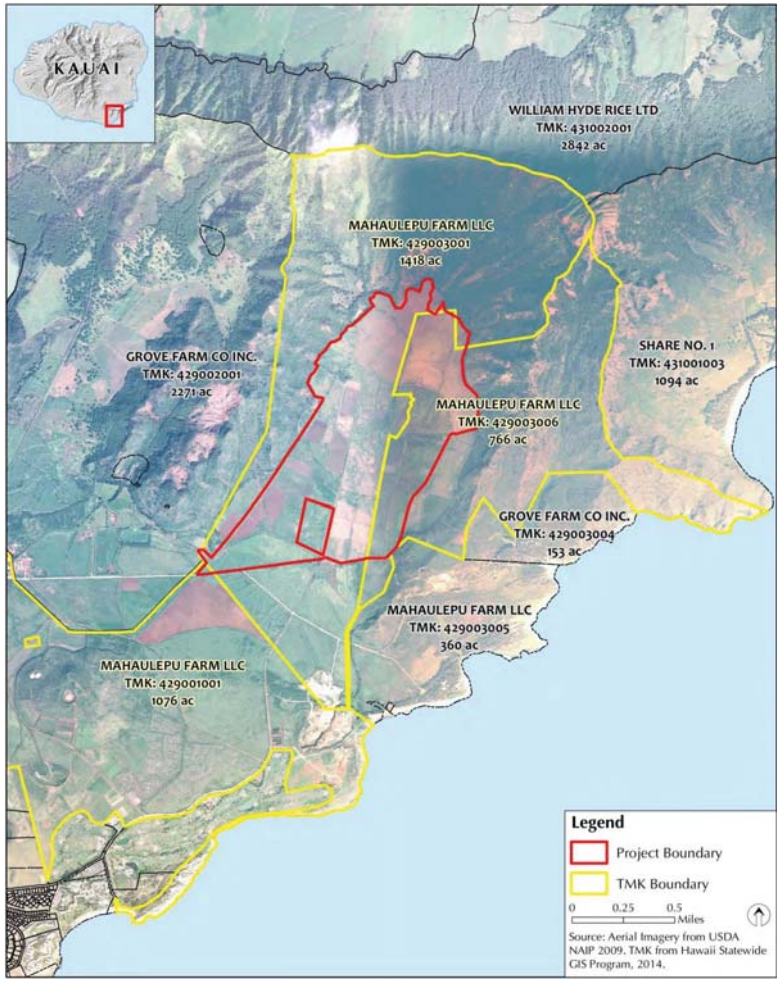


**Figure 1.2** **Tax Map Key** (2-9-001:001-portion; 2-9-003:001-portion & 006-portion)





# 2.0 PROJECT DESCRIPTION

This section presents the purpose and need for HDF, background, summary project description and alternatives considered.

## 2.1 PURPOSE AND NEED FOR THE ACTION

Dairies have been an important component of the Hawai'i agricultural industry for over a century. Until 1984, 100 percent of Hawai'i's milk was produced by local dairies. By 2008, costs for importing feed and other operational expenses had skyrocketed, causing nearly all of the local dairies to close. The two remaining dairies located on the Island of Hawai'i only supply about 9 percent of the state's fresh milk demand, with the majority of fresh milk imported. With a growing statewide awareness of the need to increase food security for island communities, the establishment of sustainable dairies will be vital to Hawai'i's future.

Kaua'i landowner Māhā'ulepū Farms, LLC, a subsidiary of Grove Farm, recognized the void and began to explore ways to restart the island's dairy industry. In partnership with various entities, including Ulupono Initiative, a pasture-based system with monitored nutrient input and output was identified as a clean, cost-effective and sustainable method. A partnership of landowners and supporters throughout the state worked to determine optimal sites for Hawai'i's first grass-fed dairy. Kaua'i was found to have sufficient irrigation water quantity combined with suitable soils supportive of nutritious grass types to minimize reliance on imported feed. Māhā'ulepū specifically provides required conditions for a pasture-based dairy, including minimally sloped terrain with few stones for safe navigation by cows, and agricultural-zoned land available for 20 years or more of sufficient acreage to support an economically viable dairy. Ulupono Initiative formed Hawai'i Dairy Farms, LLC with an investment of $17.5 million and leased Māhā'ulepū land from Māhā'ulepū Farms, LLC to create the first grass-based dairy in Hawai'i.

## 2.2 BACKGROUND

HDF occupies agricultural land in Māhā'ulepū Valley on the island of Kaua'i's south shore (*Figure 1.1 Project Location Map*). The 578-acre site consists of portions of three parcels leased from Grove Farm (*Figure 1.2 Tax Map Key*). Māhā'ulepū Valley lies on the leeward side of the Hā'upu mountain ridge, a prominent feature of southern Kaua'i, where Mt. Hā'upu forms the highest point at 2,297-feet elevation in the back of the valley.

The area has been used for agricultural operations for the past 200 years, notably part of the Kōloa Plantation for cultivation of sugar cane. Māhā'ulepū has a long history of agricultural use, as it was one of the first places in the island chain where sugar cane was commercially grown. As early as 1820, sugar cane was milled in Māhā'ulepū for local use; commercial-scale operation was established in 1878 by Kōloa Plantation. Cultivation continued under various entities until 1996 when the Kōloa Sugar Mill closed. Ranching began in the valley in 1986, and taro cultivation was introduced on an adjacent parcel in 2007.

The nearest populated area to Māhā'ulepū Valley is the Kōloa town community approximately 2.0 miles to the west. Kōloa town has its roots firmly tied to the agricultural history of the region. The Po'ipū Beach resort area, located approximately 2.5 miles to the south, began with oceanfront resort hotel development in the 1960s. During the 1970s and 1980s, agricultural lands in the Po'ipū area were reclassified from State Agricultural District to Urban District, and rezoned by the County as a resort area. Significant expansion along this coastline occurred from 1980 to present, with active development of hotels, timeshare condominiums, single-family resort residences, golf courses and commercial centers.

Community concern over loss of agricultural land for another proposed resort on the last stretch of undeveloped Māhā'ulepū coastline prompted protection of 1,533 acres of agricultural lands under the Important Agricultural Lands (IAL) provision of the Hawai'i State Constitution (Article XI, Section 3). This constitutional requirement is for conservation and protection of agricultural lands, promotion of diversified agriculture, and increased agricultural self-sufficiency. The IAL designation assures available agriculturally suitable lands to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. The designation process determined the land meets physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai'i. In 2011, approximately 1,533 acres of land in Māhā'ulepū were classified by the State Land Use Commission as IAL. This IAL area includes the 578 acres leased by HDF.

## 2.3 PROPOSED ACTION

The Proposed Action will establish and operate the first zero-discharge, grass-fed dairy in Hawai'i, utilizing a sustainable, pasture-based rotational grazing system to produce fresh, locally available nutritious milk for Hawai'i families. The ultimate herd size will be determined through tracking nutrient uptake and output by cows; the HDF site in Māhā'ulepū Valley on the island of Kaua'i is projected to be capable of supporting up to 2,000 productive dairy cows at full-scale operations. The pasture-based rotational grazing method focuses on growing grass as a local food source appropriate for cow health and quality milk production. The method developed by dairy experts is designed to be zero-point source discharge, meaning 100 percent of the cows' manure will remain on the farm as fertilizer for the pasture grass.

At full-scale operations, the dairy would produce up to 3.7 million gallons annually, which is double the current volume of milk produced in Hawai'i. The type of milking cow to be used is smaller in stature than the dairy cow commonly used across North America, and is known as a "Kiwi cross". A critical element of the sustainable dairy operation is propagation of the primary food source for the dairy cows. HDF will grow Kikuyu and Kikuyu-Guinea grass throughout the pastures. The grasses are established across Kaua'i, and provide a nutritious food source for dairy cows. Field trials of the Kikuyu varieties are underway at the site with assessment of grass yields being monitoring by horticultural experts. Once cows are on the site, the grass will receive fertilizer applications using greatly diluted nutrient waters from the dairy's waste settling pond. The State of Hawai'i Department of Health (DOH) regulates waste management utilizing U.S. Environmental Protection Agency (EPA) requirements. In September and October 2014, a Waste Management Plan for HDF's Animal Feeding Operation (AFO) - up to 699 cows - was reviewed by DOH. Dairy operations with more than 700 cows require additional regulatory review by DOH of an updated Wastewater Management Plan for a Large Concentrated Animal Feeding Operation (CAFO).





HDF will construct facilities for the commercial dairy operation, including barn and milking parlor, cow walkways and farm roads, effluent settling and storage ponds, livestock water distribution system, storage tanks, operations buildings and office. Limited support infrastructure will include water supply, individual wastewater system (utilizing a septic system), electrical power, and communications. Buildings roofs will be equipped with photovoltaic panels for solar power generation.

HDF will apply modern best practices for pasture dairy operations utilizing precision agricultural technology to monitor grass productivity, health of the cows, and effluent management. Approximately 118 fenced paddocks (about 4.5 - 5.0 acres each) will be monitored for effective grass growth, nutrient application and cow grazing. HDF will establish the herd of dairy cows over several years guided by the results of the nutrient analysis, potentially reaching full-scale capacity of 2,000 cows for the farm. Heifers, non-milking cows, calves and bulls will be moved off-site to pastures of local ranching partners for herd management.

## 2.4 ALTERNATIVES

The Draft EIS will evaluate alternatives that meet the project's Purpose and Need, and which consider changes to dairy operation and location. Three alternatives to the proposed action will be considered in the Draft EIS, as outlined below. The potential environmental impacts of each alternative will be addressed in the Draft EIS, along with a comparison of alternatives.

No-Action Alternative. The No-Action Alternative would continue future use of agricultural property without the establishment of the sustainable grass-fed dairy operations. With the Important Agricultural Lands designation, this land is expected to be used for either grazing or cultivation. Portions of the property would be available for cattle and sheep grazing, or other more intensive agricultural uses.

Confined Dairy Operation Alternative. The alternative for a Confined Dairy Operation at the Māhā'ulepū location would require additional manure management as nutrients would not be returned to pastures. Additional grain and forages would be imported to sustain dairy cows. The Confined Dairy Operation Alternative would utilize large barns to house and feed the cows. Animals would be confined within the barns and milking parlor; no pasture area would be required. No manure would be deposited on pasture grasses and grass would not be utilized as a locally available feed source. The quantity of effluent to be managed would be increased with cows confined in the barn, and additional water would be required to adequately wash down the barn floors to maintain animal health. Resultant increased quantities of effluent would require disposal, as diluted effluent nutrients would not be needed to grow pasture grasses.

Alternative Dairy Location. An alternative Kaua'i location using a site other than Māhā'ulepū would be considered under this alternative. The grass-fed dairy operation requires 500 to 600 acres of usable, gently-sloped land on agricultural zoned lands available for long-term lease. The micro-climate requires soil conditions favorable for nutrient absorption with access to a reasonable priced irrigation water source, to sustain nutritious grass pastures. Other required elements would include roadway access, potable water and irrigation water sources.

## 2.5 PROJECT SCHEDULE

Following EIS review, HDF will construct the agricultural buildings and support infrastructure for the grass-fed sustainable dairy operations. It is anticipated that facility development will take approximately 10 months to complete. Initial operations are permitted to begin with up to 699 cows. Expansion of the herd would occur over a period of several years with sufficient grass-food source and nutrient utilization on site. Dairy operations with more than 700 cows require additional regulatory review.

## 2.6 REQUIRED REVIEWS, PERMITS AND APPROVALS

Agricultural facilities and operations of HDF will require reviews and approvals from federal, state and county agencies and entities. Anticipated permits and approvals are listed in this section, organized by the regulatory agency. Compliance with government plans and policies is noted within Section 5.0 of this EISPN, and will be evaluated in the Draft EIS.

County of Kaua'i –

- Department of Public Works:
  Building Permit (issued November 2014)
  Grubbing and Grading (agricultural exemption approved by County March 2014)

State of Hawai'i –

- Department of Health:
  Wastewater Branch
  - Animal Feeding Operation/Waste Management Plan (review completed Oct. 2014)
  - Large Concentrated Animal Feeding Operation/Waste Management Plan
  - Individual Wastewater System

  Clean Water Branch
  - National Pollution Discharge Elimination System (NPDES)
    Construction Stormwater General Permit

  Sanitation Branch
  - Compliance with Rules for Livestock Facilities and Milk Industry
  - Milk Producer Permit
- Department of Agriculture:
  - Compliance with Rules for Livestock Facilities
- Department of Land and Natural Resources, State Historic Preservation Division:
  - Hawai'i Revised Statutes, Chapter 6E - Historic Preservation Review

U.S. Department of Agriculture

- Natural Resources Conservation Service:
  - Agricultural Conservation Plan (approved)





# 3.0 ENVIRONMENTAL SETTING

The Draft EIS will identify the existing environmental conditions at the site of the HDF (Proposed Action). Preliminary information about relevant environmental resource areas is summarized below.

## 3.1 NATURAL ENVIRONMENT CONDITIONS

### 3.1.1 CLIMATE

The Kōloa area is generally known for its mild conditions. The average annual rainfall in Māhā'ulepū is 50 inches at the dairy facility, and temperatures range anywhere from 72-86°F in the summer months, and 64-80°F in the winter.

### 3.1.2 NATURAL HAZARDS

Flood Hazard: According to the Flood Insurance Rate Map prepared by the Federal Emergency Management Agency, the project is located in Zone X. Zone X includes areas of low flood risk which do not require federal flood insurance.

Tsunami: HDF lies outside the tsunami evacuation zone.

Seismic Hazard: The Kaua'i and Ni'ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands. The earthquake risk has been evaluated as minimal. Appropriate building codes will be adhered to in construction of dairy facilities; these will be documented in the Draft EIS.

Hurricane: The Central North Pacific hurricane season is June through November. Hurricanes are considered to be relatively rare events in the Hawaiian Islands. Records show that strong wind storms have stuck all major Hawaiian Islands. The first officially recognized hurricane in Hawaiian waters was Hurricane Hiki in August 1950. Since that time, five hurricanes have caused serious damage in Hawai'i: Nina (1957), Dot (1959), Iwa (1982), Estelle (1986), and Iniki (1992).

Operational plans for safekeeping of the dairy's livestock and property during natural hazard events will be identified in the Draft EIS.

### 3.1.3 TERRESTRIAL ENVIRONMENT

Geology and Soils: The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) survey data shows the project area consisting of various soil types. The most abundant soil types are Kalihi clay and Ka'ena clay, brown variant, 1 to 6 percent slopes. The USDA Soil Conservation Service Soil Survey from 1972 describes the Kalihi series as poorly drained soils that developed in alluvium derived from basic igneous rock. Average annual soil temperature is 74°F. The Ka'ena series is a very deep soil that also drains poorly, and is primarily

located on alluvial fans and talus slopes on both O'ahu and Kaua'i. Elevations of this soil series vary anywhere from 50 to 150 feet. Existing soil conditions will be evaluated in the Draft EIS.

Topography: The project site is situated in the valley of Māhā'ulepū ahupua'a near the southern coast of Kaua'i. The Māhā'ulepū valley is located on the leeward side of the Hā'upu mountain ridge. The valley is flanked by ridge lines on both sides. Mt. Hā'upu is the highest point on the ridgeline at the back of the valley with an elevation of 2,297 feet. The HDF site upper elevation is about 150 feet. The parcel is gradually sloped to the 60-foot elevation at Māhā'ulepū Road at the makai boundary. No changes to topography will occur with the HDF operation, as will be presented in the Draft EIS.

Surface Water Resources: A system of 'auwai (agricultural ditch), reservoirs and irrigation pipes and pumps were developed to irrigate fields in the area, initially for commercial sugar cane from 1878 to 1996, followed by cattle ranching and taro cultivation. An interior parcel supports a kalo lo'i (taro field) leased by a farmer. Several ditches exist between these north-south running ditches to drain the fields. Mill Ditch forms the southern boundary of the parcel, which flows into Waiopili Stream and discharges to the ocean at Māhā'ulepū Beach. Surface water quality is being studied, and will be presented in the Draft EIS.

Ground Water Resources: The HDF parcel is within the Kōloa hydrologic unit defined by the State Commission on Water Resource Management. The Māhā'ulepū well site includes up to 14 irrigation wells drilled by former sugar cane plantations. About one-half mile to the east of the dairy facility is Kōloa F well, a source for public drinking water used by the County of Kaua'i Department of Water. Drinking water and irrigation water supply for HDF, and ground water quality will be addressed in the Draft EIS.

Botanical Resources: The area is characteristic of heavily disturbed lowland areas throughout Hawai'i, dominated by introduced plant species that have become naturalized – those that spread and expand range in suitable habitat. Long-term use by agriculture has removed native plant-dominated ecosystems. No known endangered plants are thought to exist on the parcel. A botanical survey will be conducted for the HDF site and surrounds, and included in the Draft EIS.

Faunal Resources: Four native Hawaiian birds – three waterbirds and the Hawaiian nēnē - are known to utilize water features around the HDF parcel. These species are listed by both federal and state statutes as endangered. Migratory shore birds may occasionally use the pasture areas. A faunal survey will be conducted for the HDF site and surrounds, and included in the Draft EIS. An assessment of arthropods/vector insects (e.g., flies) will be presented in the Draft EIS.

## 3.2 HUMAN ENVIRONMENT CONDITIONS

Archaeological, Historic, and Cultural Resources: Lowland areas of Māhā'ulepū were a source for fresh water and irrigation in proximity to the ocean, which provided resources for sustenance of the Hawaiian people and their culture. An expansive early agricultural network on Kaua'i was established throughout the Kōloa region. Following European contact, Māhā'ulepū became one of the first sites of commercial plantation agriculture in the main Hawaiian Islands.

An Archaeological Inventory Survey (AIS) was conducted for the project area to assess the presence of historic properties. There are no significant archaeological or historic sites known to exist within the HDF pastures. The AIS study area extended beyond the pasture areas to provide additional information





on features located on the upslope area, which includes a boulder with petroglyphs and habitation and ceremonial features. In consultation with the State Historic Preservation Division, AIS findings are being properly documented, which will be presented in the Draft EIS.

A Cultural Impact Assessment (CIA) will be undertaken to evaluate knowledge of traditional cultural uses of the HDF site for access, worship and gathering. The study will collect information from people with ancestral ties and connection to the area's history and uses, and will include documents, stories and legends from the region. The CIA will be presented in the Draft EIS.

Recreational Resource: The HDF property has been used for agriculture and grazing, and has not historically been open to the public for recreational use. Traditional cultural activities along the Māhā'ulepū coast include coastal and mountain hiking, hunting, fishing and gathering. "Shipwreck Beach" (Keoneloa Bay) fronts the Grand Hyatt Kaua'i, where shoreline access by foot extends northeast to the Māhā'ulepū coast. The Draft EIS will address recreational uses in the area.

Noise: Current noise levels in the area are typical of open space and agricultural use. Noise conditions associated with short-term and long-term activities will be addressed in the Draft EIS.

Air Quality: The State of Hawai'i Department of Health Clean Air Branch monitors ambient air at various stations for gaseous and particulate air pollutants. National ambient air quality standards (NAAQS) have been established by the Environmental Protection Agency for six pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter ($PM_{10}$ and $PM_{2.5}$). In addition, Hawai'i has established a state ambient air standard for hydrogen sulfide. One monitoring station is maintained on Kaua'i to measure air quality impacts from cruise ships. Air quality conditions and agricultural odor conditions will be evaluated in the Draft EIS.

Visual and Aesthetic Resources: Public and private views of the HDF property are limited from off-site locations. Active agricultural uses occur on the lands surrounding HDF and across this valley. Visual resources and future view conditions will be addressed in the Draft EIS.

Socio-Economic Conditions: Hawai'i's resident population is expected to grow from 1,363,621 to 1,708,900 between 2010 and 2040, an increase of 25 percent. Māhā'ulepū is located in the Po'ipū area on the south shore of Kaua'i. In 2010, the population of the Kōloa-Po'ipū Census tract was 2,544 and the median age was 44.5 years. Po'ipū is one of the two major tourist and luxury home destinations on the island, with a large inventory of hotels, transient vacation rentals, and luxury vacation homes. Of the 2,139 housing units in the Po'ipū tract, about 1,203 (56.2 percent) are vacant. About 25% homes in the area are valued above $1 million.

In 2012, Kaua'i had an estimated 144,127 acres in farming. The County of Kaua'i *Important Agricultural Lands Study* (2014) estimates 21,158 acres of land on Kaua'i is needed to feed 70,000 people (slightly above the total island population) without beef production. Based on a 2,500-calorie diet of fruits, vegetable, starch, dairy and some meat, an estimated 12,775,000 lbs. of milk per year would be needed to sustain 70,000 people on the island. A summary of the existing economic conditions and a projection of the HDF's anticipated economic impact will be included in the Draft EIS.

Hazardous Materials: There are no known hazardous material conditions at the HDF site or adjoining properties. Potential hazardous materials conditions will be addressed in the Draft EIS.

Emergency Response: The nearest medical facility is Wilcox Memorial Hospital located in Līhu'e, 16.5 miles northeast of the project location. The County of Kaua'i Fire Department services the entire island of Kaua'i. The closest fire station to the site is located in Kōloa, approximately 4.5 miles to the west. The County of Kaua'i Police Department provides services for the entire island. The closest police substation is located in Kōloa, approximately 3.5 miles from HDF. Emergency response services will be addressed in the Draft EIS.

## 3.3 INFRASTRUCTURE

Agricultural Operations: The current Conservation Plan covers agricultural use of these lands, approved by the West Kaua'i Soil and Water Conservation District in December 2013. An update to the Conservation Plan will include the HDF operations, and be presented in the Draft EIS.

Roadways and Traffic: Access to the property is about one mile off Kōloa Bypass Road by Māhā'ulepū Road. Private agricultural roadways provide access to the HDF site. Current traffic conditions, construction traffic and operational traffic will be addressed in the Draft EIS.

Drainage and Storm Water Runoff: The project site has been used for previous agricultural and grazing activities, and has a system of ditches to channel storm water through the area as well as to drain fields. Existing and future drainage conditions will be presented in the Draft EIS.

Wastewater: There is no existing wastewater system serving the HDF site. The HDF office facility will utilize an Individual Wastewater System consisting of a septic tank system. Wastewater facilities will be presented in the Draft EIS.

A Waste Management Plan (July 2014) was prepared for the HDF operations and was reviewed by the State of Hawai'i Department of Health Wastewater Branch (October 2014). HDF is designed to be a zero-discharge facility, whereby nutrients excreted as manure will be managed on the HDF property to grow grass as the cows' major food source. Manure is excreted within the dairy pastures and also captured at the milking parlors during the twice daily milking cycle. The pasture rotation system will distribute nutrients throughout the fields, supplemented by diluted effluent from the waste management ponds. Findings from the Waste Management Plan and related technical studies will be presented in the Draft EIS.

Water Supply: Water from nearby Waita Reservoir will be used for pasture irrigation and existing wells on site will provide potable water for dairy operations and facility use. Water will be treated to federal milk standards. Treatment of well water to potable standards will provide water for the milking parlor and yards, for milk cooling and for livestock consumption. The water system and water uses will be described in the Draft EIS.

Solid Waste Disposal: Solid waste generated by the dairy facilities will be contained onsite and removed by licensed private waste haulers for disposal at the County's solid waste management facility. Solid waste management will be addressed in the Draft EIS.

Electrical Power and Communications: HDF has obtained a service agreement for power from the Kaua'i Independent Utility Cooperative (KIUC). Electrical power will be generated on-site through rooftop photovoltaic panels. Electrical power infrastructure and communications systems will be covered in the Draft EIS.





# 4.0 PROBABLE IMPACTS AND MITIGATIVE MEASURES

The construction and operation of HDF may result in environmental impacts. Mitigation measures will be discussed and developed with regulatory agencies.

The EIS will discuss probable impacts, both short- and long-term, and propose appropriate mitigation actions that can minimize potentially adverse effects. Short-term impacts are generally associated with construction, and prevail only for the duration of the construction period. Long-term effects would be those agricultural activities which continue after the construction period.

## 4.1 SHORT-TERM IMPACTS

The Draft EIS will address potential short-term impacts to the natural environment. Construction-related activities will create noise, dust, air pollution, and traffic due to vehicle and equipment operations. Construction activities may result in short-term adverse impacts to the environment, such as temporary soil disturbance. However, construction will be completed in accordance with federal, state and county regulations and employ best management practices to minimize temporary impacts.

Numerous jobs will be created during the construction period for the overall site development, and off-site improvements. This will result in short-term positive impacts to employment conditions within the area. Construction workers are expected to commute to the site from various parts of Kaua'i.

## 4.2 LONG-TERM IMPACTS

The Draft EIS will include an analysis of the potential long-term impacts to natural and human environments resulting from agricultural facilities development and operation of HDF. Implementation of the project will support the State and County's agricultural and economic goals by providing for greater food security and economic activity.

Potential for increased air and water emissions will be evaluated in the Draft EIS, along with the anticipated benefits of long-term agricultural land use and increased local employment. Long-term effects to the environment are expected to be minimal.

Cumulative impacts of HDF with planned developments in the Kōloa-Po'ipū region will be identified in the Draft EIS. Continued agricultural use of the area is consistent with the State and County land use policies, which identifies the region as important agricultural land for Kaua'i.

## 4.3 SIGNIFICANCE CRITERIA

The Draft EIS will assess the overall impact on the environment based on criteria established in HRS Chapter 343, and HAR Chapter 200 (Environmental Impact Statement Rules). In determining whether an action may have a significant effect on the environment, the EIS will consider the potential full scale operations at HDF with up to 2,000 cows, alternative actions, and the expected consequences (primary, secondary and cumulative, as well as short-term and long-term).

Thirteen categories of Significance Criteria are identified in HAR Chapter 200 (following); the EIS will assess impacts in relation to these criteria.

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;*
2. *Curtails the range of beneficial uses of the environment;*
3. *Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;*
4. *Substantially affects the economic or social welfare of the community or State;*
5. *Substantially affects public health;*
6. *Involves substantial secondary impacts, such as population changes or effects on public facilities;*
7. *Involves a substantial degradation of environmental quality;*
8. *Is individually limited but cumulatively has a considerable effect upon the environment or involves a commitment for large actions;*
9. *Substantially affects a rare, threatened, or endangered species, or its habitat;*
10. *Detrimentally affects air or water quality or ambient noise levels;*
11. *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*
12. *Substantially affects scenic vistas and view planes identified in county or state plans or studies;*
13. *Requires substantial energy consumption.*

## 4.4 REASON FOR PREPARATION OF AN EIS

HDF will voluntarily prepare an EIS to disclose the existing and anticipated environmental conditions at the HDF location. The higher rigor of an EIS was selected over that of an Environmental Assessment to fully analyze potential impacts of construction and ongoing dairy operations, and to recommend appropriate mitigation as warranted. None of the agricultural operations associated with the HDF constitute a "trigger" under HRS Chapter 343 requirements. Hawai'i State Department of Health, as the agency with a preponderance of regulatory involvement, will act as the Approving Agency. This Environmental Impact Statement Preparation Notice has been prepared pursuant to HRS Chapter 343 and HAR Chapter 200. The appropriate environmental documents will be prepared and processed in accordance with Chapter 343.





## 4.5 EIS TECHNICAL STUDIES

The following is a list of studies consigned to evaluate current conditions and analyze the potential impacts of the HDF improvements and operations. The Draft EIS will summarize study findings and analyses; the reports will be included as appendices.

***Civil Engineering / Waste Management Plan***
Group 70 International, Inc.

***Cultural and Archaeological Impact Assessments***
Scientific Consultant Services, Inc.

***Marine Biology and Water Quality***
Marine Research Consultants, Inc.

***Terrestrial Resources Study***
Rana Biological Consulting, Inc.

***Vector Insect Assessment***
Steven Lee Montgomery, Ph.D.

***Air Quality Study***
ARCADIS

***Groundwater Hydrology***
Tom Nance Water Resources Engineering

***Soils and Agronomy Assessment***
Russell Yost, Ph.D

***Pasture Nutrient Balance Study***
Red Barn Consulting

# 5.0 CONFORMANCE WITH LAND USE PLANS, POLICIES AND CONTROLS

Relevant plans and policies are shown in the following list. Agricultural facilities and operations of HDF will require reviews and approvals from federal, state and county agencies. Anticipated permits and approvals are listed in Section 2.6. Conformance with applicable land use policies will be addressed in the Draft EIS.

**County of Kaua'i**

Kaua'i General Plan
Kōloa - Po'ipū - Kalāheo Development Plan
South Kaua'i Community Plan
Comprehensive Zoning Ordinance
Kaua'i County Building Code

**State of Hawai'i**

Acts183 and 233: Important Agricultural Lands
State Constitution
State Plan
State Functional Plan: Agriculture, Economy
State Land Use Law: Agricultural District
State Water Policies
2050 Sustainability Plan
Coastal Zone Management
Department of Agriculture
- Animal Industry
- Milk Control Rules

Department of Health
- National Pollutant Discharge Elimination System Permit
- Livestock Facility Sanitation
- Animal Feeding Operations/Large Concentrated Animal Feeding Operations/ Waste Management Plan

Department of Land and Natural Resources, State Historic Preservation Division
- Hawai'i Revised Statutes, Chapter 6E - Historic Preservation Review

**Federal**

U.S. Environmental Protection Agency
- Animal Feeding Operations/Large Concentrated Animal Feeding Operations/ Waste Management Plan
- Clean Air Act
- Clean Water Act (see State of Hawai'i Department of Health)

U.S. Department of Agriculture
- Natural Resources Conservation Service Conservation Plan





# 6.0 ANTICIPATED DETERMINATION

It is anticipated the Final EIS will be accepted by the State of Hawai'i Department of Health, the Approving Agency for the Proposed Action.

# 7.0 AGENCY CONTACT AND PUBLIC OUTREACH

Listed below are the agencies or parties contacted regarding the proposed project prior to publication of the draft Environmental Impact Statement.

Federal Agencies

U.S. Army Corps of Engineers
U.S. Dept. of Agriculture, National Resources Conservation Service – West Kaua'i SWCD

State of Hawai'i Agencies

Department of Agriculture
Department of Business, Economic Development, and Tourism – Office of Planning
Department of Health – Environmental Planning Office, Various Divisions
Department of Land and Natural Resources
Department of Land and Natural Resources, State Historic Preservation Division
Department of Transportation
Kaua'i – Ni'ihau Islands Burial Council, State Historic Preservation Division
Office of Environmental Quality Control
Office of Hawaiian Affairs

County of Kaua'i Agencies

Department of Water
Planning Department
Department of Public Works
Office of Economic Development

State and County Elected Officials

State Senate District 8 – Senator Ron Kouchi
State House of Representatives District 14 – Rep. Derek Kawakami
State House of Representatives District 15 – Rep. James Tokioka
State House of Representatives District 16 – Rep. Dee Morikawa
The Honorable Mayor Bernard P. Carvalho, Jr.

County Council Representatives: Mel Rapozo; Ross Kagawa, Arryl Kaneshiro, Mason Chock, JoAnn Yukimura, KipuKai Kuali'i, Gary Hooser.

Other Organizations and Individuals

Kaua'i County Farm Bureau
Kaua'i Chamber of Commerce
Kaua'i Economic Development Board
Kōloa Community Association
Kaua'i Filipino Chamber of Commerce
Malama Kōloa
Mālama Māhā'ulepū
Friends of Māhā'ulepū
Surfrider Foundation Kaua'i Chapter
Po'ipū Beach Resort Association
Kaua'i Planning & Action Alliance
Kaua'i Visitors Bureau





Other Organizations and Individuals (con't)

Contractors Association of Kaua'i
Rotary Clubs (of Po'ipū and Kaua'i)
Kōloa Landing
Whalers Cove

# Appendix 12

Hawai'i Dairy Farms

MAHA'ULEPU, KAUA'I

*Grass farmers with a passion for dairy.*

**REQUEST FOR COST CERTIFICATION FOR CLAIM OF THE IMPORTANT AGRICULTURAL LAND QUALIFIED AGRICULTURAL COST TAX CREDIT**

**Part I**

Name of Taxpayer: Pierre M. Omidyar

SSN/FEIN: [redacted]

Address: 720 University Avenue, Suite 200, Los Gatos, California 95032 Attn:

Tffany Bay of Comprehensive Financial Management

(Number and street, including apartment number or rural route, city, state, and zip code

Location of designated Important Agricultural Land(s) on which qualified costs have been incurred (County and TMK No.): (4) 2-9-003-001 and (4) 2-9-003-006

Total qualified costs claimed (total should equal the sum of all qualified agricultural costs in Part II):$3,194,929.62

Credit year: First year 2014 Second year Third year

Contact person (Name and title): David Laeha CFO

Telephone No.: 808-292-3410 Email Address:David@hawaiidairyfarms.com or dlaeha@cfohawaii.com

**Part II**

Identify the qualified agricultural cost (with an "x") and the amount of qualified agricultural cost that the taxpayer is claiming).

The plans, design, engineering, construction, renovation, repair, maintenance, and equipment for:

A. (☒) Roads or utilities, primarily for agricultural purposes, where the majority of the lands serviced by the roads or utilities, excluding lands classified as conservation lands, are important agricultural lands; $89,987.39



Hawai'i Dairy Farms

MAHA'ULEPU, KAUA'I

B. (☒) Agricultural processing facilities in the State, primarily for agricultural purposes, where the majority of the crops or livestock processed, harvested, treated, washed, handled, or packaged are from agricultural businesses; $605,814.04

C. (☒) Water wells, reservoirs, dams, water storage facilities, water pipelines, ditches, or irrigation systems in the State, primarily for agricultural purposes, providing water for lands, the majority of which, excluding lands classified as conservation lands, are important agricultural lands; and $1,649,283.42

D. (☐) Agricultural housing in the State, exclusively for agricultural purposes; provided that: $

(i) The housing units are occupied solely by farmers or employees for agricultural businesses and their immediate family members;

(ii) The housing units are owned by the agricultural business;

(iii) The housing units are in the general vicinity, as determined by the department of agriculture, of agricultural lands owned or leased by the agricultural business; and

(iv) The housing units conform to any other conditions that may be required by the department of agriculture;

E. (☒) Feasibility studies, regulatory processing, and legal and accounting services related to the items described above; $734,672.37

F. (☒) Equipment, primarily for agricultural purposes, used to cultivate, grow, harvest, or process agricultural products by an agricultural business; $26,163.74; and

G. (☒) Regulatory processing, studies, and legal and other consultant services related to obtaining or retaining sufficient water for agricultural activities and retaining the right to farm on lands identified as important agricultural lands. $89,008.66

Please attach receipts and any other appropriate documentation which supports your request for certification. A brief narrative description of the purpose of the expenditure should be included with your request. Also, please note that the Department of Taxation may audit and adjust certification to conform to the facts.

Print this form on company letterhead and send along with receipts and the narrative description to:

Department of Agriculture
1428 S. King St.
Honolulu, HI 96814
Attn: Planning Office.

P.O. Box 1690, Koloa, Hawai'i 96756-1690 | HawaiiDairyFarms.com

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4/25/2013 | Hee & Ching | Accounting March | 458.00 | | E | | | |
| 4/25/2013 | Hee & Ching | Accounting Dec 2012 | 445.00 | | E | | | |
| 3/5/2013 | Hee & Ching | Accounting Feb | 608.00 | | E | | | |
| 2/5/2013 | Hee & Ching | Accounting Jan | 1,722.00 | | E | | | |
| 1/9/2013 | Hee & Ching | Accounting - Dec | 1,158.00 | | E | | | |
| 9/16/2013 | Hee & Ching | Accounting August | 998.00 | | E | | | |
| 8/19/2013 | Hee & Ching | Accounting - July | 1,546.00 | | E | | | |
| 7/16/2013 | Hee & Ching | Accounting | 457.00 | | E | | | |
| 6/12/2013 | Hee & Ching | Accounting - May | 1,179.00 | | E | | | |
| 10/14/2013 | Hee & Ching | Accounting - September | 1,735.00 | | E | | | |
| 11/12/2013 | Hee & Ching | Accounting | 1,426.00 | | E | | | |
| 5/13/2013 | ITC Water Management | Design | 2,094.24 | | E | | | |
| 2/26/2013 | ITC Water Management | Design | 2,094.24 | | E | | | |
| 9/11/2013 | Kodani & Associates | Engineering | 8,484.32 | | E | | | |
| 8/16/2013 | Kodani & Associates | Engineering - July | 6,072.88 | | E | | | |
| 7/29/2013 | Kodani & Associates | Engineering | 2,984.36 | | E | | | |
| 6/17/2013 | Kodani & Associates | Engineering | 9,843.69 | | E | | | |
| 10/10/2013 | Kodani & Associates | Engineering | 4,010.39 | | E | | | |
| 11/18/2013 | Kodani & Associates | Engineering | 3,479.14 | | E | | | |
| 12/10/2013 | Ohana Steel Buildings | Engineering | 15,782.28 | Non-refundable deposit | E | | | |
| 10/26/2013 | Straightedge | Engineering | 6,200.00 | | E | | | |
| 2/5/2013 | Valley Agricultural Software | Software subscription | 3,019.00 | | E | 548,432.96 | 186,239.41 | 734,672.37 |
| 12/5/2013 | LBD Coffee | Grain drill and seed box | 9,653.43 | | F | 9,653.43 | 16,510.31 | 26,163.74 |
| 12/1/2013 | All Property Consulting | preconstruction services | 3,098.40 | | G | | | |
| 10/31/2013 | All Property Consulting | preconstruction services | 2,572.29 | | G | | | |
| 1/6/2013 | Atlantic Dairy Consulting | Livestock Pre-purchase | 8,009.69 | | G | | | |
| 11/25/2013 | Atlantic Dairy Consulting | Planning, designing, engineering | 4,699.44 | | G | | | |
| 11/6/2013 | Atlantic Dairy Consulting | Supplies and software | 589.99 | | G | | | |
| 11/29/2013 | Dairy Solutionz | Planning, designing, engineering | 6,000.00 | | G | | | |
| 10/23/2013 | Wai Engineering | Engineering | 6,057.15 | | G | 31,026.96 | 57,981.70 | 89,008.66 |
| | | | 1,826,626.74 | | | 1,826,626.74 | 1,368,302.88 | 3,194,929.62 |
| | | | 1,826,626.74 | | | | 3,194,929.62 | |

(A) See separate schedule for 2014 costs sorted by class and subtotaled by IAL categories

## Hawaii Dairy Farms LLC

Summary of invoices submitted for IAL cost tax credits

| Invoice Date | Payee | Description | Amount | | | 2013 | (A) 2014 | Total YR1 |
|---|---|---|---|---|---|---|---|---|
| 11/22/2013 | Kauai Island Utility Cooperative | Engineering and design | 21,800.00 | Non-refundable deposit | A | 21,800.00 | 68,187.39 | 89,987.39 |
| 12/31/2013 | Dairy Solutionz | Oncharge Toll Holdings | 24,717.00 | Freight on irrigation equipr | B | | | |
| 12/18/2013 | Don Chapman Dairy | Milking Parlour components | 367,430.00 | Non-refundable deposit | B | 392,147.00 | 213,667.04 | 605,814.04 |
| 11/27/2013 | E&I | Irrigation materials | 376,787.64 | Non-refundable deposit | C | | | |
| 11/27/2013 | E&I | Irrigation materials | 363,997.00 | Non-refundable deposit | C | | | |
| 12/6/2013 | Gallagher | Irrigation parts | 82,781.75 | Non-refundable deposit | C | 823,566.39 | 825,717.03 | 1,649,283.42 |
| 4/25/2013 | Cades | Legal | 3,664.92 | | E | | | |
| 5/21/2013 | Cades | Legal | 4,764.40 | | E | | | |
| 8/31/2013 | Cades | Legal | 8,485.46 | | E | | | |
| 8/19/2013 | Cades | Legal - July | 26,651.82 | | E | | | |
| 6/26/2013 | Cades | Legal - May | 4,083.77 | | E | | | |
| 7/26/2013 | Cades | Legal - June | 1,007.85 | | E | | | |
| 10/21/2013 | Cades | Legal | 3,845.93 | | E | | | |
| 10/31/2013 | Cades | Legal | 9,369.11 | | E | | | |
| 2/22/2013 | Case Lombardi | Legal | 1,099.46 | | E | | | |
| 12/19/2013 | Case Lombardi | Legal | 1,610.00 | | E | | | |
| 5/29/2013 | Dairy Solutionz | Planning, designing, engineering | 32,000.00 | | E | | | |
| 4/15/2013 | Dairy Solutionz | Planning, designing, engineering | 75,000.00 | | E | | | |
| 4/15/2013 | Dairy Solutionz | Planning, designing, engineering | 25,000.00 | | E | | | |
| 2/12/2013 | Dairy Solutionz | Planning, designing, engineering | 18,945.00 | | E | | | |
| 8/18/2013 | Dairy Solutionz | Engineering | 13,008.96 | | E | | | |
| 7/30/2013 | Dairy Solutionz | Engineering | 32,000.00 | | E | | | |
| 7/15/2013 | Dairy Solutionz | Effluent & Irrigation design | 6,543.80 | | E | | | |
| 7/11/2013 | Dairy Solutionz | Max Kennedy travel | 6,825.24 | | E | | | |
| 6/26/2013 | Dairy Solutionz | Engineering | 32,000.00 | | E | | | |
| 3/7/2013 | Dairy Solutionz | Trough molds and travel | 18,286.15 | | E | | | |
| 7/11/2013 | Dairy Solutionz | Engineering - Max | 13,055.00 | | E | | | |
| 8/28/2013 | Dairy Solutionz | Engineering | 18,600.00 | | E | | | |
| 9/24/2013 | Dairy Solutionz | Planning, designing, engineering | 8,000.00 | | E | | | |
| 9/18/2013 | Dairy Solutionz | Planning, designing, engineering | 6,978.35 | | E | | | |
| 8/28/2013 | Dairy Solutionz | Planning, designing, engineering | 14,311.41 | | E | | | |
| 3/14/2013 | Deleware Secretary of state | Legal filing | 250.00 | | E | | | |
| 12/23/2012 | Group70 | Planning, designing, engineering | 26,575.79 | | E | | | |
| 10/21/2013 | Hawaii Dairy Service | Planning, designing, engineering | 60,000.00 | | E | | | |
| 5/10/2013 | Hee & Ching | Accounting | 674.00 | | E | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 13034 - payment 2 for 25% of labor charges (wired in NZD 129,728.75) | 111,047.81 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12992 - 40' HC GP Ctr FSCU6541362 (wired in NZD 4,209.00) | 3,602.90 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12992 - Dec 2013 transport long haul (wired in NZD 563.50) | 482.36 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 13033 - deduction for overpmt of airfare invoice revised after wire sent (in NZD -1,898.99) | | 1,625.54 | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 03/18/2014 | wire | Inv 13046 - cables for irrigation & back bone upgrade electrical work (wired in NZD 45,403.12) | 40,363.37 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 03/18/2014 | wire | Inv 13081 - 50% deposit - 250mm main line pipe extension installation (wired in NZD 9,920) | 8,818.88 | | Irrigation | C |
| Genske, Mulder & Company, LLP | 02/10/2014 | 1204 | Invoice 14133-00M | 1,570.00 | | Accounting | E |
| GFH Global Hawaii LLC | 01/21/2014 | 1187 | Invoice 74093-1 | 1,503.66 | | Irrigation - Fre | C |
| GFH Global Hawaii LLC | 01/21/2014 | 1181 | demurrage | 1,370.20 | | Irrigation - Fre | C |
| GFH Global Hawaii LLC | 01/21/2014 | 1181 | service/ advance fee | 68.06 | | Irrigation - Fre | C |
| GFH Global Hawaii LLC | 01/27/2014 | 1182 | Invoice 74085-1 | 1,675.39 | | Irrigation - Fre | C |
| GKG Law, P.C. | 01/07/2014 | 1151 | engagement fee | 1,000.00 | | Legal | E |
| GKG Law, P.C. | 03/17/2014 | 1310 | Invoice 98081 - 02/14 | 6,145.50 | | Legal | E |
| GKG Law, P.C. | 03/17/2014 | 1310 | engagement fee applied | | 1,000.00 | Legal | E |
| Glover Honsador LLC | 01/31/2014 | 1175 | delay and overtime charges | 512.50 | | Roads | A |
| Glover Honsador LLC | 01/31/2014 | 1175 | chips 6000 psi | 820.54 | | Roads | A |
| Glover Honsador LLC | 01/31/2014 | 1175 | commercial 3500 psi | 3,624.35 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 10000-2 - Invoice 0330-10922 - 02/03/14 chips 6000 psi | 1,230.78 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10922 - 02/03/14 commercial 3500 psi | 3,624.35 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10923 - 02/04/14 chips 6000 psi | 1,128.21 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10928 - 02/05/14 chips 6000 psi | 615.39 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10933 - 02/06/14 chips 6000 psi | 1,025.64 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0300-10936 - 02/07/14 chips 6000 psi | 1,025.64 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10940 - 02/10/14 chips 6000 psi | 1,025.64 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1338 | 17000-2 - Invoice 0330-10948 - 02/13/14 chips 6000 psi | 1,025.64 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10944 - 02/12/14 chips 6000 psi | 1,025.64 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10944 - 02/12/14 commercial 3500 psi | 604.06 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1338 | 10000-2 - Invoice 0330-10952 - 02/14/14 chips 6000 psi | 1,025.64 | | Roads | A |
| Glover Honsador LLC | 03/24/2014 | 1338 | 10000-2 - Invoice 0330-10956 - 02/19/14 chips 6000 psi | 1,062.76 | | Roads | A |
| Hawaii Dairy Services, LLC | 02/18/2014 | 1272 | Feb 2014 - Apr 2014 service fee | 12,500.00 | | Consultant ser | G |
| Hee & Ching CPAs LLC | 02/03/2014 | 1200 | 11/13-12/13 | 8,055.00 | | Accounting | E |
| Hee & Ching CPAs LLC | 02/03/2014 | 1200 | reimburse for 100 forever postage stamps | 45.75 | | Accounting | E |
| Hee & Ching CPAs LLC | 03/10/2014 | 1303 | 01/14 | 6,217.00 | | Accounting | E |
| Hee & Ching CPAs LLC | 03/10/2014 | 1303 | reimburse for 100 forever postage stamps | 45.75 | | Accounting | E |
| Hee & Ching CPAs LLC | 03/17/2014 | 1311 | 02/14 | 7,342.00 | | Accounting | E |
| Hee & Ching CPAs LLC | 03/17/2014 | 1311 | reimburse for order of 500 checks | 47.07 | | Accounting | E |
| I&L Rentals, LLC | 01/13/2014 | 1156 | 11/21/13-12/19/13 Toyota pick up truck rental | 1,335.94 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/10/2014 | 1205 | 01/27/14 IR 8K Reachlift | 257.81 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/18/2014 | 1264 | Invoice 200002700-0001 - 01/20/14-02/17/14 25KVA / 20KW generator rental | 1,361.98 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/18/2014 | 1264 | Invoice 200002701-0001 - 01/17/14-02/14/14 Ford pickup truck crew cab rental | 1,335.94 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/18/2014 | 1264 | Invoice 200002775-0001 - 5K Reach 19' Genie forklift rental | 1,065.93 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002702-0002 - 01/24/14-02/21/14 Ford pickup truck ext cab rental | 1,335.94 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002705-0004 - 01/27/14-02/24/14 4000W light tower rental | 997.40 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002706-0001 - 01/27/14-02/24/14 8K Reach IR forklift rental | 2,976.57 | | Agricultural pr | B |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002721-0003 - 01/29/14-02/26/14 45KVA / 36KW generator rental | 1,361.98 | | Agricultural pr | B |
| I&L Rentals, LLC | 03/03/2014 | 1289 | Invoice 200002701-0003 - 02/14/14-02/21/14 Ford pickup truck crew cab rental (final) | 565.11 | | Agricultural pr | B |

**Hawaii Dairy Farms, LLC**
**Expense by Vendor Detail**
**As of April 7, 2014**

04/07/2014

| | Date | Num | Memo | Debit | Credit | | IAL Class |
|---|---|---|---|---|---|---|---|
| Air Liquide America L.P. | 01/29/2014 | 1176 | Invoice 352850 - welding tools - fabricator, journeyman, chopper rider, glove, brush, wire spool | 1,700.24 | | Agricultural pr | B |
| Air Liquide America L.P. | 02/05/2014 | 1203 | Ranger 250 GXT, Kohler AC/DC welder / generator | 4,017.16 | | Agricultural pr | B |
| Air Liquide America L.P. | 02/10/2014 | 1208 | Invoice 353502 - oxygen and acetylene cylinders | 473.71 | | Agricultural pr | B |
| Air Liquide America L.P. | 03/31/2014 | 1342 | 17000-2 - Invoice 357886 - ground clamp, electrode holder, lug, welding cable | 564.53 | | Agricultural pr | B |
| AJAR, Inc. | 01/13/2014 | 1154 | Invoice 670255 - install sub surface drip system | 5,114.55 | | Irrigation and | C |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670279 - 12/30/13 repair F 728 8" main line | 1,139.06 | | Irrigation and | C |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670287 - mulch and plant grass | 7,946.82 | | Irrigation and | C |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670288 - 12/10/13 install hog wire fence in grass area at dairy site | 2,068.57 | | Irrigation and | C |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670291 - plow field 728, 12/23/13 riser repair, 01/03/14 flat repair | 4,052.71 | | Irrigation and | C |
| AJAR, Inc. | 01/27/2014 | 1195 | Invoice 670296 - 01/10/14-01/15/14 - spray Mahaulepu | 4,418.46 | | Irrigation and | C |
| AJAR, Inc. | 02/18/2014 | 1269 | Invoice 670319 - plant 2 acres of grass - land prep - labor & material | 2,598.94 | | Irrigation and | C |
| AJAR, Inc. | 02/18/2014 | 1269 | Invoice 670319 - harrow | 11,025.97 | | Irrigation and | C |
| AJAR, Inc. | 03/24/2014 | 1332 | 22000-2 - Invoice 670331 - move harrow | 452.77 | | Irrigation and | C |
| All Property Consulting, Inc. | 01/13/2014 | 1155 | Dec 2013 consulting | 1,187.49 | | Construction s | G |
| All Property Consulting, Inc. | 01/13/2014 | 1155 | Dec 2013 - reimburse for seed shipping | 54.90 | | Construction s | G |
| All Property Consulting, Inc. | 02/18/2014 | 1260 | Jan 2014 consulting | 3,562.48 | | Construction s | G |
| Allied Machinery Corporation | 01/17/2014 | 1163 | Inv KE04333 - Case IH Scout XL diesel UTV | 16,510.31 | | Agricultural Eq | F |
| Cades Schutte LLP | 01/13/2014 | 1160 | Invoice 301656 - 11/13 | 26,178.00 | | Legal | E |
| Cades Schutte LLP | 01/27/2014 | 1194 | Invoice 303080 - 12/13 | 9,895.28 | | Legal | E |
| Cades Schutte LLP | 02/24/2014 | 1274 | Invoice 304200 - 01/14 | 10,471.20 | | Legal | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0043 - I.Habib - Dec 2013 project support | 4,800.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - fixed charges - legal (NZD $20,000) | 16,400.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - fixed charges - milking system construction mgr for final 2 months (NZD $20,000) | 16,400.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - fixed charges - insurance (NZD $20,000) | 16,400.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - installation deposit (NZD $104,872) | 12,899.25 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0048 - annual Ag Hub backbone connection fee | 715.88 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0054 - I.Habib - Jan 2014 project support | 3,200.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0056 - complete hardware set for AgHub per technology transfer agreement | 24,735.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0057 - reimburse D.Chapman travel (NZD $1,750) | 1,447.25 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0058 - reimburse 01/03/14 E&I shipment toll cartage et al (NZD $1,826.17) | 1,509.51 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0065 - reimburse Holmes Consulting Group costs for VAT layout change | 4,071.00 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0066 - reimburse D.Fairweather travel | 2,538.97 | | Planning, desig | E |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0079 - I.Habib - Feb 2014 project management | 5,100.00 | | Planning, desig | E |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - irrigation material (wired in NZD $175,370) | 149,064.50 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - effluent material (wired in NZD $73,645) | 62,598.25 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - water system material (wired in NZD $57,778) | 49,111.30 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - spare materials (wired in NZD $1,690) | 1,436.50 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 02/03/2014 | wire | Inv 13030 - airfare (wired in NZD 14,558.92) | 12,171.26 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12994 - irrigation material (wired in USD) | 221,339.00 | | Irrigation | C |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12994 - spare pivot parts (wired in USD) | 13,836.00 | | Irrigation | C |

| | |
|---|---|
| 2014 IAL Expenditures per invoices | **1,368,302.88** |
| 2013 IAL Expenditures per invoices | 1,826,626.74 |
| Grand total | **3,194,929.62** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **I&L Rentals, LLC** | 03/03/2014 | 1289 | Invoice 200002750-0002 - 02/01/14-03/01/14 Ford pickup truck crew cab rental | 1,328.13 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/03/2014 | 1289 | Invoice 200002775-0002 - 02/05/14-03/05/14 8K Reach forklift hook attachment rental | 510.42 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/03/2014 | 1289 | Invoice 200002797-0001 - 02/08/14-03/08/14 fuel tank w/pump rental | 507.81 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/03/2014 | 1289 | Invoice 200002752-0001 - 02/03/14-03/03/14 Ford pickup truck ext cab rental | 1,335.94 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/10/2014 | 1301 | Invoice 200002773-0001 - 02/05/14-02/20/14 185CFM air compressor rental | 1,336.99 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/10/2014 | 1301 | Invoice 200002700-0002 - 02/17/14-03/17/14 25KVA / 20KW generator rental | 1,361.98 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/17/2014 | 1308 | Invoice 200002842-0001 - 02/19/14-03/19/14 50AMP spider box rental | 427.08 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/17/2014 | 1308 | Invoice 200002705-0005 - 02/24/14-03/24/14 4000W light tower rental | 997.40 | Agricultural pr | B |
| **I&L Rentals, LLC** | 03/31/2014 | 1343 | Invoice 200002775-0003 - 03/05/14-04/02/14 Reach forklift hook attachment rental | 510.42 | Agricultural pr | B |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01818 - 02/03/14 equipment rental | 360.34 | Agricultural pr | B |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01820 - 02/04/14 equipment rental | 3,062.91 | Agricultural pr | B |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01823 - 02/06/14 equipment rental | 1,801.71 | Agricultural pr | B |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01828 - 02/11/14 trap rock | 3,497.43 | Roads | A |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01830 - 02/12/14 trap rock | 9,995.91 | Roads | A |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01832 - 02/13/14 trap rock | 10,555.50 | Roads | A |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01835 - 02/14/14 trap rock | 24,761.77 | Roads | A |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01835 - 02/14/14 equipment rental charge | 1,261.20 | Agricultural pr | B |
| **Jas. W. Glover, Ltd.** | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01836 - 02/14/14 loading fee overtime charge | 101.56 | Agricultural pr | B |
| **Kodani & Associates Engineers, LLC** | 01/13/2014 | 1153 | 11/13 | 12,937.42 | Engineering | G |
| **Kodani & Associates Engineers, LLC** | 01/27/2014 | 1186 | 12/13 | 13,552.00 | Engineering | G |
| **Kodani & Associates Engineers, LLC** | 03/03/2014 | 1290 | 01/14 | 6,916.62 | Engineering | G |
| **Kodani & Associates Engineers, LLC** | 03/24/2014 | 1329 | 02/14 | 7,270.79 | Engineering | G |
| **R Ranch LLC** | 01/08/2014 | wire | 80% deposit for wood posts and flat racks | 113,658.41 | processing fac | B |
| **R Ranch LLC** | 02/24/2014 | 1277 | Invoices 20109, 20114, 20115, 20116, 20117, 20118 | 16,379.96 | processing fac | B |
| **R.J. Farias** | 01/27/2014 | 1185 | Inv 648985 - 12/30/13-01/15/14 shred tall grass & brush at dairy site | 16,259.27 | Agricultural pr | B |
| **R.J. Farias** | 01/27/2014 | 1185 | Inv 499051 - 01/16/14-01/25/14 shred tall grass & brush at dairy site | 9,281.19 | Agricultural pr | B |
| **Redmond Tree Service LLC** | 01/27/2014 | 1193 | Invoice 391 - 01/13/14-01/18/14 land clearing & chipping | 2,122.78 | Agricultural pr | B |
| **Redmond Tree Service LLC** | 02/18/2014 | 1265 | Invoice 397 - land clearing & chipping | 1,607.71 | Agricultural pr | B |
| **Redmond Tree Service LLC** | 02/18/2014 | 1265 | Invoice 395 - land clearing & chipping | 1,836.67 | Agricultural pr | B |
| **Redmond Tree Service LLC** | 03/03/2014 | 1291 | Invoice 400 - land clearing & chipping | 2,000.73 | Agricultural pr | B |
| **Waalani Enterprises LLC** | 03/24/2014 | 1335 | 11000-17 - Invoice 5206 - GX 200 OHV pressure washer | 1,197.91 | Agricultural pr | B |
| **Waalani Enterprises LLC** | 03/24/2014 | 1335 | 11000-17 - Invoice 5206 - GX 200 Honda OHV air compressor | 1,406.24 | Agricultural pr | B |
| **Waalani Enterprises LLC** | 03/24/2014 | 1335 | 9000-6 - Invoice 5228 - truck, low boy, trailer, grader, roller rentals with operator | 5,555.76 | Agricultural pr | B |
| **Waalani Enterprises LLC** | 03/24/2014 | 1335 | 13000-1 - Invoice 5233 - haul 7 containers | 2,056.28 | Agricultural pr | B |
| **Wai Engineering, Inc.** | 01/27/2014 | 1184 | Inv 18822 - Site A - 50% down pmt on irrigation materials | 51,740.00 | Irrigation | C |
| **Wai Engineering, Inc.** | 02/24/2014 | 1276 | Inv 18871 - Site A - pmt 2 balance on irrigation materials | 51,739.79 | Irrigation | C |
| **Wai Engineering, Inc.** | 03/24/2014 | 1330 | 17000-1 - Inv K18878 - effluent irrigation & design materials | 2,493.70 | Irrigation | C |
| **Wai Engineering, Inc.** | 03/24/2014 | 1330 | 17000-1 - Inv K18879 - isolation valve materials | 4,061.79 | Irrigation | C |
| **Waldron Norton Lilly International** | 02/10/2014 | 1207 | Invoice 53250 - GATU8478079 & GESU4652402 | 1,680.00 | Freight proces | B |
| **Waldron Norton Lilly International** | 02/10/2014 | 1207 | Invoice 53270 - GESU4492583 & GESU4579106 | 3,360.00 | Freight proces | B |
| **Waldron Norton Lilly International** | 02/10/2014 | 1207 | Invoice 53270 - TCKU9187655 | 960.00 | Freight proces | B |
| | | | | **1,370,928.42** | **2,625.54** | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01836 - 02/14/14 loading fee overtime charge | 101.56 | | Agricultural pr | B | |
| R Ranch LLC | 01/08/2014 | wire | 80% deposit for wood posts and flat racks | 113,668.41 | | processing faci | B | |
| R Ranch LLC | 02/24/2014 | 1277 | Invoices 20109, 20114, 20115, 20116, 20117, 20118 | 16,379.96 | | processing faci | B | |
| R.J. Farias | 01/27/2014 | 1185 | Inv 649965 - 12/30/13-01/15/14 shred tall grass & brush at dairy site | 16,259.27 | | Agricultural pr | B | |
| R.J. Farias | 01/27/2014 | 1185 | Inv 499051 - 01/16/14-01/25/14 shred tall grass & brush at dairy site | 9,281.19 | | Agricultural pr | B | |
| Redmond Tree Service LLC | 01/27/2014 | 1193 | Invoice 391 - 01/13/14-01/18/14 land clearing & chipping | 2,122.78 | | Agricultural pr | B | |
| Redmond Tree Service LLC | 02/18/2014 | 1265 | Invoice 397 - land clearing & chipping | 1,607.71 | | Agricultural pr | B | |
| Redmond Tree Service LLC | 02/18/2014 | 1265 | Invoice 395 - land clearing & chipping | 1,836.67 | | Agricultural pr | B | |
| Redmond Tree Service LLC | 03/03/2014 | 1291 | Invoice 400 - land clearing & chipping | 2,000.73 | | Agricultural pr | B | |
| Waalani Enterprises LLC | 03/24/2014 | 1335 | 11000-17 - Invoice 5206 - GX 200 OHV pressure washer | 1,197.91 | | Agricultural pr | B | |
| Waalani Enterprises LLC | 03/24/2014 | 1335 | 11000-17 - Invoice 5206 - GX 200 Honda OHV air compressor | 1,406.24 | | Agricultural pr | B | |
| Waalani Enterprises LLC | 03/24/2014 | 1335 | 9000-6 - Invoice 5228 - truck, low boy, trailer, grader, roller rentals with operator | 5,555.76 | | Agricultural pr | B | |
| Waalani Enterprises LLC | 03/24/2014 | 1335 | 13000-1 - Invoice 5233 - haul 7 containers | 2,056.28 | | Agricultural pr | B | |
| Waldron Norton Lilly International | 02/10/2014 | 1207 | Invoice 53250 - GATU8478079 & GESU4652402 | 1,680.00 | | Freight proces | B | |
| Waldron Norton Lilly International | 02/10/2014 | 1207 | Invoice 53270 - GESU4492583 & GESU4579106 | 3,360.00 | | Freight proces | B | |
| Waldron Norton Lilly International | 02/10/2014 | 1207 | Invoice 53270 - TCKU9187655 | 980.00 | | Freight proces | B | |
| | | | | | | Freight proces | B | 213,667.04 |
| AJAR, Inc. | 01/13/2014 | 1154 | Invoice 670255 - install sub surface drip system | 5,114.55 | | Irrigation and | C | |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670279 - 12/30/13 repair F 728 8" main line | 1,139.06 | | Irrigation and | C | |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670287 - mulch and plant grass | 7,946.82 | | Irrigation and | C | |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670288 - 12/10/13 install hog wire fence in grass area at dairy site | 2,068.57 | | Irrigation and | C | |
| AJAR, Inc. | 01/17/2014 | 1164 | Invoice 670291 - plow field 728, 12/23/13 riser repair, 01/03/14 flat repair | 4,062.71 | | Irrigation and | C | |
| AJAR, Inc. | 01/27/2014 | 1195 | Invoice 670296 - 01/10/14-01/15/14 - spray Mahaulepu | 4,418.46 | | Irrigation and | C | |
| AJAR, Inc. | 02/18/2014 | 1269 | Invoice 670319 - plant 2 acres of grass - land prep - labor & material | 2,598.94 | | Irrigation and | C | |
| AJAR, Inc. | 02/18/2014 | 1269 | Invoice 670319 - harrow | 11,025.97 | | Irrigation and | C | |
| AJAR, Inc. | 03/24/2014 | 1332 | 22000-2 - Invoice 670331 - move harrow | 452.77 | | Irrigation and | C | |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - irrigation material (wired in NZD $175,370) | 149,064.50 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - effluent material (wired in NZD $73,645) | 62,598.25 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - water system material (wired in NZD $57,778) | 49,111.30 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 01/17/2014 | wire | Inv 12995 - spare materials (wired in NZD $1,690) | 1,436.50 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/03/2014 | wire | Inv 13030 - airfare (wired in NZD 14,558.92) | 12,171.26 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12994 - irrigation material (wired in USD) | 221,339.00 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12994 - spare pivot parts (wired in USD) | 13,836.00 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 13034 - payment 2 for 25% of labor charges (wired in NZD 129,728.75) | 111,047.81 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12992 - 40' HC GP Ctr FBCU6541382 (wired in NZD 4,209.00) | 3,602.90 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 12992 - Dec 2013 transport long haul (wired in NZD 583.50) | 482.36 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 02/19/2014 | wire | Inv 13033 - deduction for overpmt of airfare invoice revised after wire sent (in NZD -1,898.99) | | 1,625.54 | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 03/18/2014 | wire | Inv 13046 - cables for irrigation & back bone upgrade electrical work (wired in NZD 45,403.12) | 40,363.37 | | Irrigation | C | |
| Effluent and Irrigation Design (NZ) Ltd | 03/18/2014 | wire | Inv 13081 - 50% deposit - 250mm main line pipe extension installation (wired in NZD 9,920) | 8,818.88 | | Irrigation | C | |
| GFH Global Hawaii LLC | 01/21/2014 | 1167 | Invoice 74093-1 | 1,503.86 | | Irrigation - Fre | C | |
| GFH Global Hawaii LLC | 01/21/2014 | 1181 | demurrage | 1,370.20 | | Irrigation - Fre | C | |
| GFH Global Hawaii LLC | 01/21/2014 | 1181 | service/ advance fee | 68.06 | | Irrigation - Fre | C | |
| GFH Global Hawaii LLC | 01/27/2014 | 1182 | Invoice 74085-1 | 1,675.39 | | Irrigation - Fre | C | |
| Wai Engineering, Inc. | 01/27/2014 | 1184 | Inv 18822 - Site A - 50% down pmt on irrigation materials | 51,740.00 | | Irrigation | C | |
| Wai Engineering, Inc. | 02/24/2014 | 1276 | Inv 18871 - Site A - pmt 2 balance on irrigation materials | 51,739.79 | | Irrigation | C | |
| Wai Engineering, Inc. | 03/24/2014 | 1330 | 17000-1 - Inv K18878 - affluent irrigation & design materials | 2,493.70 | | Irrigation | C | |
| Wai Engineering, Inc. | 03/24/2014 | 1330 | 17000-1 - Inv K18879 - isolation valve materials | 4,061.79 | | Irrigation | C | 825,717.03 |
| Cades Schutte LLP | 01/13/2014 | 1160 | Invoice 301656 - 11/13 | 26,178.00 | | Legal | E | |
| Cades Schutte LLP | 01/27/2014 | 1194 | Invoice 303080 - 12/13 | 9,895.28 | | Legal | E | |
| Cades Schutte LLP | 02/24/2014 | 1274 | Invoice 304200 - 01/14 | 10,471.20 | | Legal | E | |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0043 - I Habib - Dec 2013 project support | 4,800.00 | | Planning, desig | E | |

**Hawaii Dairy Farms, LLC**

## Expense by Vendor Detail

**As of April 7, 2014**

04/07/2014

| | Date | Num | Memo | Debit | Credit | | IAL Class | Subtotals by IAL Class |
|---|---|---|---|---|---|---|---|---|
| Glover Honsador LLC | 01/31/2014 | 1175 | delay and overtime charges | 512.50 | | Roads | A | |
| Glover Honsador LLC | 01/31/2014 | 1175 | chips 6000 psi | 820.54 | | Roads | A | |
| Glover Honsador LLC | 01/31/2014 | 1175 | commercial 3500 psi | 3,624.35 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 10000-2 - Invoice 0330-10922 - 02/03/14 chips 6000 psi | 1,230.78 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10922 - 02/03/14 commercial 3500 psi | 3,624.35 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10923 - 02/04/14 chips 6000 psi | 1,128.21 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10928 - 02/05/14 chips 6000 psi | 615.39 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10933 - 02/06/14 chips 6000 psi | 1,025.64 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0300-10936 - 02/07/14 chips 6000 psi | 1,025.64 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10940 - 02/10/14 chips 6000 psi | 1,025.64 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1338 | 17000-2 - Invoice 0330-10948 - 02/13/14 chips 6000 psi | 1,025.64 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10944 - 02/12/14 chips 6000 psi | 1,025.64 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1337 | 17000-2 - Invoice 0330-10944 - 02/12/14 commercial 3500 psi | 604.06 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1338 | 10000-2 - Invoice 0330-10952 - 02/14/14 chips 6000 psi | 1,025.64 | | Roads | A | |
| Glover Honsador LLC | 03/24/2014 | 1338 | 10000-2 - Invoice 0330-10956 - 02/19/14 chips 6000 psi | 1,062.76 | | Roads | A | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01828 - 02/11/14 trap rock | 3,497.43 | | Roads | A | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01830 - 02/12/14 trap rock | 9,995.91 | | Roads | A | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01832 - 02/13/14 trap rock | 10,555.50 | | Roads | A | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01835 - 02/14/14 trap rock | 24,791.77 | | Roads | A | 68,187.39 |
| Air Liquide America L.P. | 01/29/2014 | 1178 | Invoice 352850 - welding tools - fabricator, journeyman, chopper rider, glove, brush, wire spool | 1,700.24 | | Agricultural pr | B | |
| Air Liquide America L.P. | 02/05/2014 | 1203 | Ranger 250 GXT, Kohler AC/DC welder / generator | 4,017.16 | | Agricultural pr | B | |
| Air Liquide America L.P. | 02/10/2014 | 1208 | Invoice 353502 - oxygen and acetylene cylinders | 473.71 | | Agricultural pr | B | |
| Air Liquide America L.P. | 03/31/2014 | 1342 | 17000-2 - Invoice 357886 - ground clamp, electrode holder, lug, welding cable | 564.53 | | Agricultural pr | B | |
| I&L Rentals, LLC | 01/13/2014 | 1156 | 11/21/13-12/19/13 Toyota pick up truck rental | 1,335.94 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/10/2014 | 1205 | 01/27/14 IR 8K Reachlift | 257.01 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/18/2014 | 1264 | Invoice 200002700-0001 - 01/20/14-02/17/14 25KVA / 20KW generator rental | 1,361.98 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/18/2014 | 1264 | Invoice 200002701-0001 - 01/17/14-02/14/14 Ford pickup truck crew cab rental | 1,335.94 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/18/2014 | 1264 | Invoice 200002775-0001 - 5K Reach 19' Genie forklift rental | 1,085.93 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002702-0002 - 01/24/14-02/21/14 Ford pickup truck ext cab rental | 1,335.94 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002705-0004 - 01/27/14-02/24/14 4000W light tower rental | 997.40 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002708-0001 - 01/27/14-02/24/14 8K Reach IR forklift rental | 2,976.57 | | Agricultural pr | B | |
| I&L Rentals, LLC | 02/24/2014 | 1281 | Invoice 200002721-0003 - 01/29/14-02/26/14 45KVA / 36KW generator rental | 1,361.98 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/03/2014 | 1289 | Invoice 200002701-0003 - 02/14/14-02/21/14 Ford pickup truck crew cab rental (final) | 565.11 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/03/2014 | 1289 | Invoice 200002750-0002 - 02/01/14-03/01/14 Ford pickup truck crew cab rental | 1,328.13 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/03/2014 | 1289 | Invoice 200002775-0002 - 02/05/14-03/05/14 8K Reach forklift hook attachment rental | 510.42 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/03/2014 | 1289 | Invoice 200002797-0001 - 02/08/14-03/08/14 fuel tank w/pump rental | 507.81 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/03/2014 | 1289 | Invoice 200002752-0001 - 02/03/14-03/03/14 Ford pickup truck ext cab rental | 1,335.94 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/10/2014 | 1301 | Invoice 200002773-0001 - 02/05/14-02/20/14 185CFM air compressor rental | 1,336.99 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/10/2014 | 1301 | Invoice 200002700-0002 - 02/17/14-03/17/14 25KVA / 20KW generator rental | 1,361.98 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/17/2014 | 1308 | Invoice 200002842-0001 - 02/19/14-03/19/14 50AMP spider box rental | 427.08 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/17/2014 | 1308 | Invoice 200002705-0005 - 02/24/14-03/24/14 4000W light tower rental | 997.40 | | Agricultural pr | B | |
| I&L Rentals, LLC | 03/31/2014 | 1343 | Invoice 200002775-0003 - 03/05/14-04/02/14 Reach forklift hook attachment rental | 510.42 | | Agricultural pr | B | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01818 - 02/03/14 equipment rental | 360.34 | | Agricultural pr | B | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01820 - 02/04/14 equipment rental | 3,062.91 | | Agricultural pr | B | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 9000-1 - Invoice 0320-01823 - 02/06/14 equipment rental | 1,801.71 | | Agricultural pr | B | |
| Jas. W. Glover, Ltd. | 03/24/2014 | 1336 | 10000-2 - Invoice 0320-01835 - 02/14/14 equipment rental charge | 1,261.20 | | Agricultural pr | B | |

ORIGINAL

LAND USE COMMISSION
STATE OF HAWAII

2011 MAY 19 P 2:44

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

| | | |
|---|---|---|
| In The Matter Of The Petition Of | ) | DOCKET NO. DR11-43 |
| | ) | |
| MĀHĀ 'ULEPŪ FARM LLC | ) | FINDINGS OF FACT, |
| | ) | CONCLUSIONS OF LAW, |
| For A Declaratory Order To Designate | ) | AND DECISION AND ORDER |
| Important Agricultural Lands | ) | |
| For Approximately 1,533 Acres At Kōloa, | ) | |
| Kaua'i, Hawai'i | ) | |

FINDINGS OF FACT, CONCLUSIONS
OF LAW, AND DECISION AND ORDER
AND
CERTIFICATE OF SERVICE



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - fixed charges - legal (NZD $20,000) | 16,400.00 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - fixed charges - milking system construction mgr for final 2 months (NZD $20,000) | 16,400.00 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - fixed charges - insurance (NZD $20,000) | 16,400.00 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0044 - installation deposit (NZD $104,872) | 12,899.25 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0048 - annual Ag Hub backbone connection fee | 715.88 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 02/05/2014 | wire | Invoice 0054 - I.Habib - Jan 2014 project support | 3,200.00 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0056 - complete hardware set for AgHub per technology transfer agreement | 24,735.00 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0057 - reimburse D.Chapman travel (NZD $1,750) | 1,447.25 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0058 - reimburse 01/03/14 E&I shipment toll cartage et al (NZD $1,826.17) | 1,509.51 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0065 - reimburse Holmes Consulting Group costs for VAT layout change | 4,071.00 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0066 - reimburse D.Fairweather travel | 2,538.97 | | Planning, desig | E | |
| Dairy Solutionz (NZ) Ltd | 03/06/2014 | wire | Invoice 0079 - I.Habib - Feb 2014 project management | 5,100.00 | | Planning, desig | E | |
| Genske, Mulder & Company, LLP | 02/10/2014 | 1204 | Invoice 14133-00M | 1,570.00 | | Accounting | E | |
| GKG Law, P.C. | 01/07/2014 | 1151 | engagement fee | 1,000.00 | | Legal | E | |
| GKG Law, P.C. | 03/17/2014 | 1310 | Invoice 98081 - 02/14 | 6,145.50 | | Legal | E | |
| GKG Law, P.C. | 03/17/2014 | 1310 | engagement fee applied | | 1,000.00 | Legal | E | |
| Hee & Ching CPAs LLC | 02/03/2014 | 1200 | 11/13-12/13 | 8,065.00 | | Accounting | E | |
| Hee & Ching CPAs LLC | 02/03/2014 | 1200 | reimburse for 100 forever postage stamps | 45.75 | | Accounting | E | |
| Hee & Ching CPAs LLC | 03/10/2014 | 1303 | 01/14 | 6,217.00 | | Accounting | E | |
| Hee & Ching CPAs LLC | 03/10/2014 | 1303 | reimburse for 100 forever postage stamps | 45.75 | | Accounting | E | |
| Hee & Ching CPAs LLC | 03/17/2014 | 1311 | 02/14 | 7,342.00 | | Accounting | E | |
| Hee & Ching CPAs LLC | 03/17/2014 | 1311 | reimburse for order of 500 checks | 47.07 | | Accounting | E | 186,239.41 |
| Allied Machinery Corporation | 01/17/2014 | 1163 | Inv KE04333 - Case IH Scout XL diesel UTV | 16,510.31 | | Agricultural Eq | F | 16,510.31 |
| All Property Consulting, Inc. | 01/13/2014 | 1155 | Dec 2013 consulting | 1,187.49 | | Construction s | G | |
| All Property Consulting, Inc. | 01/13/2014 | 1155 | Dec 2013 - reimburse for seed shipping | 54.90 | | Construction s | G | |
| All Property Consulting, Inc. | 02/18/2014 | 1260 | Jan 2014 consulting | 3,502.48 | | Construction s | G | |
| Hawaii Dairy Services, LLC | 02/18/2014 | 1272 | Feb 2014 - Apr 2014 service fee | 12,500.00 | | Consultant ser | G | |
| Kodani & Associates Engineers, LLC | 01/13/2014 | 1153 | 11/13 | 12,937.42 | | Engineering | G | |
| Kodani & Associates Engineers, LLC | 01/27/2014 | 1186 | 12/13 | 13,552.00 | | Engineering | G | |
| Kodani & Associates Engineers, LLC | 03/03/2014 | 1290 | 01/14 | 6,916.62 | | Engineering | G | |
| Kodani & Associates Engineers, LLC | 03/24/2014 | 1329 | 02/14 | 7,270.79 | | Engineering | G | 57,981.70 |
| | | | | 1,370,928.42 | 2,625.54 | | | 1,368,302.88 |
| | | | 2014 IAL Expenditures per invoices | 1,368,302.88 | | | | |
| | | | | | | | | 1,368,302.88 |
| | | | 2013 IAL Expenditures per invoices | 1,826,626.74 | | | | |
| | | | Grand total | 3,194,929.62 | | | | |

ORIGINAL

2011 MAY 19 P 2:44
LAND USE COMMISSION
STATE OF HAWAII

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

| | | |
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| In The Matter Of The Petition Of | ) | DOCKET NO. DR11-43 |
| | ) | |
| MĀHĀ'ULEPŪ FARM LLC | ) | FINDINGS OF FACT, |
| | ) | CONCLUSIONS OF LAW, |
| For A Declaratory Order To Designate | ) | AND DECISION AND ORDER |
| Important Agricultural Lands | ) | |
| For Approximately 1,533 Acres At Kōloa, | ) | |
| Kaua'i, Hawai'i | ) | |
| | ) | |

**FINDINGS OF FACT, CONCLUSIONS**
**OF LAW, AND DECISION AND ORDER**

MĀHĀ'ULEPŪ FARM LLC ("Petitioner") filed a Petition for Declaratory Order to Designate Important Agricultural Lands ("Petition") on February 23, 2011, pursuant to Hawai'i Revised Statutes ("HRS") §§ 205-44 and 45 and Hawai'i Administrative Rules ("HAR") chapter 15-15 to designate as Important Agricultural Lands ("IAL") approximately 1,533 acres of land situated at Kōloa, Kaua'i, Hawai'i, and identified as Tax Map Keys ("TMK"): 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6 (collectively "Petition Area").



The State of Hawai'i Land Use Commission ("Commission"), having heard and examined the testimony, evidence, and argument of counsel presented during the hearing, along with the pleadings filed herein, hereby makes the following Findings of Fact, Conclusions of Law, and Decision and Order:

**FINDINGS OF FACT**

PROCEDURAL MATTERS

1. On February 23, 2011, Petitioner filed the Petition, Verification, and Exhibits "A" through "C" of the Petition.

2. On April 8, 2011, the State of Hawai'i Office of Planning ("OP") filed comments on the Petition.

3. On April 12, 2011, the County of Kaua'i Planning Department ("Planning Department") filed comments on the Petition.

4. On April 13, 2011, the State of Hawai'i Department of Agriculture ("DOA") filed comments on the Petition.

5. On April 19, 2011, OP filed the comments of the State of Hawai'i Commission on Water Resource Management ("CWRM") on the Petition.

6. On April 21, 2011, Petitioner filed an Errata to the Petition.

7. On April 25, 2011, Petitioner filed a Second Errata to the Petition.

8. On May 3, 2011, Petitioner filed a response to the comments of OP, the County, and DOA on the Petition.

9. On May 11, 2011, the DOA filed additional comments on the Petition.

10. On May 12, 2011, the Commission held a site visit to view the Petition Area.

11. On May 12, 2011, the Commission held an action meeting on the Petition in Līhu'e, Kaua'i, Hawai'i. Benjamin M. Matsubara, Esq., Curtis T. Tabata, Esq., and Michael Tresler appeared on behalf of Petitioner. Also appearing were Bryan Yee, Esq., and Jesse Souki on behalf of OP and Michael Dahilig on behalf of the Planning Department.[1]

12. The Commission entered, without objection, the written comments of OP, the DOA, the Planning Department, and the CWRM, and Petitioner's response thereto as well as the written testimonies of Matilda A. Yoshioka, Steven Kai, and Roy Oyama and Melissa McFerrin into the record in this proceeding. The Commission also heard public testimony from Jerry Ornellas, Karol Haraguchi, Joseph Manini, and Beryl Blaich.

DESCRIPTION OF PETITION AREA

[1] At the meeting, Commission Lezy disclosed that he had provided legal services to Grove Farm Fish & Poi, a subsidiary of Grove Farm Company, Inc. There were no objections by Petitioner, OP, and the Planning Department to Commissioner Lezy's participation in this docket.



13. The Petition Area consists of approximately 1,533 acres of land, situated at Kōloa, Kaua'i, Hawai'i, TMKs: 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6.

14. The Petition Area is owned in fee simple interest by Petitioner.

DESCRIPTION OF REQUEST

15. Petitioner seeks a determination from the Commission that the lands identified by Petitioner in this Petition should be designated as IAL pursuant to HRS §§ 205-44 and 45.

16. Petitioner is not seeking to reclassify any agricultural lands to the State Land Use Urban, Rural or Conservation Districts.

17. Petitioner has represented that it is not claiming and will not claim any credits described in HRS § 205-45(h).

CONFORMANCE WITH THE STANDARDS AND CRITERIA FOR THE IDENTIFICATION OF IAL

18. The Petition Area, consisting of approximately 1,533 acres of land, currently has approximately 1,274 acres in cultivation or ranching and is being leased to eight independent farms and ranchers for the cultivation of taro, seed corn, and forage crops as well as for cattle ranching. Prior agricultural use of the Petition Area includes over 100 years of sugarcane cultivation until 1996 when the Kōloa Mill was closed.

19. The University of Hawai'i, Land Study Bureau ("LSB"), developed the Overall Productivity Rating, which classified soils according to five levels, with "A"

representing the class of highest productivity soils and "E" representing the lowest. Approximately 88.5 percent of the Petition Area is rated B. The balance of the Petition Area is rated C, D, E, or is unclassified and is either essential elements of the active agricultural operations (reservoirs, drainageways, etc.) or is surrounded by B rated lands.

20. Based on the Sunshine Maps prepared in 1985 by the Department of Business, Economic Development and Tourism, formerly known as the State Department of Planning and Economic Development, Energy Division, over 80.7 percent of the Petition Area receives an annual average 450 calories of solar energy per square centimeter per day, while the balance of the lands receive an annual average of 400 calories of solar energy per square centimeter per day.

21. In 1977, the DOA developed a classification system to identify Agricultural Lands of Importance to the State of Hawai`i ("ALISH"). The classification system is based primarily, though not exclusively, upon the soil characteristics of the lands. The three classes of ALISH lands are "Prime," "Unique," and "Other," with all remaining lands termed "Unclassified." When utilized with modern farming methods, Prime agricultural lands have a soil quality, growing season, and moisture supply necessary to produce sustained crop yields economically. Unique agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of a specific crop. Other agricultural lands include those that



have not been rated as Prime or Unique. Approximately 41.5 percent of the Petition Area is classified as Prime and 36.4 percent is classified as Other. The balance of the lands includes essential elements of the active agricultural operations such as reservoirs and drainageways.

22. The main water source for irrigation of the Petition Area is the Waitā Reservoir, which occupies approximately 429 acres of land and has a 2.3 billion gallon capacity. Pu`uhi Reservoir and Māhā`ulepū Reservoir are both located on the Petition Area and have a combined capacity of approximately 2.5 million gallons. Waitā Reservoir serves as a resource for Pu`uhi Reservoir and Māhā`ulepū Reservoir. The gravity flow system is capable of providing approximately 7.9 million gallons per day ("MGD"), and current water demand on the Petition Area is approximately 2.4 MGD. Water demand for potential agricultural uses on the Petition Area is approximately 6 MGD. Water delivery capacity can be increased by adding pumps.

23. The Petition Area's agricultural classification is consistent with the County 2000 General Plan Update and the Kōloa-Po`ipū-Kalāheo Planning District Land Use Map. Almost all of the Petition Area is designated as Agriculture with a few portions designated as Open.

24. The Petition Area is situated within the State Land Use Agricultural District.

25. The Petition Area contributes to maintaining a critical land mass important to agricultural operating productivity.

26. The Petition Area is fully integrated with the irrigation, roadway, and transport infrastructure necessary to support agricultural production, harvesting, processing, and shipping of product.

## CONCLUSIONS OF LAW

1. The Commission has jurisdiction over the Petition pursuant to HRS §§ 91-8, 205-44, and 205-45 and HAR § 15-15-98.

2. Pursuant to HRS § 205-44(a), the Commission has the authority to designate lands as IAL so long as any of the criteria in HRS § 205-44(c) are met.

3. The Petition Area is currently used for agricultural production in accordance with HRS § 205-44(c)(1).

4. The Petition Area has soil qualities and growing conditions that support agricultural production in accordance with HRS § 205-44(c)(2).

5. The Petition Area constitutes lands identified under agricultural productivity rating systems, such as the ALISH system adopted by the Board of Agriculture on January 28, 1977, in accordance with HRS § 205-44(c)(3).

6. The Petition Area includes traditional Native Hawaiian agricultural uses such as taro cultivation in accordance with HRS § 205-44(c)(4).



7. The Petition Area has sufficient quantities of water to support viable agricultural production in accordance with HRS § 205-44(c)(5).

8. The Petition Area's designation as IAL is consistent with the general, development, and community plans of the County in accordance with HRS § 205-44(c)(6).

9. The Petition Area contributes to maintaining a critical land mass that is important to agricultural operating productivity in accordance with HRS § 205-44(c)(7).

10. The Petition Area is near support infrastructure conducive to agricultural productivity, such as transportation to markets, water, or power in accordance with HRS § 205-44(c)(8).

11. The designation of the Petition Area as IAL meets the purposes of Article XI, Section 3, of the Hawai'i State Constitution by conserving and protecting agricultural lands, promoting diversified agriculture, increasing agricultural self-sufficiency, and assuring the availability of agriculturally suitable lands.

12. The designation of the Petition Area as IAL meets the objectives of HRS § 205-42(b) by contributing to the maintenance of a strategic agricultural land resource base that can support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities and increase agricultural self-sufficiency for current and future generations.

13. The designation of the Petition Area as IAL meets the policies of HRS § 205-43(1) by promoting the retention of IAL in blocks of contiguous, intact, and functional land units large enough to allow flexibility in agricultural production and management.

14. The designation of the Petition Area as IAL meets the policies of HRS § 205-43(7) by facilitating the access of farmers to IAL for long-term viable agricultural use.

15. The designation of the Petition Area as IAL meets the policies of HRS § 205-43(8) by promoting the maintenance of essential agricultural infrastructure systems, including irrigation systems.

16. The Petition Area meets the requirements of HRS § 205-45 for designation as IAL.

17. Any conclusion of law herein improperly designated as a finding of fact should be deemed or construed as a conclusion of law; any finding of fact herein improperly designated as a conclusion of law should be deemed or construed as a finding of fact.

**DECISION AND ORDER**

This Commission, having duly considered the Petition, the oral and/or written comments of Petitioner, OP, the DOA, the Planning Department, and the CWRM, and a motion having been made at a meeting on May 12, 2011, in Līhu`e,



Kaua`i, Hawai`i, and the motion having received the affirmative votes required by HAR § 15-15-13 and HRS § 205-45(e), and there being good cause for the motion,

HEREBY ORDERS that the Petition Area, consisting of approximately 1,533 acres of land, situated at Kōloa, Kaua`i, Hawai`i, identified as TMKs: 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6, and shown approximately on Exhibit "1," attached hereto and incorporated by reference herein, shall be and is hereby designated as IAL as governed by HRS chapter 205.

IT IS FURTHER ORDERED that the designation of the Petition Area as IAL shall be subject to the following conditions:

1. Petitioner shall comply with representations made to the Commission with respect to not claiming any credits described in HRS § 205-45(h) with respect to the Petition Area.

2. Within seven days of the issuance of the Commission's Decision and Order, Petitioner shall record it with the Bureau of Conveyances.

ADOPTION OF ORDER

This ORDER shall take effect upon the date this ORDER is certified by this Commission.

Done at Honolulu, Hawai'i, this 19th day of May, 2011, per motion on May 12, 2011.

LAND USE COMMISSION

STATE OF HAWAI'I

By

VLADIMIR DEVENS
Chairperson and Commissioner

APPROVED AS TO FORM

Deputy Attorney General

Filed and effective on:

5/19/11

Certified by:

ORLANDO DAVIDSON
Executive Officer



**EXHIBIT "1"**

(Consisting of 3 pages)

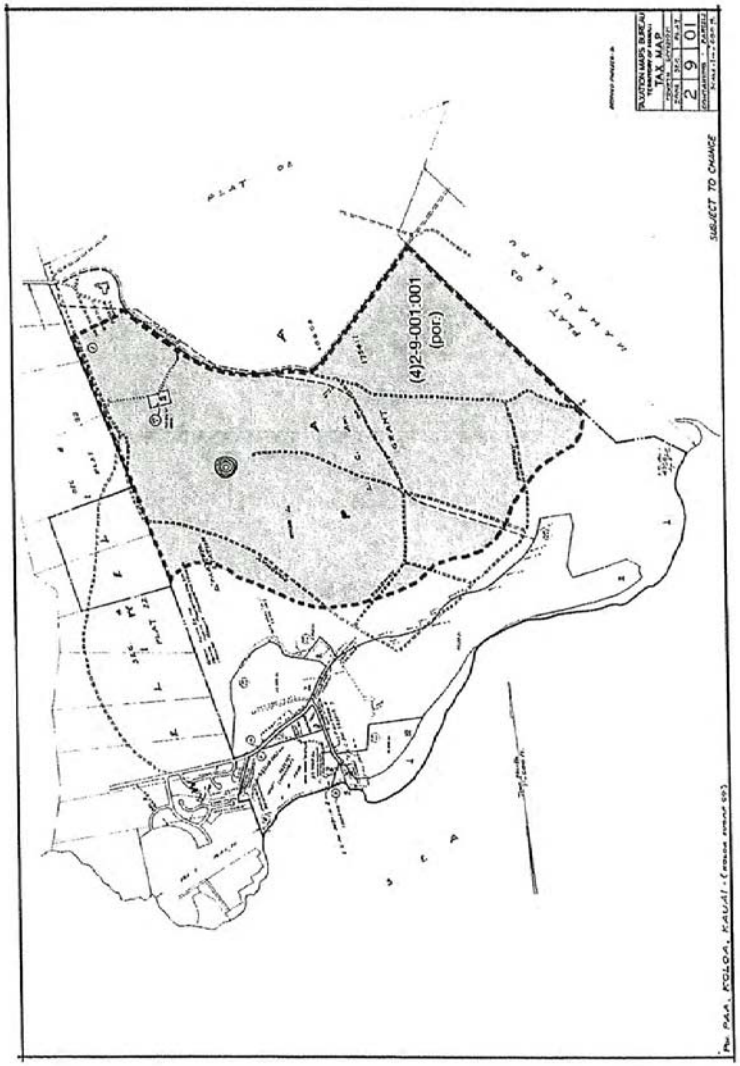
**DR11-43**

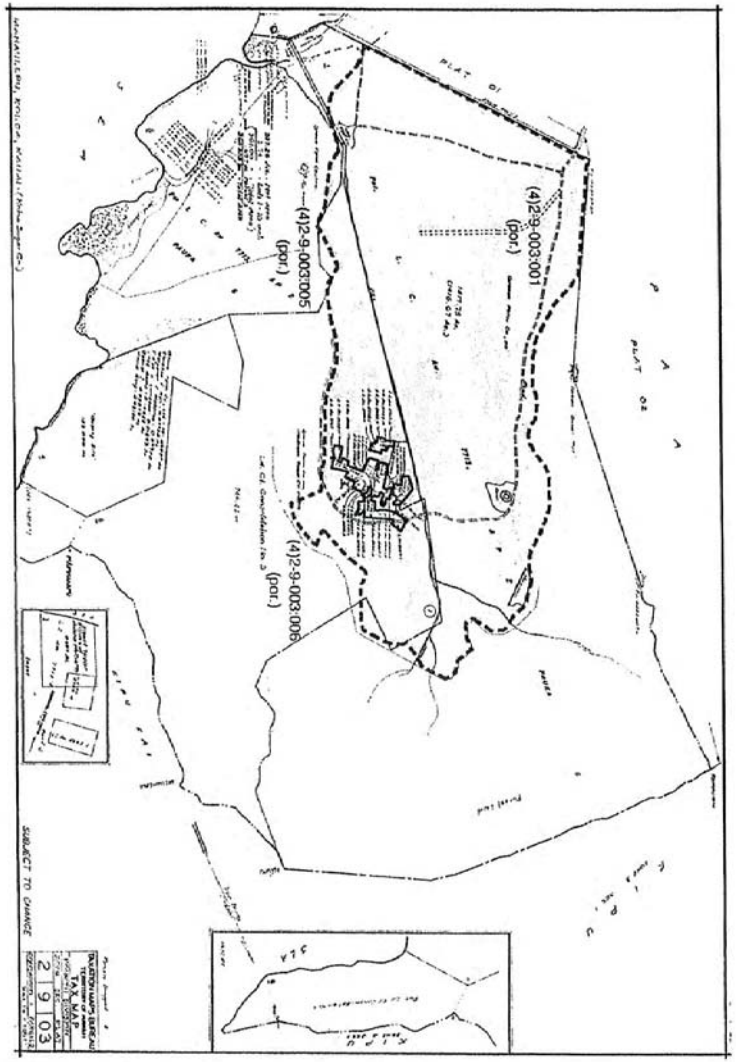
Approximately 1,533 acres of land owned by Petitioner are designated as Important Agricultural Land ("IAL"). The parcels are specifically described as Tax Map Keys ("TMK"): 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6.

The following table shows a summary of the TMK parcels and approximate acreages for the IAL lands:

| TMK | Approximate Acreage |
|---|---|
| 2-9-01: por. 1 | 710 |
| 2-9-03: por. 1 | 632 |
| 2-9-03: por. 5 | 6 |
| 2-9-03: por. 6 | 185 |
| **Total** | 1,533 |

The tax maps that follow further identify the portions of the individual TMK parcels that are designated IAL.






ORIGINAL

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

| | | |
|---|---|---|
| In The Matter Of The Petition Of | ) | DOCKET NO. DR11-43 |
| | ) | |
| MĀHĀ'ULEPŪ FARM LLC | ) | CERTIFICATE OF SERVICE |
| | ) | |
| For A Declaratory Order To Designate Important Agricultural Lands For Approximately 1,533 Acres At Kōloa, Kaua'i, Hawai'i | ) | |

LAND USE COMMISSION
STATE OF HAWAII
2011 MAY 19 P 2:44

**CERTIFICATE OF SERVICE**

I hereby certify that a copy of the **FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DECISION AND ORDER** was served upon the following by either hand delivery or depositing the same in the U. S. Postal Service by regular or certified mail as noted:

| | HAND DELIVERED | REGULAR MAIL | CERTIFIED MAIL |
|---|---|---|---|
| JESSE SOUKI, DIRECTOR<br>Office of Planning<br>235 S. Beretania Street Rm. 600<br>Honolulu, Hawai'i 96813 | X | | |

| | HAND DELIVERED | REGULAR MAIL | CERTIFIED MAIL |
|---|---|---|---|
| BRYAN YEE, ESQ.<br>Deputy Attorney General<br>Hale Auhau, Third Floor<br>425 Queen Street<br>Honolulu, Hawai'i 96813 | | X | |
| BENJAMIN M. MATSUBARA, ESQ.<br>Matsubara-Kotake<br>888 Mililani Street, 8th Floor<br>Honolulu, Hawaii 96813 | | | X |
| ALFRED CASTILLO, ESQ.<br>Office of the County Attorney,<br>County of Kauai<br>4444 Rice Street, Suite 220<br>Lihue, Hawaii, 96766 | | | X |
| Michael A. Dahilig<br>Director of Planning<br>4444 Rice St. Suite 453<br>Lihue, HI, 96766 | | X | |

Dated: Honolulu, Hawaii, 5/19/11.

ORLANDO DAVIDSON
Executive Officer



Benjamin M. Matsubara, Esq.
Curtis Tabata, Esq.
Wyeth Matsubara, Esq.
888 Mililani Street, 8th Floor
Honolulu, HI 96813

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Benjamin M. Matsubara, Esq.
Curtis Tabata, Esq.
Wyeth Matsubara, Esq.
888 Mililani Street, 8th Floor
Honolulu, HI 96813

COMPLETE THIS SECTION ON DELIVERY

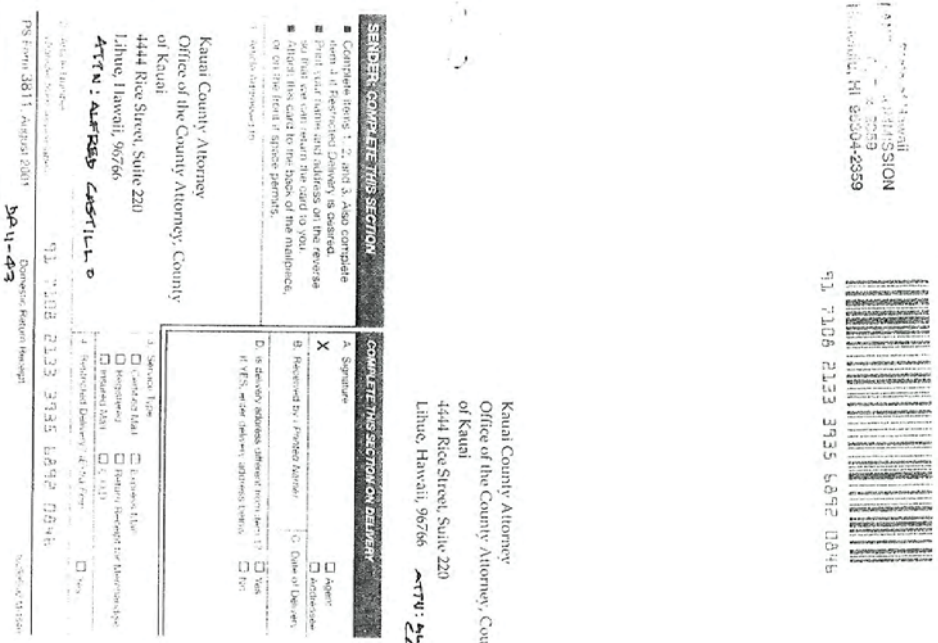
A. Signature: X ☐ Agent ☐ Addressee
B. Received by (Printed Name) C. Date of Delivery
D. Is delivery address different from item 1? ☐ Yes ☐ No
If YES, enter delivery address below:

3. Service Type: ☐ Certified Mail ☐ Express Mail ☐ Registered ☐ Return Receipt for Merchandise ☐ Insured Mail ☐ C.O.D.
4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 91 7108 2133 3935 6892 0853

State of Hawaii
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359

91 7108 2133 3935 6892 0853




## Ching, Noa K

**From:** Ching, Noa K
**Sent:** Thursday, February 26, 2015 10:51 AM
**To:** David Laeha
**Cc:** Yamamoto, Earl J
**Subject:** RE: IAL Tax credit application questions

Hi David,

We don't have better maps other than the ones provided in the D/O for Mahaulepu Farm LLC's IAL petition. I would suggest contacting Mahaulepu Farm and the Land Use Commission to get a better sense of where the IAL designation is. The Land Use Commission's number is: (808) 587-3822.

Determining exactly where the IAL lands are in relation to the expenditures you are trying to claim in your IAL tax credit application is essential because all of the "qualified agricultural cost" categories have some sort of nexus related to IAL designated lands.

For example, cost category "C" requires that all irrigation costs provide water for lands the majority of which are designated as IAL. The DOA cannot process costs related to this category without the assurance by the applicant that these costs provide water for lands the majority of which are designated as IAL.

Noa

**From:** David Laeha [mailto:david@hawaiidairyfarms.com]
**Sent:** Wednesday, February 25, 2015 11:54 PM
**To:** Ching, Noa K
**Subject:** RE: IAL Tax credit application questions

Noa:

I believe the question you are asking is if our expenditures relate only to the portion of the land which is designated as IAL. I'm not sure I can answer this. In review of the maps, it was difficult to determine which sections of the maps were IAL and which sections are not. Would you be able to show me more specifically which sections are IAL? I can meet with you in your office tomorrow if it will help. Please let me know if you'd like to meet.

**From:** Ching, Noa K [mailto:Noa.K.Ching@hawaii.gov]
**Sent:** Tuesday, February 24, 2015 11:27 AM
**To:** David Laeha
**Subject:** RE: IAL Tax credit application questions

Apologies, I just realized I sent you the petition. Attached is the Decision and Order. Designated areas/maps should be the same in both.

**From:** Ching, Noa K
**Sent:** Friday, February 20, 2015 3:55 PM
**To:** 'David Laeha'

**Cc:** Yamamoto, Earl J
**Subject:** RE: IAL Tax credit application questions

Hi David,

Thank you for your responses. For my first question, I meant to ask whether all of the invoices you presented in your IAL Tax Credit application were solely for the improvement of lands designated as IAL by the LUC's decision and order (attached). From the maps provided in the decision and order, it seems that only a portion of TMK 2-9-003-001 and TMK 2-9-003-006 were designated as IAL.

Noa

**From:** David Laeha [mailto:david@hawaiidairyfarms.com]
**Sent:** Thursday, February 19, 2015 11:44 PM
**To:** Ching, Noa K
**Cc:** Yamamoto, Earl J
**Subject:** RE: IAL Tax credit application questions

Aloha Noa:

Please see ** responses below:

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**From:** Ching, Noa K [mailto:Noa.K.Ching@hawaii.gov]
**Sent:** Wednesday, February 18, 2015 4:19 PM
**To:** david@hawaiidairyfarms.com
**Cc:** Yamamoto, Earl J
**Subject:** IAL Tax credit application questions

Mr. Laeha,

I am contacting you regarding Hawaii Diary Farm's IAL tax application for 2014. I have several questions regarding your application.

- Are the entirety of costs you are claiming for improvements on land designated as IAL? **Is your question is this the entirety of all costs? No, there are more but we wanted to hear back about what types of questions you have so we can submit the balance with a clearer understanding.

- For the legal and accounting costs you are claiming under qualified cost type "E", please confirm that these costs are related to the plans, design, engineering, construction, renovation, repair, maintenance or equipment for: roads or utilities primarily for agricultural purposes; agricultural processing facilities in the State; irrigation systems in the State; or, agricultural housing in the State. **The legal and accounting costs seem to be related to all these areas as these costs were for contracts with vendors, payments to vendors, etc.

- For some invoices related to irrigation (invoices 71-76), please clarify how these relate to the plans, design, engineering, construction, renovation, repair, maintenance or equipment for water wells, reservoirs, dams, water storage facilities, water pipelines, ditches, or irrigation systems in the State. **I'll need to access the file and review these specific invoices, but if E&I invoices, these costs relate to design and construction of very elaborate irrigation systems. Will check file and get back to you with a more definitive answer.

I anticipate having more questions later on this week. Thank you for your assistance. ** would be happy to meet with you to discuss in more detail any questions you might have.



## Ching, Noa K

**From:** Ching, Noa K
**Sent:** Friday, March 06, 2015 9:56 AM
**To:** David Laeha
**Cc:** Yamamoto, Earl J
**Subject:** Follow up IAL tax credit questions

David,

Per our conversation earlier this week, the Hawaii Department of Agriculture relies on the applicant to determine the location of IAL designated lands and the location of improvements that the applicant is trying to claim for IAL tax credits. It would be the applicant's responsibility to verify/defend the claimed location of IAL designated lands and improvements.

For Mr. Pierre Omidyar's 2014 Request for Cost Certification for Claim of the Important Agricultural Land Qualified Agricultural Cost Tax Credit, please **confirm** the following:

- For qualified agricultural costs category A: (Roads and Utilities) please confirm that all of your claimed costs under this category services lands the majority of which are designated as IAL.

- For qualified agricultural costs category B: (Agricultural Processing Facilities in the State) please confirm that the majority of the crops or livestock processed by these facilities will be from an agricultural business.

- For qualified agricultural costs category C: (Irrigation systems in the state) please confirm that all of your claimed costs under this category services lands the majority of which are designated as IAL.

- For qualified agricultural costs category F: (Equipment) please confirm that all of the claimed costs under this category will be used by an agricultural business.

- For qualified agricultural costs category G: (Regulatory processing, studies, and other consultant services) please confirm that these services were undertaken for agricultural activities on lands designated as IAL.

An "agricultural business" is defined under HRS 235-110.93(K), as "any person with a commercial agricultural, silvicultural, or aquacultural facility or operation . . . provided that the principal place of the agricultural business in maintained in the State (of Hawaii) and more than fifty per cent of the land the agricultural business owns or leases, excluding conservation land, is important agricultural land."

## Ching, Noa K

**From:** Ching, Noa K
**Sent:** Monday, March 09, 2015 8:14 AM
**To:** David Laeha
**Cc:** Yamamoto, Earl J
**Subject:** Re: Follow up IAL tax credit questions

David,

Thank you for your responses. From your responses, it seems that that all of your claimed expenses meet the IAL nexus. I will continue to process your application.

Thanks,

Noa

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**From:** David Laeha <david@hawaiidairyfarms.com>
**Sent:** Sunday, March 8, 2015 11:54 PM
**To:** Ching, Noa K
**Cc:** Yamamoto, Earl J
**Subject:** RE: Follow up IAL tax credit questions

ALoha Noa:

Please see my ** responses below and let me know if this response satisfies your request for a confirmation on each of the key confirmation requests below:

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**From:** Ching, Noa K [mailto:Noa.K.Ching@hawaii.gov]
**Sent:** Friday, March 6, 2015 9:56 AM
**To:** David Laeha
**Cc:** Yamamoto, Earl J
**Subject:** Follow up IAL tax credit questions

David,

Per our conversation earlier this week, the Hawaii Department of Agriculture relies on the applicant to determine the location of IAL designated lands and the location of improvements that the applicant is trying to claim for IAL tax credits. It would be the applicant's responsibility to verify/defend the claimed location of IAL designated lands and improvements.

For Mr. Pierre Omidyar's 2014 Request for Cost Certification for Claim of the Important Agricultural Land Qualified Agricultural Cost Tax Credit, please **confirm** the following:

- For qualified agricultural costs category A: (Roads and Utilities) please confirm that all of your claimed costs under this category services lands the majority of which are designated as IAL. ** I confirm that the claimed costs under this category services lands the majority of which are designated as IAL.



- For qualified agricultural costs category B: (Agricultural Processing Facilities in the State) please confirm that the majority of the crops or livestock processed by these facilities will be from an agricultural business. ** I confirm that the majority of the crops or livestock processed by these facilities will be from an agricultural business on lands which are designated as IAL.

- For qualified agricultural costs category C: (Irrigation systems in the state) please confirm that all of your claimed costs under this category services lands the majority of which are designated as IAL. ** I confirm that the claimed costs under this category services lands the majority of which are designated as IAL.

- For qualified agricultural costs category F: (Equipment) please confirm that all of the claimed costs under this category will be used by an agricultural business. ** I confirm that the claimed costs under this category will be used by an agricultural business on lands which are designated as IAL.

- For qualified agricultural costs category G: (Regulatory processing, studies, and other consultant services) please confirm that these services were undertaken for agricultural activities on lands designated as IAL. ** I confirm that the claimed costs under this category services lands the majority of which are designated as IAL.

An "agricultural business" is defined under HRS 235-110.93(K), as "any person with a commercial agricultural, silvicultural, or aquacultural facility or operation . . . provided that the principal place of the agricultural business in maintained in the State (of Hawaii) and more than fifty per cent of the land the agricultural business owns or leases, excluding conservation land, is important agricultural land."

## Ching, Noa K

**From:** Ching, Noa K
**Sent:** Friday, March 20, 2015 9:49 AM
**To:** David Laeha
**Subject:** RE: Scan Data from [Dell-C2665dnf-EAC1FA]

David,

Your IAL tax credit application has been approved for the full requested amount of $3,194,929.62. I am now writing the certificate, and I need one more piece of information. Could you please tell me the total acreage for the project boundary indicated in the map you attached in this previous email?

Thank you,

Noa

**From:** David Laeha [mailto:david@hawaiidairyfarms.com]
**Sent:** Sunday, March 08, 2015 11:37 PM
**To:** Ching, Noa K
**Subject:** FW: Scan Data from [Dell-C2665dnf-EAC1FA]

Aloha Noa:

Attached is a clearer drawing of where the TMK's (2-9-01 and 2-9-03 por6) which were approved as designated IAL and the placement of the farm relative to those portions of the TMKs. Given this, it is clear we are likely 100% on IAL lands.

**From:** Jim Garmatz [mailto:jim@hawaiidairyfarms.com]
**Sent:** Tuesday, March 3, 2015 12:32 PM
**To:** David Laeha; David Laeha
**Subject:** Fw: Scan Data from [Dell-C2665dnf-EAC1FA]

Red are farm boundaries.

Jim Garmatz
Hawaii Dairy Farms
Note my new email address: jim@hawaiidairyfarms.com
Phone: 808-212-5985

**From:** hdfcopier1@gmail.com
**Sent:** Tuesday, March 03, 2015 12:30 PM
**To:** jim@hawaiidairyfarms.com
**Subject:** Scan Data from [Dell-C2665dnf-EAC1FA]



## Ching, Noa K

**From:** Ching, Noa K
**Sent:** Monday, March 30, 2015 7:59 AM
**To:** David Laeha
**Subject:** RE: Scan Data from [Dell-C2665dnf-EAC1FA]

David,

Thank you for the final piece of information. I am sending out a completed N-344 form to you. Which address do you want this sent out to? After I mail this out to you, the process you have with the DOA is completed. You would work with DoTAX in claiming the credit.

Thanks,

Noa

**From:** David Laeha [mailto:david@hawaiidairyfarms.com]
**Sent:** Sunday, March 29, 2015 12:33 AM
**To:** Ching, Noa K
**Subject:** RE: Scan Data from [Dell-C2665dnf-EAC1FA]

Aloha Noa:

I believe our project boundary is 581.5 acres. We chose to refrain from using all the acerage as a small portion of the property will not be fenced as there is cultural significance and we do not intend to infringe upon that portion. Thanks for your help on this project. Please let me know what the next steps are for us.

**From:** Ching, Noa K [mailto:Noa.K.Ching@hawaii.gov]
**Sent:** Friday, March 20, 2015 9:49 AM
**To:** David Laeha
**Subject:** RE: Scan Data from [Dell-C2665dnf-EAC1FA]

David,

Your IAL tax credit application has been approved for the full requested amount of $3,194,929.62. I am now writing the certificate, and I need one more piece of information. Could you please tell me the total acreage for the project boundary indicated in the map you attached in this previous email?

Thank you,

Noa

**From:** David Laeha [mailto:david@hawaiidairyfarms.com]
**Sent:** Sunday, March 08, 2015 11:37 PM
**To:** Ching, Noa K
**Subject:** FW: Scan Data from [Dell-C2665dnf-EAC1FA]

Aloha Noa:

Attached is a clearer drawing of where the TMK's (2-9-01 and 2-9-03 por6) which were approved as designated IAL and the placement of the farm relative to those portions of the TMKs. Given this, it is clear we are likely 100% on IAL lands.

---

**From:** Jim Garmatz [mailto:jim@hawaiidairyfarms.com]
**Sent:** Tuesday, March 3, 2015 12:32 PM
**To:** David Laeha; David Laeha
**Subject:** Fw: Scan Data from [Dell-C2665dnf-EAC1FA]

Red are farm boundaries.

Jim Garmatz
Hawaii Dairy Farms
Note my new email address: jim@hawaiidairyfarms.com
Phone: 808-212-5985

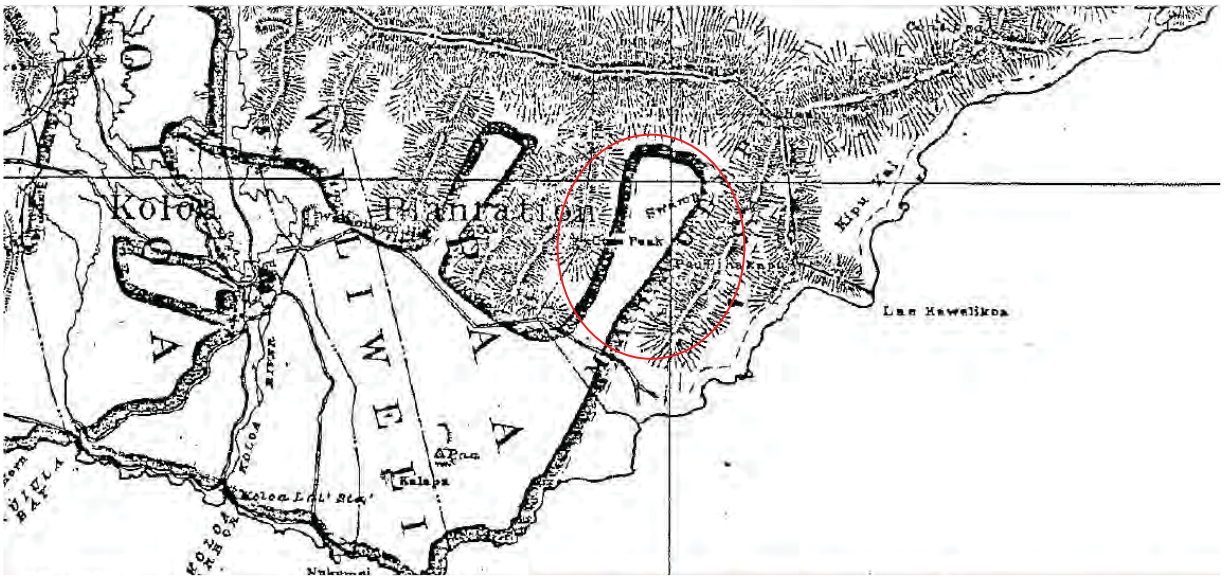
**From:** hdfcopier1@gmail.com
**Sent:** Tuesday, March 03, 2015 12:30 PM
**To:** jim@hawaiidairyfarms.com
**Subject:** Scan Data from [Dell-C2665dnf-EAC1FA]



** Also, wanted to be sure Mr. Omidyar's Social Security number is blocked out in the event anyone requests copies of the file.

Noa

# Appendix 13


Kolora
Plantation
Lake Kawelikoa
KOLOA RIVER
Kalapa

# Appendix 14

GROUP 70
INTERNATIONAL

PRINCIPALS

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OF COUNSEL

Ralph E. Portmore FAICP
Hitoshi Hida AIA

RECEIVED
JUN 01 2016
WASTEWATER BRANCH

May 25, 2016

State of Hawai'i
Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Attn: Ms. Sina Pruder, Chief, Wastewater Branch

**Subject:** **Hawai'i Dairy Farms**
**Waste Management Plan – Updates for Review**
**Māhā'ulepū, Kaua'i, Hawai'i**
**TMK: (4) 2-9-003: 001 por and 006 por & (4) 2-9-001: 001 por**

Dear Ms. Pruder:

As you have been aware, in late 2013, Ulupono Initiative made the investment to fund Hawai'i Dairy Farms, the first pasture-based rotational-grazing dairy in the state. Hawai'i Dairy Farms, LLC (HDF) was formed as a positive step toward the island state's food security, economic diversity, and sustainability. At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually at market price.

The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy farms found elsewhere in the state.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai'i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future to up to 2,000 productive milking cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The State of Hawai'i, Department of Health (DOH), Wastewater Branch has previously reviewed HDF's submitted Waste Management Plan (WMP) for an operation of 699 mature dairy cows, as required by the "Guidelines for Livestock Waste Management". In the WMP, HDF detailed the operations and management of the effluent ponds, which will be used to store effluent and manure for re-use as a primary nutrient source for growing Kikuyu grass, the cows' main food source. With the final review of the WMP by DOH in October 2014, HDF obtained their required building permit and approval to construct the dairy facility.

In the course of this effort, opponents to the dairy filed a lawsuit against HDF, claiming that an Environmental Impact Statement (EIS) was required prior to use of the agricultural land that HDF is situated upon. While HDF strongly disagrees with that requirement, HDF has *voluntarily* agreed to prepare and submit an EIS





pursuant to HRS Chapter 343. The purpose of the EIS is to evaluate potential environmental impacts of a pasture-based, rotational-grazing dairy system at 699 mature dairy cows and up to 2,000 mature dairy cows in Māha'ulepū Valley, Kaua'i.

While the EIS process was progressing, on-going technical studies and field trials were continued for various dairy components, including and not limited to groundwater and surface water quality assessments, historical and archeological studies, nutrient management calculations, and forage trials. Refinements to the dairy operation, including and not limited to adjustments to the total available pasture area, physical setbacks, inclusion of calves in the nutrient model, and current forage data, improved the nutrient mass balance analysis within the WMP previously submitted to DOH. The following attachment consists of an executive summary and description of those changes.

HDF would like to emphasize that the pasture-based, rotational-grazing dairy system, including the design of the effluent ponds, is fundamentally the same and has not changed. At 699 mature dairy cows, the updates to the mass balance analysis have minimal effect on the effluent ponds as the farm's infrastructure had been sized for up to 2,000 mature dairy cows. The expected percentage of the nutrient demand for healthy pasture productivity which will be provided by the animals is 30.5% for nitrogen and 35.8% for phosphorus, both of which show that the nutrients applied from the animals (at the 699 mature dairy cow herd size) are only about one-third of what the grass crop requires.

Please feel free to let me know if you have any questions or comments regarding these changes or the information presented herein or in the attachment. Please also let me know if any additional information or copies are required. Thank you for your consideration and review.

Sincerely,

Paul T. Matsuda, PE
Principal/Director of Civil Engineering
Group 70 International

**Attachment(s):** Update to Waste Management Plan, Hawai'i Dairy Farms

**Copy:** Kyle Datta, Hawai'i Dairy Farms
Jim Garmatz, Hawai'i Dairy Farms
Jenna Dunn, NRCS District Conservationist, Pacific Island Area, Lihue Service Center
Adam Reed, NRCS State Agronomist, Pacific Island Area, State Office

***ATTACHMENT***

# UPDATES TO WASTE MANAGEMENT PLAN HAWAI'I DAIRY FARMS

MĀHĀ'ULEPŪ, KAUA'I, HAWAI'I

Prepared By:

**Group 70 International**
925 Bethel Street, 5th Floor
Honolulu, HI 96813
(808) 523-5866

**Red Barn Consulting**
3050 Yellow Goose Road
Lancaster, Pennsylvania 17601
(717) 393-2176

Dated:

**May 25, 2016**

## EXECUTIVE SUMMARY

The Waste Management Plan (WMP) for Hawai'i Dairy Farms, focusing on a pasture-based, rotational-grazing dairy system with 699 mature dairy cows located in Māhā'ulepū, Kaua'i, was submitted to DOH on July 23, 2014. Subsequently, the WMP was reviewed by the State of Hawai'i, Department of Health (DOH), Wastewater Branch (WWB).

On October 24, 2014, the DOH-WWB indicated that HDF has addressed all of DOH-WWB comments from their review of the WMP and that there were no further comments on the WMP. DOH-WWB indicated there would be no further action on the WMP at that time, signaling that HDF had met the requirements of the "Guidelines for Livestock Waste Management" for effluent pond systems in the State of Hawai'i.

However, before construction was able to commence, HDF voluntarily agreed to prepare and submit an Environmental Impact Statement (EIS) pursuant to HRS Chapter 343. Based upon current environmental regulations and confirmed by the State of Hawaii Department of Health, the preparation of an EIS was not required, but was requested by neighboring developments and a select group of the public. Nevertheless, HDF agreed to conduct the environmental assessment with the State of Hawaii, Department of Health agreeing to be the accepting authority.

While the EIS process was progressing, previously on-going technical studies and field trials continued and discussions with other regulatory agencies were held. Forage productivity sampling was conducted to provide current data for nutrient management consideration. This updated information, specific to the project site, requires refinements to the WMP previously reviewed by DOH-WWB.



HDF would like to emphasize that the pasture-based, rotational-grazing dairy system, including the design and sizing of the effluent ponds, is fundamentally the same and has not changed. Simply put, field-tested and proven data, based on ground-level trials and studies, can improve the basis of the WMP.

| # | Current WMP | Proposed Change | Justification |
|---|---|---|---|
| 1 | 174 calves on site | 150 calves on site | No more than 150 calves will be kept on site at any time, based on size and age. |
| 2 | Nutrient Mass Balance Table is populated by the Dairy New Zealand Model. | Nutrient Mass Balance Table is updated with the Cornell Model. | The Cornell Net Carbohydrate Protein System Model is a United States industry-recognized nutrient and milk production model. While HDF recognizes the success of the Dairy New Zealand model for evaluation of nutrients, HDF ultimately believes that the United States standard is best suited for operation on Kaua'i. |
| 3 | Project Boundary | Reduced Project Boundary | The boundary has slightly adjusted along the perimeter of the farm. |
| 4 | Receiving Water Body State Water Quality = Class A Marine Waters / Class 1 Critical Habitat | Receiving Water Body State Water Quality = Class A Marine Waters | The State of Hawai'i has recently updated its water quality classifications for this region. |
| 5 | Water Wells = 14 | Water Wells = 14 original, 3 remaining. | Most of Well Battery 14 was abandoned, with only 3 wells remaining. |
| 6 | Total Lease Area = 577.9 acs | Total Lease area = 556.8 acs | Field conditions and negotiations with Mahaulepu Farm (landowner) have resulted in a defined and measureable lease area. |
| 7 | Grazing Area = 517.3 acs | Grazing Area = 469.9 acs | Area has been set aside for project buffers, setbacks, raceways, and other areas not available for pasture grazing. |
| 8 | Land Use Summary Table | Revised Land Use Summary Table | With revisions to the project boundary, the total farm acreage has changed, including the pasture acreage, facility acreage, and open space acreage. |
| 9 | Total Paddocks = 118 | Total Paddocks = 119 | With the revision to the farm area, paddock layouts were slight altered, resulting in 1 new paddock formed. Though the farm area decreased, several paddocks were divided to create additional paddocks near the calf sheds for housing the calves. |
| 10 | Area Percentages | Revised Area Percentages | Percent areas for the dairy facility, effluent ponds, etc. compared to the total farm area have changed due to the change in leased area. |

| | | | |
|---|---|---|---|
| 11 | Access Road and Tanker Truck Turnaround | New Location for Access Road and Tanker Truck Turnaround moved to east side of facility | The new location makes access to the facility both safer and cost effective, as the steep downhill grade on the west side of the facility is avoided. |
| 12 | **Drip Irrigation in areas outside of the pivot extent** | **Gun Irrigation in areas outside of the pivot extent** | **Drip irrigation tubing and infrastructure would likely be destroyed often by grazing cows and require significant repair.** |
| 13 | Irrigated Area Percentages | Revised Irrigated Area Percentages | Percent areas for irrigated farm areas versus non-irrigated farm areas, etc. compared to the total farm area have changed due to the change in leased area. |
| 14 | **Irrigation Demand Summary** | **Revised Irrigation Demand Summary** | **Revised amounts of irrigated areas and non-irrigated areas results in changes in demand.** |
| 15 | Section 6.1 – Irrigation Schedule | Renumbered Section 6.1 to Section 6.6 | Duplicate section heading number to be renumbered for clarity and to avoid confusion. |
| 16 | **Wastewater Treatment Section** | **Wastewater Management Section** | **Public comments on the original WMP correctly indicated that the ponds are not treatment systems, as the original WMP did not indicate any wastewater treatment systems for the effluent. Wastewater is stored and not treated in the effluent ponds.** |
| 17 | Cow Weight = 1,210 lbs | Cow Weight = 1,200 lbs | Same cow but parameter has changed, with switch to Cornell Model |
| 18 | **Manure Production = 143 lbs per day** | **Manure Production = 90.8 lbs per day** | **Manure production is affected by the nutrient content and chemical composition of the forage. With updated forage testing incorporated into the Cornell Model, manure production values have been updated and are consistent with the USDA/NRCS Agricultural Waste Management Field Handbook (March 2008), which utilizes established American Society of Agricultural Engineers (ASAE) values for manure production per cow per day.** |
| 19 | Effluent / Manure Volume | Revised Effluent / Manure Volume for Calves | Added in generation of manure from calves and updated based on total manure produced. Increased daily generation effluent due to increase in wash water projections at 699 cows. |
| 20 | **Minimum Effluent Storage = 23 days** | **Minimum Effluent Storage = 25 days** | **Incorporated 2 days of storage before forecasted rain event. No effect as total storage provided is still 30 days.** |
| 21 | Effluent Totals within Storage Pond Volume | Revised Effluent Totals within Storage Pond Volume | **NOTE: The sizes of the ponds have <u>not</u> changed.** Because of the increase in daily wastewater generation, more volume is required in storage |





| | | | |
|---|---|---|---|
| | | | pond at 699 cows. However, since the pond is designed for up to 2,000 cows, the increase has no impact. |
| 22 | **Grass Yield Goal = 20 tons DM per acre per year** | **Grass Yield Goal remains the same. However, calculations are based upon ongoing grass trials = 16.3 tons DM per acre per year** | **HDF has committed to studying the operation of the farm at current grass trial levels. While HDF expects the yield goal to realize, existing trial data guarantees that 16.3 tons DM per acre per year can be produced by the current field and system.** |
| 23 | Nutrient Mass Balance Tables | Revised Nutrient Mass Balance Tables | Balance based upon revised manure numbers, revised pasture acreage, & revised grass yields. |
| 24 | **Soil Sampling Frequency = Every Three Years** | **Soil Sampling Frequency = Every Year** | **Allows for better and more efficient farm management. Sampling the soil for nutrient content and fertility recommendations more often ensures that nutrients are 1) not over applied but 2) not wasted.** |

## DESCRIPTION OF CHANGES

A description of the changes above is detailed by item number below, with the corresponding section reference to the original WMP in **bold**.

1) **Letter to DOH from Group 70 International, "Hawaii Dairy Farm, Waste management Plan – Review Comments", Dated June 23, 2014:** The number of calves on-site has been evaluated to consist of, at most, 150 calves on site, instead of 174 calves as shown in the original WMP. Calves will be managed to be moved off-site after 90 days or after they reach 150 lbs. At 699 calves, this equates to 150 calves.
2) **Section 1.0 – Project Overview:** The Cornell Net Carbohydrate Protein System (CNCPS) model is being used for the basis of estimating nutrient content of the manure, based upon grass inputs. The nutritional content of the grass has also been analyzed within field trials and actual grass grown on the Māhā'ulepū site has been input into the CNCPS model to determine the nutritional value to the animals, and ultimately the nutrient content of their manure. While the original WMP previously utilized the Dairy New Zealand model, HDF believes each model is comparable and ultimately will be used to provide the same information, but the CNCPS model is recognized in the United States. It allows for easier comparison of farm-specific data with other farms in the State of Hawaii and throughout the country. Just as significant, the inputs into the model are now based upon field trials.
3) **Figure 2 – Project Location Map**: The project boundary has been slightly altered. The taro farm within the center of the project will occupy more area than anticipated in the original WMP. Additionally, the perimeter boundary has been updated based upon a topographic survey performed for the project by Red Barn Consulting.

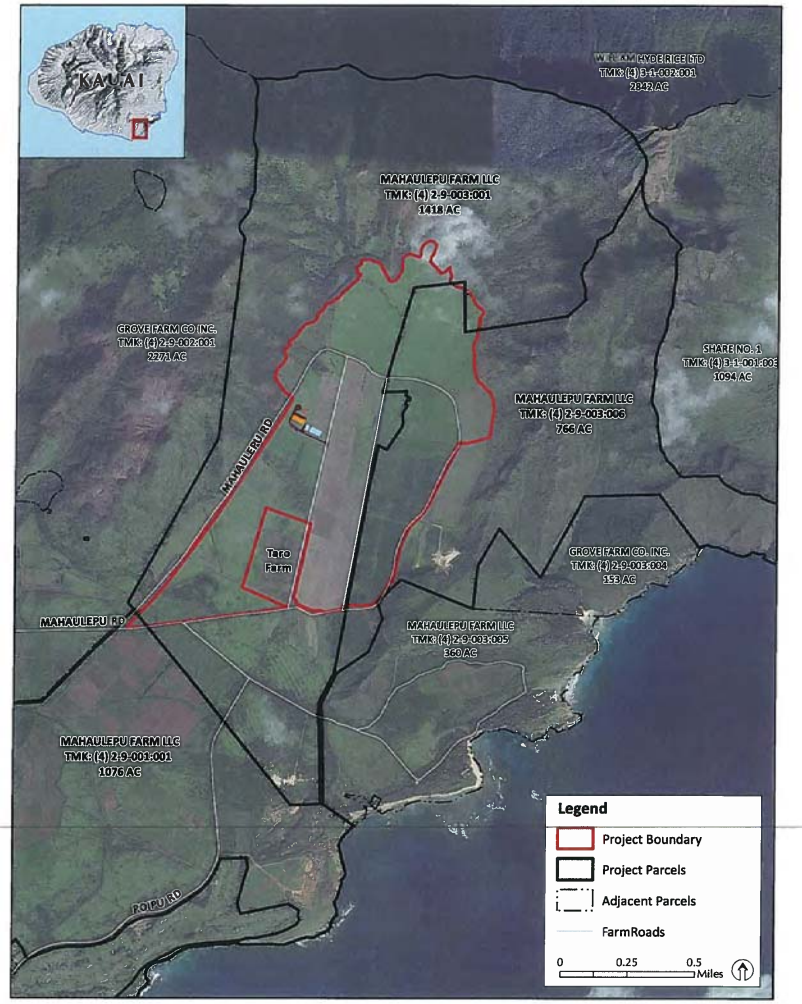



**Figure 2 – Project Location Map**





4) **Section 2.2.1 – Receiving Water Body State Water Quality:** The Water Quality Maps available from the State of Hawai'i Department of Health are no longer applicable to the project site, and State Water Body Quality is now available only within HAR §11-54. The WMP will now state that this stretch of open coastal waters is classified as Class A for water quality standards in HAR §11-54.

5) **Section 2.2.3 – Water Wells:** The existing private water wells on-site were described. Further field study has indicated that of the original 14 wells in the Māhā'ulepū 14 Well Battery, only 3 remain. These wells will be used for potable water use, a backup source, and for groundwater monitoring.

6) **Section 3.0 - Land Use Summary**: As the project boundaries have changed, the total lease area agreed upon between HDF and Mahaulepu Farms (Owner) has reduced from 577.9 acres to 556.8 acres. As mentioned, more area was reserved for the taro farm and area was removed based upon the topographic survey of the site, which identified perimeter roads and the tree line.

7) **Section 3.0 – Land Use Summary:** At 699 mature dairy cows, the original WMP included setbacks and project buffers, raceways, etc., but did not specify its total area within the pasture area calculations. The total area of the setbacks and buffers is now calculated, and the available grazing and pasture area is now 469.9 acres. Setbacks and buffers include:

   - 35-foot setback (fencing) from water resources on the farm
   - 1,000-foot setback (fencing) from the County of Kaua'i Kōloa F Well.
   - 16-foot to 20-foot wide raceways

   The addition of the 1,000-foot setback from the County of Kaua'i Kōloa F Well was requested by the County of Kauai Department of Water following submission and review of the original WMP. HDF has agreed to provide this setback and the WMP must be updated to reflect the change in available pasture areas.

8) **Section 3.0 – Land Use Summary:** Changes in the land use table are required as the project boundary, pasture acreage, and other farm features have been incorporated into the WMP.

| Land Use | Acres |
|---|---|
| **Farm** | |
| Paddocks / Pasture | 469.9 |
| Cow Races, Farm Roads, Drainage Ways & Setbacks / Vegetated Buffers | 77.2 |
| **Subtotal** | **547.1** |
| **Headquarters / Dairy Facility** | |
| Milking Parlor, Yards, Sheds, Road, Ponds | 9.7 |
| **Subtotal** | **9.7** |
| **TOTAL** | **556.8** |

9) **Section 3.0 – Land use Summary:** The net total amount of paddocks has been revised. With reconfiguration to the project area and boundaries, the paddocks and cow raceway layouts were updated. Several paddocks were created in the mauka sections of the farm, while several paddocks were removed to maintain a 1,000 foot setback from the Kōloa F County Well, which was agreed to by the County of Kauai and HDF. Several paddocks near the calf sheds were divided into smaller paddocks to allow better management of the grazing calves. The net number of paddocks, therefore, increased by one (1).

| Field | Acres | Field | Acres | Field | Acres | Field | Acres |
|---|---|---|---|---|---|---|---|
| P 101 | 3.62 | P 133 | 4.26 | P 202 | 3.60 | P 234 | 4.64 |
| P 102 | 1.12 | P 134 | 4.73 | P 203 | 3.99 | P 235 | 4.62 |
| P 103 | 4.47 | P 135 | 4.74 | P 204 | 3.40 | P 236 | 4.67 |
| P 104 | 4.54 | P 136 | 4.78 | P 205 | 6.01 | P 237 | 5.04 |
| P 105 | 3.08 | P 137 | 4.81 | P 206 | 6.04 | P 238 | 6.14 |
| P 106 | 2.94 | P 138 | 5.06 | P 207 | 4.17 | P 239 | 7.63 |
| P 107 | 3.02 | P 139 | 5.53 | P 208 | 4.41 | P 301 | 3.29 |
| P 108 | 2.91 | P 140 | 6.57 | P 209 | 0.55 | P 302 | 3.94 |
| P 109 | 1.69 | P 141 | 4.76 | P 210 | 0.59 | P 303 | 3.65 |
| P 110 | 2.83 | P 142 | 4.93 | P 211 | 0.63 | P 304 | 3.97 |
| P 111 | 3.04 | P 143 | 4.32 | P 212 | 0.52 | P 305 | 4.01 |
| P 112 | 4.19 | P 144 | 3.94 | P 213 | 0.51 | P 306 | 4.16 |
| P 113 | 4.12 | P 145 | 3.87 | P 214 | 0.48 | P 307 | 4.11 |
| P 114 | 3.80 | P 146 | 3.43 | P 215 | 4.24 | P 308 | 4.02 |
| P 115 | 4.51 | P 147 | 3.89 | P 216 | 4.54 | P 309 | 4.55 |
| P 116 | 4.29 | P 148 | 3.88 | P 217 | 4.64 | | |
| P 117 | 3.29 | P 149 | 4.11 | P 218 | 4.20 | | |
| P 118 | 4.54 | P 150 | 4.17 | P 219 | 4.41 | | |
| P 119 | 3.06 | P 151 | 4.23 | P 220 | 4.32 | P 313 | 3.00 |
| P 120 | 3.49 | P 152 | 3.44 | P 221 | 4.30 | P 314 | 3.01 |
| P 121 | 3.17 | P 153 | 4.03 | P 222 | 4.29 | P 315 | 3.01 |
| P 122 | 4.25 | P 154 | 4.46 | P 223 | 4.35 | P 316 | 3.02 |
| P 123 | 3.53 | P 155 | 3.94 | P 224 | 4.41 | P 317 | 3.78 |
| P 124 | 3.90 | P 156 | 4.46 | P 225 | 4.38 | P 318 | 3.64 |
| P 125 | 3.89 | P 157 | 4.14 | P 226 | 4.42 | P 319 | 4.34 |
| P 126 | 3.24 | P 158 | 5.24 | P 227 | 4.46 | P 320 | 4.29 |
| P 127 | 4.59 | P 159 | 4.49 | P 228 | 4.50 | | |
| P 128 | 4.38 | P 160 | 4.56 | P 229 | 4.47 | | |
| P 129 | 4.35 | P 161 | 4.52 | P 230 | 3.69 | | |
| P 130 | 4.10 | P 162 | 3.54 | P 231 | 3.39 | | |
| P 131 | 4.02 | P 163 | 3.43 | P 232 | 4.26 | | |
| P 132 | 3.94 | P 201 | 4.47 | P 233 | 4.55 | Total | 469.9 |





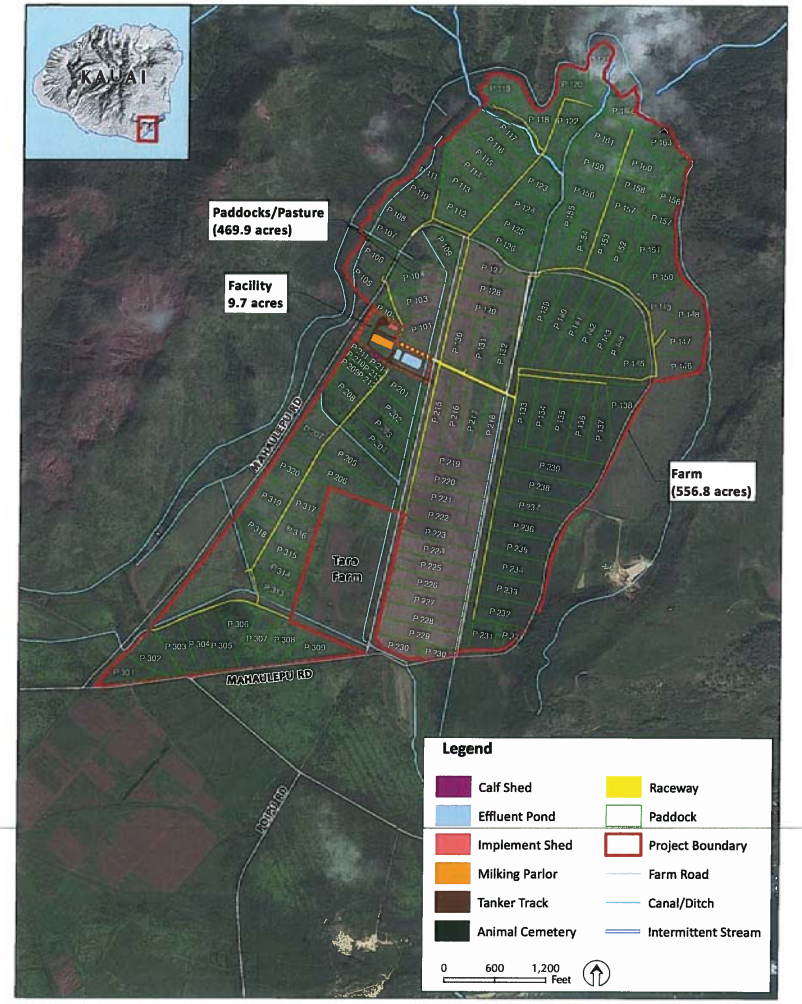



**Figure 6 – Paddock Map**

10) **Section 4.0 – Farm Description:** The original WMP noted several percentage calculations of areas for specific facilities with respect to the overall farm area. These numbers have been updated as the total farm boundary has been updated and the overall area specified as the "dairy facility" has been slightly altered to 9.7 acres (change in "open space" to paddocks).

    *The majority of the dairy farm area (**i.e. ~83%**) is dedicated to pasture. Much of the remaining area is dedicated to access roads, cow races, the dairy facility, and waterway setback / buffers. The dairy facility including the parlor, effluent ponds and secondary containment areas is contained within a **9.7-acre** area, which represents about **1.7%** of the entire farm. The corresponding building areas are under **0.1%** of the total farm area.*

11) **Section 4.2.6 – Access Road and Tanker Truck Turnaround:** Access to the dairy facility was provided off of Māhā'ulepū Road on the western side of the facility in the original WMP. Due to steeper terrain and the condition of Māhā'ulepū Road along the western side of the valley, access was relocated to one of the main farm roads in the center of the valley. The existing farm road, which passes by the taro farm and Pivot #2, is flat and is the current, operational access road to the various parts of the farm. Relocation of the access will save on construction costs and improve safety for tanker trucks to the facility. The configuration of the tanker truck turnaround adjacent to the implement shed will remain the same as in the original WMP.

12) **Section 6.2 – Drip Irrigation System:** The original WMP called for drip irrigation features in the makai areas of the farm where the center pivots could not reach. HDF has decided it will install a gun irrigation system instead, to allow for better management of the system and reduce required upkeep, as maintenance of drip irrigation facilities in active pastures where cows are grazing is expected to be more intense. The gun irrigation design will utilize a hard-hose reel gun nozzle on a cart, which attaches to hydrants, but can be moved around the area to provide even irrigation coverage.

13) **Section 6.5 – Irrigation Demand:** With the reconfiguration of the paddock layout on the farm, irrigated area totals have changed from the original WMP. Percentages of the farm that are irrigated versus non-irrigated have been updated.

***Irrigated Pasture Areas:***

| Irrigated Pasture Area | Acres |
|---|---|
| Irrigation Pivot #1 (Full Circle) | 164.7 |
| Irrigation Pivot #2 (Partial Circle) | 120.4 |
| **Subtotal** | 285.1 |
| Gun Irrigation Area | 61.4 |
| **Total Irrigated Pasture Area** | **346.5** |

***Non-Irrigated Pasture Areas:***

| Non-Irrigated Pasture Area | Acres |
|---|---|
| Pasture Area within 50' Pivot Irrigation Setback | 13.8 |
| Remaining Non-Irrigated Pasture Area | 109.6 |
| **Total Non-Irrigated Pasture Area** | **123.4** |





14) **Section 6.5 – Irrigation Demand:** With changes in the irrigation areas, the overall irrigation demand from the grass crop has changed. A reduction in irrigated area results in less irrigation water demand per day. The upper-end irrigation demand estimate, used for planning purposes, will be 2.26 MGD in lieu of 2.93 MGD as indicated in the original WMP.

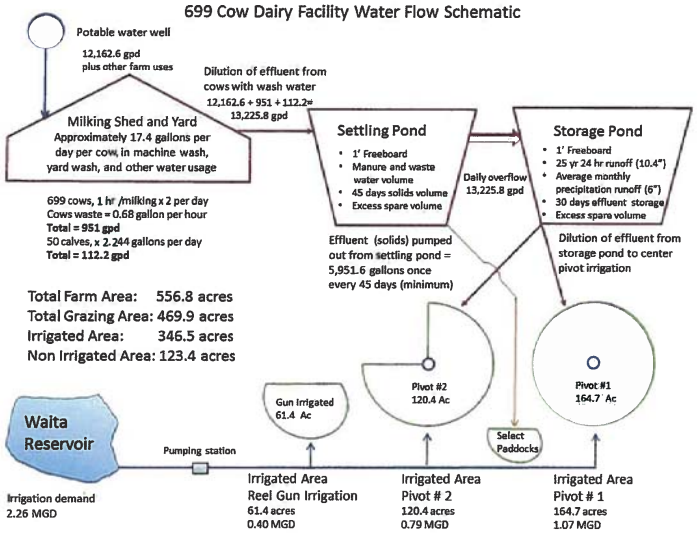
15) **Section 6.1 – Irrigation Schedule** on page 37 of the original WMP should be renumbered to Section 6.6 – Irrigation Schedule for clarity and to avoid confusion.

16) **Section 7.0 – Wastewater Treatment:** Public comments on the original WMP correctly indicated that the ponds are not treatment systems, as the original WMP did not indicate any wastewater treatment systems for the effluent. To avoid confusion and for added clarity, Section 7 – Wastewater Treatment in the original WMP should be renamed to Section 7 – Wastewater Management.

17) **Section 7.1 – Effluent / Manure Volume:** The mature cow's weight has been slightly adjusted from 1,210 lbs to 1,200 lbs.

18) **Section 7.1 – Effluent / Manure Volume:** Manure production per mature dairy cow has reduced from 143 lbs per day to 90.8 lbs per day. The change incorporates actual grass trials and forage testing data from grass grown on the farm. Manure production is affected by the nutrient content and chemical composition of the forage. With the updated forage testing data incorporated into the Cornell Model, manure production values have been updated and are consistent with the USDA/NRCS Agricultural Waste Management Field Handbook (March 2008), which utilizes established American Society of Agricultural Engineers (ASAE) values for manure production per cow per day.

19) **Section 7.1 – Effluent / Manure Volume:** The original WMP did not account for calves in the volume projections for sizing of the effluent ponds. Because the calves produce very little manure per day (19 lbs per day) and only a fraction of the calves are within the sheds which ultimately discharge to the effluent ponds, calves are typically not required to be taken into account for nutrient management purposes. However, HDF has updated the WMP to include manure production for calves, meaning there is a slight increase in the daily wastewater generation collected by the ponds. Additionally, wash water projections were increased at 699 mature dairy cows from 10,667 gpd to 12,162.6 gpd based upon an estimated requirement of 17.4 gpd of wash water per mature dairy cow. See revised waterflow schematic:




20) **Section 7.1 – Effluent / Manure Volume:** The original WMP noted that the required storage period, utilized to size the storage pond, was 23 days, including 17 days for the longest recorded consecutive day rainfall event on record, 4 days between scheduled irrigation of effluent, and 2 days for a forecasted storm event. The total storage period was then set to 30 days to provide additional capacity. 2 additional days are added into the 23 day total for pasture dry time following a significant rain event, bringing the total required minimum storage period to 25 days. However, the 30 day storage period will remain the same and will still provide additional buffer capacity.

21) **Section 7.2 – Effluent Ponds:** Overall storage pond volumes shown in the original WMP have remained the same. However, because of increased storage requirements – due to increased projections in wash water usage (10,667 gpd to 12,162.5 gpd) at 17.4 gpd per mature dairy cow as well as due to the inclusion of calves in the pond sizing calculations, more effluent is shown to be entering into the storage pond at 699 animals. However, since the pond is designed for up to 2,000 cows, there is no impact to the pond sizes.





| Design Criteria/Assumption | 699 Mature Dairy Cows | 2,000 Mature Dairy Cows | Pond |
|---|---|---|---|
| Daily Wastewater Generation | 13,225.8 gpd | 37,841.7 gpd | |
| Percentage of Solids | 1% | 1% | Settling |
| Volume of Accumulated Solids for 45-day Period Between Application | 5,951.6 gal | 17,052.6 gal | Settling |
| Daily Flow to Storage Pond | 13,225.8 gpd | 37,841.7 gpd | |
| Minimum Volume of Effluent for 30-day Design Volume Period | 396,774 gal | 1,136,841 gal | Storage |
| Depth of 25-Year, 24 Hour Storm | 10.4 inches | 10.4 inches | Storage |
| Depth of Normal Precipitation for 30-day Design Volume Period | 6 inches | 6 inches | Storage |

22) **Section 8.2 – Pasture Based Dairy:** Grass yields in the original WMP were projected for 20 tons of dry matter (DM) per acre per year and were the basis for all nutrient application rates and nutrient management planning.

HDF has approximately 18 months of grass trial data, for grass growth on over 70 acres of pasture on the project site. The grass trials simulate an expected grazing and 18-day rest period that a paddock would be subject to on the operational dairy. Current yields (as of 2015) indicate a production of 16.3 tons of DM per acre per year, only after 18 months of trials. Once the pasture is established and has matured, yields of 20 tons of DM per acre per year, or even greater, are anticipated. However, for the purposes of the WMP, HDF has elected to utilize the current grass yield at 16.3 tons of DM per acre per year as the basis of the nutrient management section, as physical trials have proven that the field is at least capable of producing this much forage.

23) **Section 8.4.2 – Nutrient Mass Balance:** With the use of 16.3 tons of DM per acre per year in the nutrient mass balance calculations, the nutrient demand of the grass crop is reduced. In the overall farm ecosystem, less production of grass means that fewer nutrients are required from the crop. However, because the quantity of nutrients supplied by 699 mature dairy cows and 150 calves is minimal on the 469.9 acres of pasture, the nutrient mass balance of the farm is not significantly impacted by the reduction in the grass yield to current data from a yield goal of 20 tons of DM per acre per year. Commercial fertilizer is still required to fulfill the grass nutrient need and maintain high productivity and soil health.

| Nutrient Application | Area (acre) | Nitrogen Applied (lbs N/year) | Phosphorous Applied (lbs $P_2O_5$/year) |
|---|---|---|---|
| Manure As-Excreted | 469.9 | 129,556 | 26,966 |
| Liquid Effluent | 285.1 | 11,980.8 | 2,586.7 |
| Slurry Application | 42.0 | 7,987.2 | 1,724.4 |
| **Total** | | **149,524** | **31,277** |
| **Plant Nutrient Demand** | | **490,200** | **87,317** |
| Percentage from Animals | | 30.5% | 35.8% |
| Required Chemical Fertilizer | | 340,676 | 56,040 |
| Percentage Demand from Fertilizer | | 69.5% | 64.2% |

| Month | N Collected in Pond (lbs-N/mo) | P Collected in Pond (lbs-P/mo) | N Excreted on Pasture (lbs-N/mo) | P Excreted on Pasture (lbs-P/mo) | N Total Deposited on Farm (lbs-N/mo) | P Total Deposited on Farm (lbs-P/mo) | N Total Uptake from Farm (lbs-N/mo) | P Total Uptake from Farm (lbs-P/mo) | N Deficit (lbs-N/mo) (Fertilizer Need) | P Deficit (lbs-P/mo) (Fertilizer Need) |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| February | 1,532 | 331 | 9,939 | 2,069 | 11,470 | 2,399 | 37,604 | 6,698 | 26,134 | 4,299 |
| March | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| April | 1,641 | 354 | 10,648 | 2,216 | 12,290 | 2,571 | 40,290 | 7,177 | 28,001 | 4,606 |
| May | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| June | 1,641 | 354 | 10,648 | 2,216 | 12,290 | 2,571 | 40,290 | 7,177 | 28,001 | 4,606 |
| July | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| August | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| September | 1,641 | 354 | 10,648 | 2,216 | 12,290 | 2,571 | 40,290 | 7,177 | 28,001 | 4,606 |
| October | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| November | 1,641 | 354 | 10,648 | 2,216 | 12,290 | 2,571 | 40,290 | 7,177 | 28,001 | 4,606 |
| December | 1,696 | 366 | 11,003 | 2,290 | 12,699 | 2,656 | 41,633 | 7,416 | 28,934 | 4,760 |
| Annual Total | 19,968 | 4,311 | 129,556 | 26,966 | 149,524 | 31,277 | 490,200 | 87,317 | 340,676 | 56,040 |





24) **Section 8.8.1 – Soil Testing Frequency:** In the original WMP, soil sampling was expected every three years. However, based upon the public's input as well as additional soils testing by Dr. Russell Yost, with the University of Hawai'i, soil sampling and testing for nutrient content and fertility recommendations will be conducted yearly. Increased testing will ensure that nutrients are not over-applied past the grass nutrient demand, and HDF will benefit from more frequent testing to ensure that nutrients are not wasted.

## SUMMARY

HDF believes that the changes made above improve the original Waste Management Plan, submitted to DOH on July 23, 2014, which was subsequently reviewed. These changes not only address public concern over the proposed dairy (with the addition of calves, reduction in available pasture area, etc.), but also are grounded in scientific reality with the additional incorporation of field-tested and site-specific, proven data (grass yields and soils analysis) and technical studies conducted within the last year.

HDF would like to emphasize that the pasture-based, rotational-grazing dairy system, including the design and sizing of the effluent ponds, is fundamentally the same and has not changed. Simply put, better and more current data, based on ground-level trials and studies, can improve the basis of the WMP.

# Appendix 15

**NATURAL RESOURCES CONSERVATION SERVICE**
**PACIFIC ISLANDS AREA**

**CONSERVATION PRACTICE STANDARD**

# WASTE STORAGE FACILITY

**(No.)**

**CODE 313**

## DEFINITION

A waste storage impoundment made by constructing an embankment and/or excavating a pit or dugout, or by fabricating a structure.

## PURPOSE

To temporarily store wastes such as manure, wastewater, and contaminated runoff as a storage function component of an agricultural waste management system.

## CONDITIONS WHERE PRACTICE APPLIES

- Where the storage facility is a component of a planned agricultural waste management system
- Where temporary storage is needed for organic wastes generated by agricultural production or processing
- Where the storage facility can be constructed, operated and maintained without polluting air or water resources
- Where site conditions are suitable for construction of the facility
- To facilities utilizing embankments with an effective height of 35 feet or less where damage resulting from failure would be limited to damage of farm buildings, agricultural land, or township and country roads.
- To fabricated structures including tanks, stacking facilities, and pond appurtenances.

## CRITERIA

**General Criteria Applicable to All Waste Storage Facilities.**

**Laws and Regulations.** Waste storage facilities must be planned, designed, and constructed to meet all federal, state, and local laws and regulations.

**Location.** To minimize the potential for contamination of streams, waste storage facilities should be located outside of floodplains. However, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event, or larger if required by laws, rules, and regulations. Waste storage facilities shall be located so the potential impacts from breach of embankment, accidental release, and liner failure are minimized; and separation distances are such that prevailing winds and landscape elements such as building arrangement, landforms, and vegetation minimize odors and protect aesthetic values.

Various localities may have specific requirements which must be followed. For instance, the State of Hawaii, Department of Health, requires waste facilities be located a buffer distance of 1,000 feet from public drinking water resources and 50 feet from surface water resources. Waste storage facilities shall not be located in wetlands.

**Storage Period.** The storage period is the maximum length of time anticipated between emptying events. The minimum storage period shall be based on the timing required for environmentally safe waste utilization considering the climate, crops, soil, equipment, and local, state, and federal regulations.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service State Office or visit the Field Office Technical Guide.





**Design Storage Volume.** The design storage volume equal to the required storage volume shall consist of the total of the following as appropriate:

(a) Manure, wastewater, and other wastes accumulated during the storage period

(b) Normal precipitation less evaporation on the surface area (at the design storage volume level) of the facility during the storage period

(c) Normal runoff from the facility's drainage area during the storage period

(d) 25-year, 24-hour precipitation on the surface (at the required design storage volume level) of the facility

(e) 25-year, 24-hour runoff from the facility's drainage area

(f) Residual solids after liquids have been removed. A minimum of 6 inches shall be provided for tanks

(g) Additional storage as may be required to meet management goals or regulatory requirements

**Inlet.** Inlets shall be of any permanent type designed to resist corrosion, plugging, and ultraviolet ray deterioration while incorporating erosion protection as necessary.

The inlet pipe should have a minimum diameter of 6 inches. An inlet pipe shall terminate a sufficient distance from the shoreline to insure good distribution. A plumbing cleanout must be provided, as needed, to allow access to the pipe for removing blockage.

**Emptying Component.** Some type of component shall be provided for emptying storage facilities. It may be a facility such as a gate, pipe, dock, wet well, floating pump, pumping platform, retaining wall, or ramp. Features to protect against erosion, tampering, and accidental release shall be incorporated as necessary.

**Accumulated Solids Removal.** Provision shall be made for periodic removal of accumulated solids to preserve storage capacity. The anticipated method for doing this must be considered in planning, particularly in determining the configuration of ponds and type of seal, if any.

**Safety.** Design shall include appropriate safety features to minimize the hazards of the facility. Ramps used to empty liquids shall have a slope of 4 horizontal to 1 vertical or flatter. Those used to empty slurry, semi-solid, or solid waste shall have a slope of 10 horizontal to 1 vertical or flatter unless special traction surfaces are provided. Warning signs, fences, ladders, ropes, bars, rails, and other devices shall be provided, as appropriate, to ensure the safety of humans and livestock. Ventilation and warning signs must be provided for covered waste holding structures, as necessary, to prevent explosion, poisoning, or asphyxiation. Pipelines shall be provided with a water-sealed trap and vent, or similar device, if there is a potential, based on design configuration, for gases to enter buildings or other confined spaces. Ponds and uncovered fabricated structures for liquid or slurry waste with walls less than 5 feet above ground surface shall be fenced and warning signs posted to prevent children and others from using them for other than their intended purpose.

**Erosion Protection.** Embankments and disturbed areas surrounding the facility shall be treated to control erosion.

**Liners.** Liners shall meet or exceed the criteria in Pond Sealing or Lining, Compacted Clay Treatment (521D); or Pond Sealing or Lining, Flexible Membrane (521A).

**Additional Criteria for Waste Storage Ponds**

**Soil and foundation.** The pond shall be located in soils with an acceptable permeability that meets all applicable regulation, or the pond shall be lined. Information and guidance on controlling seepage from waste impoundments can be found in the Agricultural Waste Management Field Handbook (AWMFH), Appendix 10D.

The pond shall have a bottom elevation that is a minimum of 2 feet above the seasonal high water table unless features of special design are incorporated that address buoyant forces, pond seepage rate and non-encroachment of the water table by contaminants. The water table may be lowered by use of perimeter drains, if feasible, to meet this requirement.

**Maximum Operating Level.** The maximum operating level for waste storage ponds shall be the pond level that provides for the required

volume less the volume contribution of precipitation and runoff from the 25-year, 24-hour storm event plus the volume allowance for residual solids after liquids have been removed. A permanent marker or recorder shall be installed at this maximum operating level to indicate when drawdown should begin. The marker or recorder shall be referenced and explained in the O&M plan.

**Outlet.** No outlet shall automatically release storage from the required design volume. Manually operated outlets shall be of permanent type designed to resist corrosion and plugging.

**Embankments.** The minimum elevation of the top of the settled embankment shall be 1 foot above the waste storage pond's required volume. This height shall be increased by the amount needed to ensure that the top elevation will be maintained after settlement. This increase shall be not less than 5 percent. The minimum top widths are shown in Table 1. The combined side slopes of the settled embankment shall not be less than 5 horizontal to 1 vertical, and neither slope shall be steeper than 2 horizontal to 1 vertical unless provisions are made to provide stability.

**Table 1 – Minimum Top Widths**

| Total embankment Height, ft. | Top Width, ft. |
|---|---|
| 15 or less | 8 |
| 15 – 20 | 10 |
| 20 – 25 | 12 |
| 25 – 30 | 14 |
| 30 – 35 | 15 |

**Excavations.** Unless supported by a soil investigation, excavated side slopes shall be no steeper than 2 horizontal to 1 vertical.

**Additional Criteria for Fabricated Structures**

**Foundation.** The foundations of fabricated waste storage structures shall be proportioned to safely support all superimposed loads without excessive movement or settlement.

Where a non-uniform foundation cannot be avoided or applied loads may create highly variable foundation loads, settlement should be calculated from site-specific soil test data. Index tests of site soil may allow correlation with similar soils for which test data is available. If no test data is available, presumptive bearing strength values for assessing actual bearing pressures may be obtained from Table 2 or another nationally recognized building code. In using presumptive bearing values, adequate detailing and articulation shall be provided to avoid distressing movements in the structure.

Foundations consisting of bedrock with joints, fractures, or solution channels shall be treated or a separation distance provided consisting of a minimum of 1 foot of impermeable soil between the floor slab and the bedrock or an alternative that will achieve equal protection.

**Table 2 - Presumptive Allowable Bearing Stress Values[1]**

| Foundation Description | Allowable Stress |
|---|---|
| Crystalline Bedrock | 12000 psf |
| Sedimentary Rock | 6000 psf |
| Sandy Gravel or Gravel | 5000 psf |
| Sand, Silty Sand, Clayey Sand, Silty Gravel, Clayey Gravel | 3000 psf |
| Clay, Sandy Clay, Silty Clay, Clayey Silt | 2000 psf |

[1] Basic Building Code, 12th Edition, 1993, Building Officials and Code Administrators, Inc. (BOCA)

**Liquid Tightness.** Applications such as tanks, that require liquid tightness shall be designed and constructed in accordance with standard engineering and industry practice appropriate for the construction materials used to achieve this objective.

**Structural Loadings.** Waste storage structures shall be designed to withstand all anticipated loads including internal and external loads, hydrostatic uplift pressure, concentrated surface and impact loads, water pressure due to seasonal high water table in compliance with this standard and applicable local building codes.

The lateral earth pressures should be calculated from soil strength values determined from the results of appropriate soil tests. Lateral earth pressures can be calculated using the procedures in TR-74. If soil strength tests are not available, the presumptive lateral earth pressure values indicated in Table 3 shall be used.





**TABLE 3 - LATERAL EARTH PRESSURE VALUES[1]**

| | | Equivalent fluid pressure (lb/ft$^2$/ft of depth) | | | |
|---|---|---|---|---|---|
| Soil | | Above seasonal high water table[2] | | Below seasonal high water table[3] | |
| Description[4] | Unified Classification[4] | Free-standing walls | Frame tanks | Free-standing walls | Frame tanks |
| Clean gravel, sand or sand-gravel mixtures (maximum 5% fines)[5] | GP, GW, SP, SW | 30 | 50 | 80 | 90 |
| Gravel, sand, silt and clay mixtures (less than 50% fines) Coarse sands with silt and and/or clay (less than 50% fines) | All gravel sand dual symbol classifications and GM, GC, SC, SM, SC-SM | 35 | 60 | 80 | 100 |
| Low-plasticity silts and clays with some sand and/or gravel (50% or more fines) Fine sands with silt and/or clay (less than 50% fines) | CL, ML, CL-ML SC, SM, SC-SM | 45 | 75 | 90 | 105 |
| Low to medium plasticity silts and clays with little sand and/or gravel (50% or more fines) | CL, ML, CL-ML | 65 | 85 | 95 | 110 |
| High plasticity silts and clays (liquid limit more than 50)[6] | CH, MH | - | - | - | - |

[1] For lightly-compacted soils (85% to 90% maximum standard density.) Includes compaction by use of typical farm equipment.
[2] Also below seasonal high water table if adequate drainage is provided.
[3] Includes hydrostatic pressure.
[4] All definitions and procedures in accordance with ASTM D 2488 and D 653.
[5] Generally, only washed materials are in this category
[6] Not recommended. Requires special design if used.

Lateral earth pressures based upon equivalent fluid assumptions shall be assigned according to the following conditions:

- **Rigid frame or restrained wall.** Use the values shown in Table 3 under the column "Frame tanks," which gives pressures comparable to the at-rest condition.
- **Flexible or yielding wall.** Use the values shown in Table 3 under the column "Free-standing walls," which gives pressures comparable to the active condition.

Walls in this category are designed on the basis of gravity for stability or are designed as a cantilever having a base wall thickness to height of backfill ratio not more than 0.085.

Internal lateral pressure used for design shall be 65 lb/ft$^2$ where the stored waste is not protected from precipitation. A value of 60 lb/ft$^2$ may be used where the stored waste is protected from precipitation and will not become saturated. Lesser values may be used if supported by measurement of actual pressures of the waste to be stored. If heavy equipment will be operated near the wall, an additional two feet of soil surcharge shall be considered in the wall analysis.

Tank covers shall be designed to withstand both dead and live loads. The live load values for covers contained in ASAE EP378.3, Floor and Suspended Loads on Agricultural Structures Due to Use, and in ASAE EP 393.2, Manure Storages, shall be the minimum used. The actual axle load for tank wagons having more than a 2,000 gallon capacity shall be used.

If the facility is to have a roof, wind loads shall be as specified in ASAE EP288.5, Agricultural Building Snow and Wind Loads. If the facility is to serve as part of a foundation or support for a building, the total load shall be considered in the structural design.

**Structural Design.** The structural design shall consider all items that will influence the performance of the structure, including loading assumptions, material properties and construction quality. Design assumptions and construction requirements shall be indicated on standard plans.

Tanks may be designed with or without covers. Covers, beams, or braces that are integral to structural performance must be indicated on the construction drawings. The openings in covered tanks shall be designed to accommodate equipment for loading, agitating, and emptying. These openings shall be equipped with grills or secure covers for safety, and for odor and vector control.

All structures shall be underlain by free draining material or shall have a footing located below the anticipated frost depth. Fabricated structures shall be designed according to the criteria in the following references as appropriate:

- Steel: "Manual of Steel Construction", American Institute of Steel Construction.
- Timber: "National Design Specifications for Wood Construction", American Forest and Paper Association.
- Concrete: "Building Code Requirements for Reinforced Concrete, ACI 318", American Concrete Institute.
- Masonry: "Building Code Requirements for Masonry Structures, ACI 530", American Concrete Institute.

**Slabs on Grade.** Slab design shall consider the required performance and the critical applied loads along with both the subgrade material and material resistance of the concrete slab. Where applied point loads are minimal and liquid-tightness is not required, such as barnyard and feedlot slabs subject only to precipitation, and the subgrade is uniform and dense, the minimum slab thickness shall be 4 inches with a maximum joint spacing of 10 feet. Joint spacing can be increased if steel reinforcing is added based on subgrade drag theory.

For applications where liquid-tightness is required such as floor slabs of storage tanks, the minimum thickness for uniform foundations shall be 5 inches and shall contain distributed reinforcing steel. The required area of such reinforcing steel shall be based on subgrade drag theory as discussed in industry guidelines such as American Concrete Institute, ACI 360, "Design of Slabs-on-Grade".

When heavy equipment loads are to be resisted and/or where a non-uniform foundation cannot be avoided, an appropriate design procedure incorporating a subgrade resistance parameter(s) such as ACI 360 shall be used.

**CONSIDERATIONS**

Waste storage facilities should be located as close to the source of waste and polluted runoff as practicable.

Non-polluted runoff should be excluded from the structure to the fullest extent possible except where its storage is advantageous to the operation of the agricultural waste management system.

Freeboard for waste storage tanks should be considered.

Solid/liquid separation of runoff or wastewater entering pond facilities should be considered to minimize the frequency of accumulated solids removal and to facilitate pumping and application of the stored waste.

Due consideration should be given to environmental concerns, economics, the overall waste management system plan, and safety and health factors.

**Considerations for Minimizing the Potential for and Impacts of Sudden Breach of Embankment or Accidental Release from the Required Volume.**

Features, safeguards, and/or management measures to minimize the risk of failure or accidental release, or to minimize or mitigate impact of this type of failure should be considered when any of the categories listed in Table 4 might be significantly affected.





The following should be considered either singly or in combination to minimize the potential of or the consequences of sudden breach of embankments when one or more of the potential impact categories listed in Table 4 may be significantly affected:

1. An auxiliary (emergency) spillway
2. Additional freeboard
3. Storage for wet year rather than normal year precipitation
4. Reinforced embankment -- such as, additional top width, flattened and/or armored downstream side slopes
5. Secondary containment

**Table 4 - Potential Impact Categories from Breach of Embankment or Accidental Release**

| |
|---|
| 1. Surface water bodies -- perennial streams, lakes, wetlands, and estuaries |
| 2. Critical habitat for threatened and endangered species. |
| 3. Riparian areas |
| 4. Farmstead, or other areas of habitation |
| 5. Off-farm property |
| 6. Historical and/or archaeological sites or structures that meet the eligibility criteria for listing in the National Register of Historical Places. |

The following options should be considered to minimize the potential for accidental release from the required volume through gravity outlets when one or more of the potential impact categories listed in Table 4 may be significantly affected:

1. Outlet gate locks or locked gate housing
2. Secondary containment
3. Alarm system
4. Another means of emptying the required volume

**Considerations for Minimizing the Potential of Waste Storage Pond Liner Failure.**

Sites with categories listed in Table 5 should be avoided unless no reasonable alternative exists. Under those circumstances, consideration should be given to providing an additional measure of safety from pond seepage when any of the potential impact categories listed in Table 5 may be significantly affected.

**Table 5 - Potential Impact Categories for Liner Failure**

| |
|---|
| 1. Any underlying aquifer is at a shallow depth and not confined |
| 2. The vadose zone is rock |
| 3. The aquifer is a domestic water supply or ecologically vital water supply |
| 4. The site is located in an area of solutionized bedrock such as limestone or gypsum. |

Should any of the potential impact categories listed in Table 5 be affected, consideration should be given to the following:

1. A clay liner designed in accordance with procedures of AWMFH Appendix 10D with a thickness and coefficient of permeability so that specific discharge is less than 1 x $10^{-6}$ cm/sec
2. A flexible membrane liner over a clay liner
3. A geosynthetic clay liner (GCL) flexible membrane liner
4. A concrete liner designed in accordance with slabs on grade criteria for fabricated structures requiring water tightness

**Considerations for Improving Air Quality**

To reduce emissions of greenhouse gases, ammonia, volatile organic compounds, and odor, other practices such as Anaerobic Digester – Ambient Temperature (365), Anaerobic Digester – Controlled Temperature (366), Waste Facility Cover (367), and Composting Facility (317) can be added to the waste management system.

Adjusting pH below 7 may reduce ammonia emissions from the waste storage facility but may increase odor when waste is surface applied (see Waste Utilization, 633).

Some fabric and organic covers have been shown to be effective in reducing odors.

**PLANS AND SPECIFICATIONS**

Designs (drawings and specifications) shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

The design will include quantities of materials required such as:

- Earth cuts and fills
- Volume of concrete,
- Steel reinforcement, and
- Length of pipe.

**Ponds**. Drawings shall include:

- A plan layout of the embankment and pond with topographic contours,
- Profile of the embankment,
- Cross section of the embankment,
- Profile and cross section of the auxiliary spillway, and
- Inlet and outlet pipe details and material requirements.

For ponds that require a lining, the lining requirements shall be incorporated into the drawings.

**Structures.** Drawings for structures shall include:

- The location,
- Capacity,
- Dimensions,
- Material requirements,
- Structural details, and
- Foundation requirements.

Construction drawings shall show sufficient detail so that the structures will be built as designed.

The Pacific Islands Area specification for Waste Storage Facility (313) shall be provided as a construction specification.

The drawings and operating instructions for the waste storage facility will be incorporated into the comprehensive nutrient management plan.

The design shall specify the recommended species, planting method, and fertilizer for protective vegetation on the embankment and other exposed areas.

**OPERATION AND MAINTENANCE**

The Pacific Islands Area operation and maintenance plan for this practice shall be developed for and reviewed with the client that is consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for its design.

The plan shall contain the operational requirements for emptying the storage facility. This shall include the requirement that waste shall be removed from storage and utilized at locations, times, rates, and volume in accordance with the overall waste management system plan.

In addition, for ponds, the plan shall include an explanation of the permanent marker or recorder installed to indicate the maximum operating level.

The plan shall include a strategy for removal and disposition of waste with the least environmental damage during the normal storage period to the extent necessary to insure the pond's safe operation. This strategy is for the removal of the contribution of unusual storm events that may cause the pond to fill to capacity prematurely with subsequent design inflow and usual precipitation prior to the end of the normal storage period.

Development of an emergency action plan should be considered for waste storage facilities where there is a potential for significant impact from breach or accidental release. The plan shall include site-specific provisions for emergency actions that will minimize these impacts.

# Appendix 16

# Update Report

## Water quality in New Zealand: Land use and nutrient pollution

**June 2015**

## Contents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# 1 Introduction

Over recent years, public concern has grown about the quality of the water in many of New Zealand's rivers and streams, lakes, wetlands, estuaries, and aquifers. For Māori, this concern is very strong, because the relationship with particular awa and roto is central to identity.

In November 2013, the Parliamentary Commissioner for the Environment released a report titled *Water quality in New Zealand: Land use change and nutrient pollution*. The report followed an investigation into the relationship between land use and two nutrient pollutants – nitrogen and phosphorus. On land, nitrogen and phosphorus are valuable nutrients, but in water they can cause excessive growth of weeds, slime and algae.

Nutrient losses from land are, to a large extent, dependent on how the land is used. Losses of both nitrogen and phosphorus are low from land that is covered in forest or scrub, but are much higher from pastoral and arable land.

The 2013 report revealed a clear correlation between large-scale land use change to dairy farming and increases in the nitrogen 'stress' on waterways.

This is an update to the 2013 report. It summarises reactions to the original report and presents new information on land use that was not available in 2013. Recent changes in farm productivity and mitigation are described, and trends in nutrient concentrations and water quality are presented.

# 2

## Reaction to the 2013 report

The level of engagement and debate that followed the release of the report was encouraging, and it is evident the debate about water policy has now become more sharply focused on the key challenge of dealing with declines in water quality coming from changing land use.[1]

The Government's view was that agricultural production could be increased while maintaining or improving water quality. The Prime Minister, Rt Hon John Key said: *"I don't think we should assume that we're in a static position where we won't use greater science or other techniques to reduce the environmental impacts as we look to increase farm output".*[2]

In a joint press release the Minister for the Environment, Hon Amy Adams, and the Minister for Primary Industries, Hon Nathan Guy, welcomed the report.[3] Hon Adams said it underlines"*… the importance of the Government's freshwater reform programme, by showing just what could happen with our water quality if we do not have good policy in place…".* However, she was confident that *"we will see significant water quality gains within a generation".*

Other Parliamentarians were less sanguine.

Labour Party environment spokesperson Moana Mackey said *"The message is clear – business as usual, even assuming mitigation strategies are employed, will see further degradation of our waterways."*[4]

Green Party water spokesperson Eugenie Sage urged the Government to *"reconsider its proposed weak bottom lines for water quality and set tougher standards to ensure all our rivers are safe for swimming".*[5]

Maori Party co-leader Te Ururoa Flavell said the report had raised *"crucial issues"* including the changing use of land from forestry to farming.[6]



Federated Farmers welcomed the report, acknowledging the importance of good science to underpin policy development, but questioned some of the assumptions of the modelling.[7] Dairy chairman Willy Leferink said the report was *"a wake-up call"*, but the modelling was *"a worst case if we collectively do nothing".*[8] Other agriculture commentators also took the view that the modelling did not take adequate account of existing and planned mitigation on farms or of the Government's new freshwater policy.[9]

Fonterra responded to the report by stating its commitment to improve water quality, with Todd Muller, Group Director Cooperative Affairs, saying *"We share the Parliamentary Commissioner's concerns about the pressure on New Zealand's waterways and recognise the role we have to play in improving water quality."*[10] In an address to Fonterra's Annual General Meeting, Chief Executive Theo Spierings said the report was *"in the past and looking backwards"*, although Fonterra *"needed to lift its game".*[11]

Forest & Bird called for moderation of dairy conversions, with Advocacy Manager Kevin Hackwell saying *"This report must mark a turning point in the rate at which dairy conversions are polluting our waterways."*[12] Fish & Game Chief Executive, Bryce Johnson, said that the report *"… serves as a stark warning that the nation is at a crossroads."*[13]

In an Opinion-Editorial published in the New Zealand Herald, Sir David Skegg, the President of the Royal Society of New Zealand wrote:

*"Dr Jan Wright's advice is worded diplomatically, but her message is blunt. Unless New Zealand takes urgent steps to slow the expansion of dairying, many more rivers and lakes will be degraded. None of the steps being taken to lessen environmental impacts can reverse this trend in the near future."*[14]

The Royal Society's Science Media Centre sought comment on the report from several scientists.[15]

Professor Jenny Webster-Brown, Director of the Waterways Centre for Freshwater Management, University of Canterbury & Lincoln University wrote:

*"The modelling approach that has been used here is valid, in my opinion. The assumptions that have been made in the modelling scenarios are reasonable and defensible."*

Professor David Hamilton, President of the NZ Freshwater Sciences Society, wrote that the report *"… clearly highlights the enormous challenge that we face as a nation: how to meet the government's goals of doubling the value of agricultural exports by 2025 whilst meeting the 2011 National Policy Statement for Freshwater Management which requires that the 'overall quality of freshwater' in all regions of the country be maintained or improved."*

Dr Rich McDowell from AgResearch and Dr Mike Scarsbrook from DairyNZ queried the assumptions about mitigation and said that the impact of the Government's new fresh water policies had not been given due consideration.

Under standing orders, reports from the Commissioner are first tabled in Parliament, and then referred to the Local Government and Environment Committee. In reporting back to the House, the Committee said: *"We are keen to see progress in the area of water quality in New Zealand, and encourage the relevant committee of the 51st Parliament to closely observe future developments on this topic."*[16]

The Committee also said that two things would be helpful in future reports on the subject – *"solid statistical data"* on the relationship between land uses and water quality, and recommendations from the Commissioner.

This committee's request has prompted the preparation of not only this update report, which contains additional data, but also an examination of the Government's National Policy Statement for Freshwater Management which the Commissioner is releasing at the same time. That report contains six recommendations.

# 3

## Changing land use

The Commissioner's report *Water quality in New Zealand: Land use and nutrient pollution* linked a model of land use change and a model of nutrient losses from land into water. The modelling predicted changes in land use and consequential changes in nutrient loads between 2008 and 2020.

With regard to land use, the modelling predicted that the amount of land used for sheep/beef farming would continue to decline. It also predicted that dairy conversions would continue, and less productive sheep/beef land would be planted in forest or left to revert to scrub.[17]

Table 3.1 shows how land use has changed between 2008 and 2012 using satellite photographs that have recently become available.[18]



**Table 3.1.** ***Actual*** **changes in land use between 2008 and 2012 (rounded to the nearest 100 hectares).**

| Region | Sheep / Beef | Dairy | Plantation Forestry | Scrub |
|---|---|---|---|---|
| Northland | -3,900 | 5,500 | -900 | 300 |
| Auckland | -2,000 | 400 | -100 | 1,800 |
| Waikato | -7,500 | 28,400 | -18,700 | 1,400 |
| Bay of Plenty | 1,100 | 2,800 | -4,300 | -400 |
| Gisborne | -14,000 | 200 | 6,000 | 7,000 |
| Hawke's Bay | -7,400 | 2,000 | 1,400 | 3,400 |
| Taranaki | -1,100 | 4,600 | 2,500 | -2,200 |
| Manawatu-Wanganui | -9,300 | 6,200 | 3,200 | 1,800 |
| Wellington | -4,400 | 200 | 3,400 | -200 |
| Nelson and Tasman | 1,700 | 200 | -1,000 | 1,100 |
| Marlborough | -1,900 | 400 | 1,400 | 600 |
| West Coast | 200 | 5,100 | -2,500 | -1,500 |
| Canterbury | -50,100 | 50,200 | -4,200 | -1,000 |
| Otago | -17,400 | 12,700 | 2,400 | -600 |
| Southland | -35,700 | 38,900 | 1,700 | -5,000 |
| **New Zealand** | **-151,700** | **157,900** | **-9,600** | **6,600** |

At the national level, the loss of sheep/beef land is almost matched by the increase in dairy land. This is consistent with the predictions in the 2013 report.

The modelling in the 2013 report predicted a large increase in both forest and scrub land by 2020. However, between 2008 and 2012, the area of plantation forest has actually decreased, and the increase in scrub land has been small.

The projections of land use change in the model are largely driven by forecasts of commodity prices and interest rates. The actual prices over recent years have differed somewhat from the official forecast prices used in the modelling.[19]

The biggest changes in land use between 2008 and 2012 have occurred in Waikato, Canterbury, Otago, and Southland.

In Waikato, large areas of new dairy land have come from the felling of forest on the Volcanic Plateau. This will lead to big increases in nutrient losses into water in the upper Waikato catchment.

Nearly 70% of the increase in dairying land has taken place in the east of the South Island – in Canterbury, Otago, and Southland.



That land planted in forest or left to revert to scrub has not increased in line with the predictions of the modelling is not good news for future water quality. Losses of both nitrogen and phosphorus are low from forested land. Unless there is a big increase in forestry in the next few years, the modelling is likely to have *underpredicted* nutrient loads on waterways in 2020.

Source: Rob Suisted / naturespic.com

**Figure 3.1. Forestry to dairy conversion in the Upper Waikato catchment. The actual increase in dairying land in Waikato by 2012 had already exceeded what the modelling predicted for 2020.**

# 4

## Changing productivity and mitigation

The great challenge for farmers is to increase productivity while simultaneously decreasing nutrient losses. This is the focus of much industry, government and scientific effort.

Nutrient losses are affected by changes in farming practice. On one hand, increasing productivity increases nutrient losses when it is driven by using more inputs. On the other hand, increasing mitigation reduces nutrient losses.

The productivity of the sheep/beef sector remains fairly constant, having fallen from its peak in 2007.[20]

In contrast, productivity (milk solids per hectare) continues to increase rapidly in the dairy sector, largely driven by the use of more inputs – water, fertiliser, and supplementary feed.[21] Mitigation is thus required if nutrient losses are to be held steady, let alone be reduced.

A range of mitigation techniques are increasingly being used on dairy farms to reduce nutrient losses. The Dairying and Clean Stream Accord set up in 2003 was replaced by the Sustainable Dairying: Water Accord in 2013.[22] There has been a great deal of action, especially on the management of shed effluent, bridging waterways, and fencing waterways; as at May 2014, nearly 24,000 kilometres of waterways had been fenced.[23] In other areas, such as keeping stock out of wetlands and the provision of nutrient management data, progress has been much slower.[24]

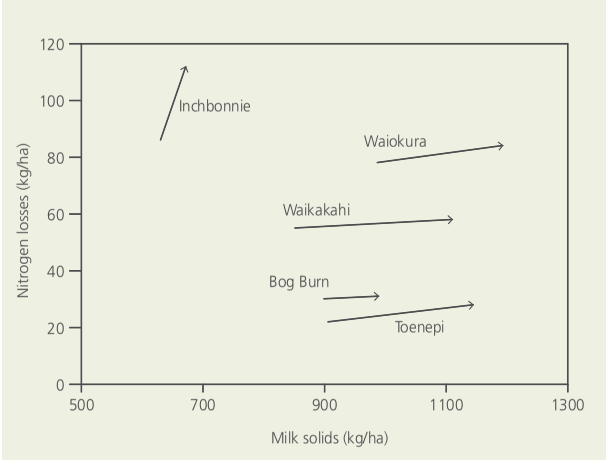
Keeping nitrogen out of water is particularly difficult because it leaves land in chemical forms that are highly soluble. 'Standard' mitigation techniques such as applying shed effluent as fertiliser on land, keeping stock out of waterways, and riparian planting all help reduce nitrogen losses, but are more effective at keeping phosphorus (and pathogens and sediment) out of waterways.[25]



The 'nitrogen challenge' can be seen in Figure 4.1. A study of five regionally representative catchments predominantly used for dairy farming was begun in 2001.[26] In all five catchments, farm productivity increased over a number of years. At the same time, dairy shed effluent was increasingly applied to land and more streams were fenced. However, this 'standard' mitigation was not enough to keep nitrogen losses constant, let alone reduce them.[27]

Experiments on research farms have shown that it is possible to reduce nitrogen losses by as much as 50%, but the most effective techniques are generally expensive.[28]

Encouragingly, some new research is showing the benefit of using a combination of techniques. On the Future farmlet in Waikato, nitrogen losses were reduced by 40 to 50% by using less nitrogen fertiliser, a lower stocking rate, with cows that excrete less nitrogen in their urine and are taken off pasture for defined periods – however, profitability fell by 5%.[29] It is important to note that successful demonstrations on research farmlets are a long way from widespread adoption of these new techniques.




Data source: Monaghan and De Klein, 2014

**Figure 4.1. 'Standard' mitigation techniques on dairy farms struggle to keep nitrogen losses from rising as productivity rises.**

# 5

## Nutrient loads, concentrations and water quality

Ongoing and increasing nutrient *loads* will generally lead to higher nutrient *concentrations* and worsening water quality – more degraded lakes, more turbid (cloudy) estuaries, greater frequency and duration of algal blooms, declines in the insects, fish and birds that rely on fresh water ecosystems, and more exceedances of nitrate toxicity limits.

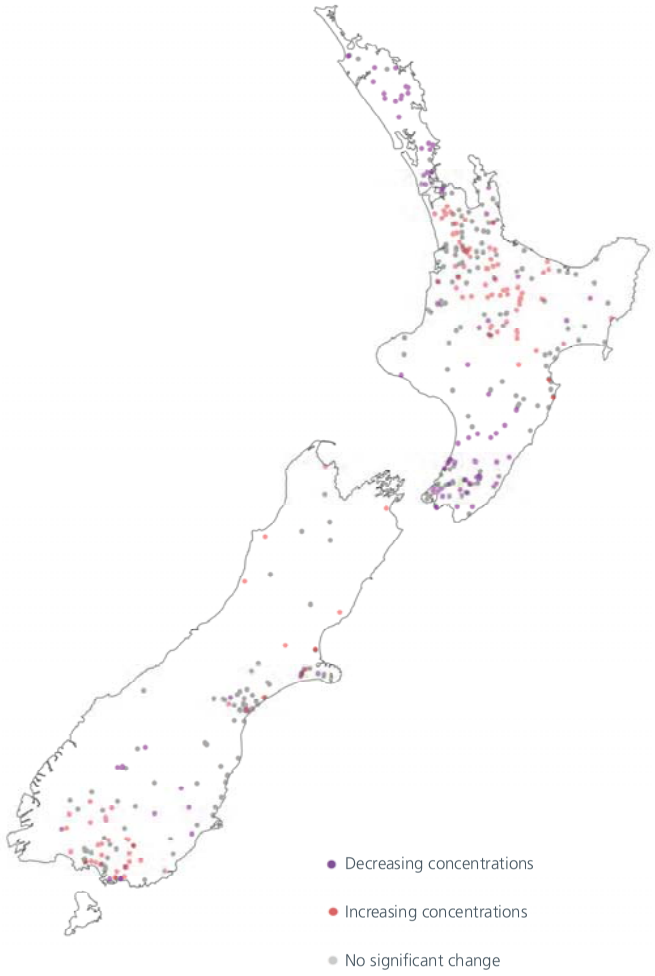
Nutrient concentrations are measured at river sites by NIWA and by regional councils.[30] Changes in nutrient concentrations between 2001 and 2011 at these sites are shown in the maps in Figures 5.1 and 5.2.[31,32]

These maps show the trends in concentrations of the main 'active' forms of nitrogen and phosphorus, that is, the chemical forms that drive the growth of unwanted plants such as invasive weeds, algae and slime. In the case of nitrogen, this is nitrate. In the case of phosphorus, it is dissolved reactive phosphorus (DRP).

The modelling in the 2013 report showed that rising *nitrogen loads* on waterways are correlated with the expansion of dairy farming. The red dots in Figure 5.1 show that *nitrate concentrations* rose between 2001 and 2011 in regions where dairy farming has expanded on a large scale.

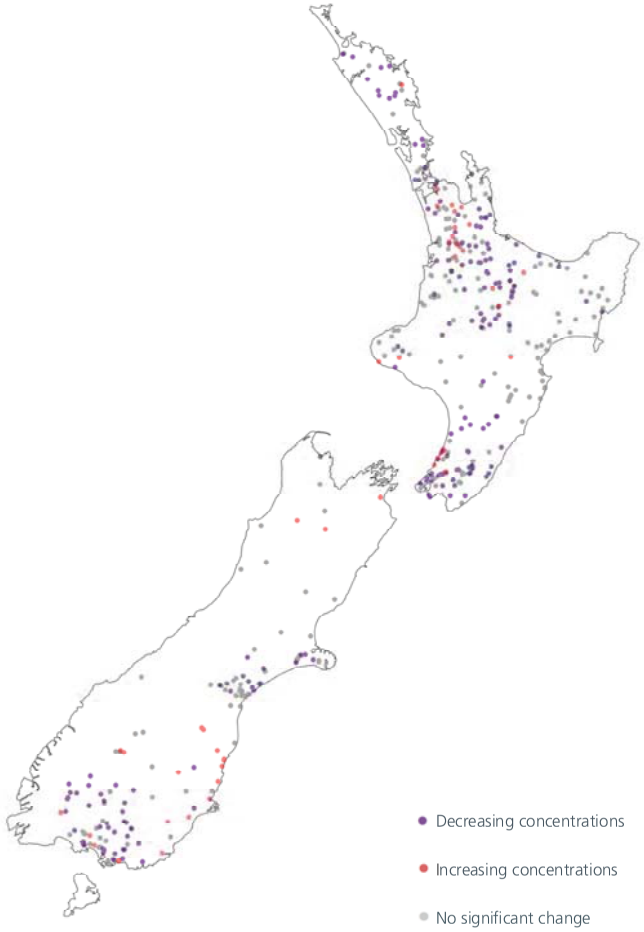
The modelling in the 2013 report predicted that *phosphorus loads* on waterways would remain relatively stable. The red dots in Figure 5.2 show DRP *concentrations* rose at relatively few river sites between 2001 and 2011. Encouragingly, there are considerably more sites shown in the figure where DRP *concentrations* fell over this period.[33]






Data source: MfE website (Environment indicator for fresh water: River condition)

**Figure 5.1. Changes in nitrate concentrations between 2001 and 2011 at over 400 river sites monitored by NIWA and by regional councils.**




Data source: MfE website (Environment indicator for fresh water: River condition)

**Figure 5.2 Changes in concentrations of dissolved reactive phosphorus between 2001 and 2011 at over 400 river sites monitored by NIWA and by regional councils.**

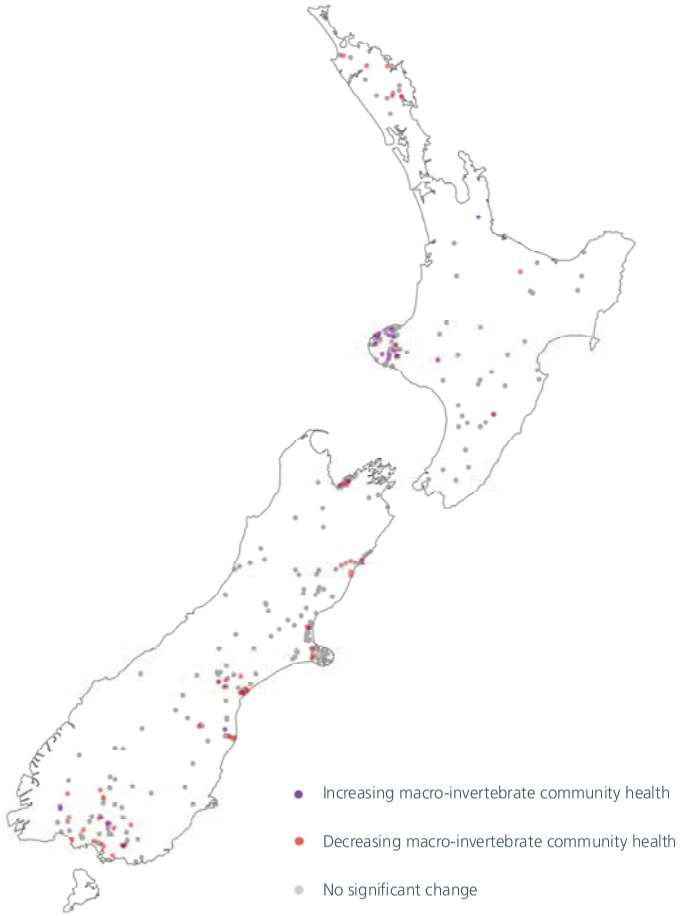
The impact of changing nutrient concentrations on the health of aquatic ecosystems is best measured with bio-indicators. The *macroinvertebrate community index* (MCI) is commonly used in New Zealand for this purpose. Macroinvertebrates are very small animals that have no backbone – they are 'macro' because they can be seen with the naked eye. In New Zealand rivers, the presence of many mayfly and caddisfly larvae is a sign of a healthy river ecosystem, while a preponderance of snails and chironomids indicates the opposite.

Figure 5.3 shows changes in MCI in rivers between 2000 and 2010.[34,35] Most sites show no change over this decade.[36] There are a number of purple dots in Taranaki, where a programme of riparian planting has been underway for many years. On the other hand, the presence of red dots in South Canterbury and Southland indicates a decline in river health.

It is important to note that these sites are only on rivers, so trends in concentrations of nutrients in lakes, estuaries, and groundwater (water bodies that tend to trap pollutants) are not shown.

The complex nature of hydrological systems means that in some areas at least, the effects of land use change will not be fully seen for many years. The legacy of nitrate in groundwater has been termed 'the load to come'.[37] In Canterbury, for instance:

*"Research by GNS has shown that nitrate in the groundwaters to the west of Christchurch is 30-to-60 years old and probably dates back to the increased application of fertiliser in the post-World War 2 era. We therefore have another 30-60 years' worth of nitrate still to travel through the groundwater system, affecting drinking water supply and lowland stream quality. It will be very difficult for more intensive irrigation and dairying to occur on the plains without the legacy of nitrate in groundwater increasing for future Cantabrians."*[38]




Data source: MfE website (Environment indicator for fresh water: River condition)

**Figure 5.3 Changes in macro-invertebrate community health between 2000 and 2010 at over 300 river sites monitored by NIWA and by regional councils.**

# 6 Discussion

Dairy farming is not the only land use responsible for declining water quality – horticulture, arable farming, intensive sheep and beef farming also have relatively high nutrient losses per hectare. But dairy farming is the land use that has continued to expand rapidly, and so is largely the cause of increased nutrient stress on waterways.

The two nutrients – nitrogen and phosphorus – differ in a number of important way, with nitrogen being the greater water quality challenge.

The main source of nitrogen is animal urine. But it is not just *how much* urine animals produce that matters, but *how* they urinate. Sheep urinate in small amounts, so the grass is able to take up much of the nitrogen as fertiliser. Cows, on the other hand, gush litres of urine at a time, overwhelming the ability of the grass to absorb it. Because the nitrogen exists in highly soluble chemical forms, some of the surplus is washed off by rain, but most leaches through soil into groundwater.

The intensification of dairy farming – more milk from each cow and more cows on each hectare – has been enabled by using more nitrogen fertiliser, irrigation in some regions of the country, and by supplementing grass with palm kernel extract and other stock food. The increase in nitrogen concentrations in waterways is sometimes attributed to the rapid increase in the amount of nitrogen fertiliser used. But it is not nitrogen fertiliser *per se* that has caused the problem. Rather, it is what it has enabled – a longer grass growing season, and thus, more cows and more urine.

There are many sources of phosphorus, including animal effluent, sewage, and wastewater from freezing works and dairy factories. Much of the phosphorus in fresh water is a legacy of clearing forests on hill country for sheep farming. The erosion that followed (and still continues) took soil containing naturally occurring phosphorus and superphosphate fertiliser into waterways. But the relative insolubility of the forms of phosphorus, and the way in which it tends to stick to soil, makes it easier to mitigate than nitrogen.

While a range of mitigation techniques are increasingly used, significant reductions in nitrogen losses on intensive farms with high inputs generally requires extensive and costlier mitigation techniques.

The volatility of milk prices is leading some to question the high input model that has become increasingly prevalent on New Zealand dairy farms. DairyNZ principal scientist John Roche recently told a forum of farmers that the average dairy farmer is milking a hundred more cows than a decade ago, yet making no more money. Dr Roche believes that the greater use of supplementary feed is undermining the resilience of the system, and that changing the model would reduce nitrate leaching.[39]

# 7 Conclusion

When nitrogen and phosphorus are lost off land into water, they can lead to degraded water quality. Nutrient losses from land are, to a large extent, dependent on how the land is used.

Nitrogen concentrations in waterways have increased in regions where dairy farming has expanded. In many places water quality has declined as a result.

A large change in land use has been taking place in New Zealand over the last two decades. Many sheep/beef farms and some forests have been converted to dairy farms. The modelling undertaken for the 2013 report, *Water quality in New Zealand: Land use and nutrient pollution*, predicted that this trend would continue to 2020.

This update report contains new information on land use that was not available in 2013. It shows that the conversion of sheep/beef farms to dairy farms has continued. However, the predicted increase in forested land has not begun to occur.

This is not good news for water quality. The modelling in the 2013 report is likely to have underpredicted the nutrients that will be lost from land into water.



This is especially true for nitrogen losses. It is much harder to stop nitrogen being lost from land than it is to stop phosphorus – nitrogen is the 'elusive' nutrient.

Losses of nitrogen and phosphorus from land can be, and are, being changed by farming practices, and this was a major consideration in the 2013 report. Changing practices on dairy farms have broadly gone in two opposing directions. The focus on growing productivity has led to higher stocking rates and greater use of inputs, driving up nutrient losses. But 'standard' mitigation practices struggle to keep nitrogen losses, in particular, from rising.

The dairy industry is facing some big challenges – challenges that are economic as well as environmental. For instance, high stocking rates that rely on importing feed not only lead to high nutrient losses, but also carry greater financial risk. It is encouraging to see the focus on ever-increasing production being questioned, and some win-win strategic thinking occurring.

## Notes

1 For example, the Board of Inquiry into the Tukituki Catchment Proposal cited the report in noting the need to more actively address the link between land use changes and water quality. *Final Report and Decisions of the Board of Inquiry into the Tukituki Catchment Proposal*, 18 June 2014, page 42.

2 *Key eyes science solution to water woes*. Bernard Hickey, Hive News. 26 November 2013.

3 *Report reinforces need for Govt's freshwater reforms.* New Zealand Government press release. 21 November 2013

4 *PCE report on nutrient pollution timely*. Labour Party press release. 21 November 2013.

5 *PCE report signals need for strong water rules*. Green Party press release. 21 November 2013.

6 *Maori Party welcomes 'Water quality in New Zealand' Report*. Maori Party press release. 21 November 2013.

7 *Farmers welcome the PCE's water contribution*. Federated Farmers press release. 21 November 2013.

8 *Environment and economy linked*. Willy Leferinck, The Dominion Post. 27 November 2013.

9 See, for instance, *Bryce, Don't forget your rod* Russell MacPherson, The Southland Times. 19 December 2013; *Action well underway to address pollution concerns*. DairyNZ press release. 21 November 2013.

10 *Fonterra Committed to Improving New Zealand Water Quality*. Fonterra press release. 21 November 2013.

11 *Fonterra has to lift its game - CEO*. Fairfax Media. 28 November 2013.

12 *Conclusion from report - dairy conversions need moderating* Royal Forest and Bird Protection Society press release. 21 November 2013.

13 *PCE report shows dairying out of control, Fish & Game NZ*. Fish and Game New Zealand press release. 21 November 2013.

14 David Skegg: We must choose riches or water? *New Zealand Herald*, 10 April 2014

15 *Shifts in farming put pressure on water quality – report.* Science Media Centre. 21 November 2013

16 Report of the Local Government and Environment Committee. Report from the Parliamentary Commissioner for the Environment, 1 August 2014 *Water quality in New Zealand: Land use and nutrient pollution*.

17 The model predicts land use based on official forecasts of the prices of commodities (wool, lamb, beef, milk solids, logs, and carbon), and projected interest rates. When the modelling was done, official forecasts for commodity prices were available up to 2015 and assumed to be constant thereafter. A $5 carbon price was assumed in the modelling. Anastasiadis, S. and Kerr, S. 2013. *Land Use and Farming Intensity: For 1996, 2008 and 2020*. Motu Economic and Public Policy Research.



18 Timar, L., Keller, E. and Le, T. *A regional summary of 2012 land use*. Motu Economic and Public Policy Research. 24 April 2015. The rows in Table 3.1 do not sum to zero because of small changes in other land uses.

19 From 2011 to 2014, the prices paid for wool, lamb, and beef have generally been higher than the prices used in the modelling. (Anastasiadis, S. and Kerr, S. 2013. *Land Use and Farming Intensity: For 1996, 2008 and 2020*. Motu Economic and Public Policy Research. p 9.). In contrast, the prices paid for logs since 2011 have been significantly below the prices used in the modelling. Another factor that has influenced the decline in forestry has been the way in which the Emissions Trading Scheme has operated. A $5 carbon price was assumed in the modelling, but because the NZ scheme allowed the purchase of 'hot air' carbon credits, it has been possible to fell forests while paying carbon prices as low as a few cents per tonne. The policy uncertainty around the Emissions Trading Scheme may also have deterred investment in carbon forests.

20 Based on information from Andrew Burtt, Chief Economist at Beef + Lamb New Zealand Economic Service. See also p. 43 of *Water quality in New Zealand: land use and nutrient pollution*.

21 *"In the decade ending June 2013, higher milk production per hectare has come from increases in quantities of inputs such as capital (cows and infrastructure), and farm working inputs (feed, fertiliser, overheads etc.)"*. DairyNZ Economic Survey 2012-13, p.23.

22 The new Accord includes new commitments and covers all dairy farmers, not just those who supply Fonterra.

23 *Sustainable Dairying: Water Accord. One year on...* First annual progress report. DCANZ and DairyNZ, 2014.

24 Some of the results are awaiting verification and progress in some areas may well be overstated. For instance, the 2011/2012 progress report on the first Accord – the Dairying and Clean Streams Accord – reports that 87% of Fonterra farms exclude stock from Accord waterways, but notes that the assessment *"is based on a non-audited verbal assessment of stock exclusion"*. (*"The Dairying and Clean Streams Accord: Snapshot of Progress 2011/2012"*, p.2). An on-the-ground audit in December 2011 found that 57% of Accord waterways were completely protected from stock. (Sanson, R. & Baxter, W. 2011. Stock Exclusion Survey. MAF Technical Paper No: 2011/102. Prepared for Ministry of Agriculture and Forestry. p.2).

25 See, for instance, McDowell, R., Wilcock B., and Hamilton, D. 2013. *Assessment of Strategies to Mitigate the Impact or Loss of Contaminants from Agricultural Land to Fresh Waters*. Report prepared for MfE. Figures 3 and 4 in this report show the estimated effectiveness and cost of mitigating nitrogen and phosphorus respectively.

26 The five catchments are Toenepi in Waikato, Waiokura in Taranaki, Waikakahi in Canterbury, Bog Burn in Southland, and Inchbonnie on the West Coast. The Inchbonnie catchment study did not begin until 2004. Monaghan, R. and De Klein, C., Integration of measures to mitigate reactive nitrogen losses to the environment from grazed pastoral dairy systems. *Journal of Agricultural Scienc*e, 152, S45–S56 2014.

27 Wilcock, R.J., Monaghan, R.M., Quinn, J.M., Srinivasan, M.S., Houlbrooke, D.J., Duncan, M.J., Wright-Stow, A.E., and Scarsbrook, M.R. 2013. Trends in water quality of five dairy farming streams in response to adoption of best practice and benefits of long-term monitoring at the catchment scale. *Marine and Freshwater Research*, 64, pp. 401–412. Table 2; and Monaghan, R. and De Klein, C. 2014. Integration of measures to mitigate reactive nitrogen losses to the environment from grazed pastoral dairy systems. *Journal of Agricultural Science*, 152, S45–S56. Table 2. The results for the Inchbonnie catchment are puzzling because, as well as a big increase in effluent disposal to land and stream fencing, the average use of nitrogen fertiliser per hectare declined. This might be related to high rainfall.

28 McDowell, R., Wilcock B., and Hamilton, D. 2013. *Assessment of Strategies to Mitigate the Impact or Loss of Contaminants from Agricultural Land to Fresh Waters*. Report prepared for Ministry for the Environment, p23.

29 DairyNZ. *Technical Series. Pastoral 21 – profitable dairy systems, low footprint*. Issue 24. October 2014, pp.1-4. [30] NIWA's National Rivers Water Quality Network comprises 77 measurement sites on 35 rivers.

30 In Figures 4.1 and 4.2 the *purple* dots are sites where nutrient concentrations have *decreased* by an amount that is statistically significant and meaningful; the *red* dots are sites where nutrient concentrations have *increased* by an amount that is statistically significant and meaningful; and the *grey* dots are sites where there has been no statistically significant or meaningful change. NIWA considers a trend to be 'meaningful' if the change is greater than 1% per year.

31 Data from the Ministry for the Enviroment website (Environmental indicator for fresh water: River condition)

32 http://www.mfe.govt.nz/more/environmental-reporting/fresh-water/river-condition-indicator. Downloaded dataset named 'Modelled state, trend and long term change data' Worksheet named 'Trends WQ' was used was used for Figures 4.1 and 4.2.

33 The reasons for this remain unclear. *"This may may reflect improving environmental management practices, such as wastewater treatment and riparian planting… Because similar patterns occurred over all land covers, another possibility is that the trends are unrelated to management but from a widespread background influence such as long duration climate variation."* Ministry for the Environment, 2013. River condition indicator.





34 In Figure 5.3 the *purple* dots are sites where the macro-invertebrate community index has *increased* by an amount that is statistically significant and meaningful; the *red* dots are sites where the macro-invertebrate community index has *decreased* by an amount that is statistically significant and meaningful; and the *grey* dots are sites where there has been no statistically significant or meaningful change. NIWA considers a trend to be 'meaningful' if the change is greater than 1% per year.

35 Data from the Ministry for the Enviroment website (Environmental indicator for fresh water: River condition)

http://www.mfe.govt.nz/more/environmental-reporting/fresh-water/river-condition-indicator. Downloaded dataset named 'Modelled state, trend and long term change data'. The worksheet named 'Trends Invertebrates' was used for Figure 5.3.

36 Note, however, that MCI has been measured at very few sites in Waikato.

37 See, for example, Howard-Williams, C., Davies-Colley, R., Rutherford, K., and Wilcock, R. 2010. *Diffuse pollution and freshwater degradation: New Zealand Perspectives*. 14th International Conference IWA Diffuse Pollution Specialist Group. p. 131.

38 Professor Jenny Webster-Brown, Director of Waterways, Lincoln University quoted in *"Call for Cantabs to think about future of water"*, Lincoln University Press Release, 13 April 2015.

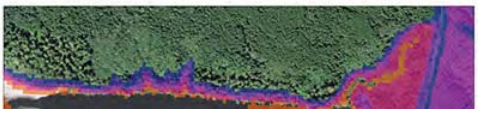
39 Dominion Post, 7 May, 2015, *"More cows, more milk, but no more profit"*. Roche, J. and Horan, B., 2015, *"Resilient farming systems – surviving volatility"*.

# Appendix 17

QIN Homepage
QIN Planning Dept
Project Background
Main Relocation Page
Neighborhoods
Housing
Sustainability
Community Facilities
Generations Building
School
Parks and Open Space
Infrastructure
Queets

# Taholah Village Relocation Master Plan

## PROJECT BACKGROUND:



The Quinault Indian Nation (QIN) has always depended on the Quinault River and Pacific Ocean for sustenance. Both have played integral roles in the Nation's identity and survival. However, due to climate change and its proximity to the Cascadia Subduction Zone, the Village of Taholah is under threat from tsunamis, storm surge and riverine flooding. The QIN was fortunate in receiving an ANA SEDS Grant to develop a Master Plan for relocating the village to approximately 200 acres of higher ground 1/2 mile from the existing village center.

Lower Village Inundation Map with Various Community Buildings

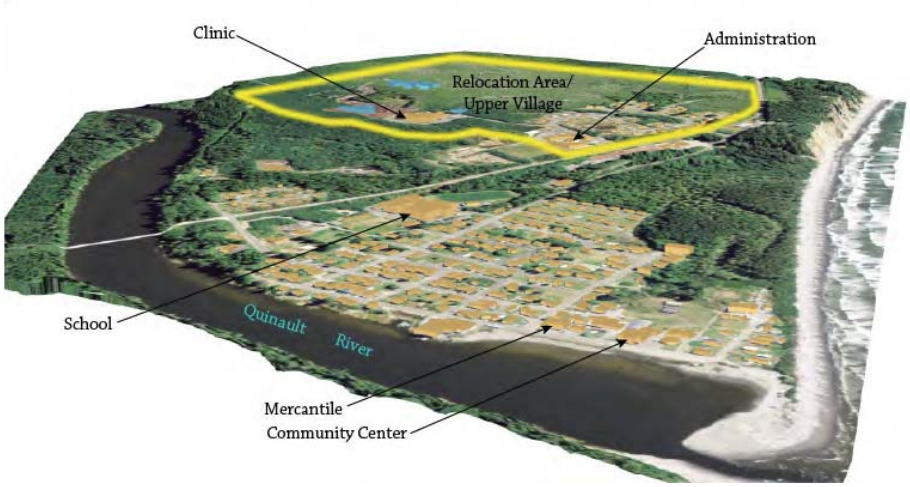
Approximately 660 people live in the lower village, nearly 100 of whom are Tribal elders. 150 children attend school and/or live in the lower village and are currently within the flood and tsunami zones. The lower village consists of approximately 175 homes, the K-12 school, the Mercantile, post office, cannery, office space for 60 tribal employees and vital community services. These services include police and fire service, the Tribal Court, the Senior Programs Center, Head Start and day care, the Diabetes program, the gym, the recreation department, the Quinault Enterprise Board and the Quinault Cultural Center and Museum.

Because the community and elected leaders have decided that relocating the lower Village of Taholah is a priority, the next critical step is to plan the Village. In order for Quinault Indian Nation to move government buildings and build roads and infrastructure; and in order for the Quinault Housing Authority and households to build homes in the Upper Village, a Master Plan is needed to articulate land uses, private and public development standards, lot lines, and the location and design of public buildings and facilities.


http://quinaultindiannation.com/planning/projectinfo.html

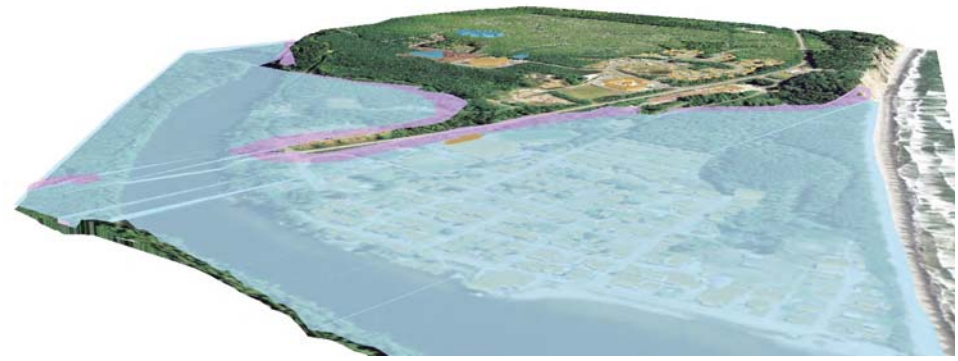
## THE PLAN:

The Nation has started this process in order to provide its residents, and business the opportunity to move to a safer place, in a manner that ensures continuity in government service provision, affordable housing options for residents who wish to relocate, construction of green and resilient infrastructure systems, and the creation of a healthy socially and economically vibrant community.




Taholah: Existing Condition





Taholah: After Tsunami (9.2 Cascadia Subduction Zone Quake)

## PROCESS:

The initial portion of the project involves two components, community involvement and an inventory of existing conditions. The community has started the process of village-wide meetings and is establishing stakeholder committees so that staff can understand conditions and community aspirations. This way the Master Plan will incorporate the needs of the community and plan for the appropriate community facilities, types of housing and recreation facilities. From these meetings will emerge Community Design Standards and Principles that will

guide the subdivision and land use plans.

**OUTCOME:**

At the end of the Master Planning process, the  Nation will have a blueprint for redevelopment of the village, safe from flooding and tsunamis that incorporates the vision of the community members, sustainable practices, culture, amenities and upgraded community facilities. The document will contain coordinated utility, land use, subdivision and phasing plans allowing for orderly construction of the new village.

For more information, please contact Kelsey Moldenke, Charles Warsinske, or Sue Kalama by email or at (360) 276-8211, extensions 397, 1038, or 228, respectively.

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# Appendix 18

# SOUTH KAUA'I COMMUNITY PLAN

KŌLOA • PO'IPŪ • KALĀHEO • 'ŌMA'O • LĀWA'I

## EXECUTIVE SUMMARY

Prepared by:

PBR HAWAII & ASSOCIATES, INC.

With:

OPTICOS

July 2015




## ACKNOWLEDGEMENTS

Mahalo nui loa to the dedicated staff of the County of Kaua'i Planning Department and their associates from sister agencies who participated in the development and fine tuning of this document. We also want to thank the countless hours spent by our Citizens Advisory Committee and members of the public who helped craft the vision, policies, and direction for the future of South Kaua'i. This project would not be possible without you.

**Citizens Advisory Committee**

- Louis Abrams, Kōloa Community Association
- Chip Bahouth, Starwood Resorts
- Peter Baldwin/John Horwitz/Rick Robinson, EA Knudsen Trust
- Ted Blake, Kōloa community representative
- Maxine Correa, Kalāheo community representative
- Russ Hasegawa, Kōloa Elementary School
- Arryl Kaneshiro, 'Ōma'o community representative
- Lila Metzger, Kalāheo Community Association
- Jody Kjeldsen, Po'ipū Beach Resort Association
- Marty Kuala, Mālama Māhā'ulepū
- Sam Lee, Po'ipū community representative
- Rupert Rowe, Kāneiolouma Heiau
- Tom Shigemoto, A&B Properties
- Scott Sloan, National Tropical Botanical Garden
- David Hinazumi, Grove Farm Properties

**County of Kaua'i Planning Department**

- Michael A. Dahilig, Planning Director
- Marie Williams, Project Manager
- Peter Nakamura (in memoriam)
- Ashlee Jimenez (former project assistant)
- Marisa Valenciano
- Lee Steinmetz, Transportation Planner
- Ian Jung, County Deputy Attorney
- Ruby Pap, UH Sea Grant Land Use Agent

**Subconsultants**

- Opticos Design, Inc., Form-Based Code
- Cultural Surveys Hawai'i, Archaeology
- Fehr & Peers, Traffic & Transportation
- The Limtiaco Consulting Group, Civil Engineers
- Ron Ho & Associates, Inc., Electrical Engineers


## DEDICATION

***Peter Nakamura (July 17, 1953–November 25, 2013)***

*Dedicated to the memory of Peter Nakamura, Manager for the Long Range Division of the County of Kaua'i Planning Department, an exemplar of public service, whose intelligence, diligence, and kindness blessed all those he worked with.*

***Stella Burgess (January 11, 1953–February 18, 2014)***

*For Aunty Stella Burgess, whose never-fading aloha will be remembered by the people she blessed and in the places she kept. A source, a pillar, a steward of Hawaiian culture for the South Shore community and island.*

## DISCLAIMER

The Hawaiian translation of the South Kaua'i Community Plan and the South Kaua'i Community Plan Ordinance are translated and published in Hawaiian for reference and informational purposes only. The County of Kaua'i cannot guarantee the accuracy of any translated text. Any person or entity that relies on the translated text and content does so at their own risk. The County of Kaua'i shall not be liable for any claims or losses caused by reliance on the accuracy and reliability of the translated text. The translation is not a substitute for the official South Kaua'i Community Plan or the South Kaua'i Community Plan Ordinance. If any discrepancies between the original English text and the Hawaiian translation exist, the original English version shall prevail and be the authoritative version of the law and policy.

# 1 INTRODUCTION

The South Kaua'i Community Plan (SKCP) is an update to the 1978 Kōloa-Po'ipū-Kalāheo Development Plan. It is a long-range plan with a 20-year time horizon, from 2015 to 2035, and is one of six regional plans for the island referred to as Development Plans in the County of Kaua'i Charter, Article XIV (Figure 1-1). The plan is driven by a community vision that calls for balanced, responsible development that enhances existing communities and preserves the local rural lifestyle. It provides guidance for the future growth and physical development of the South Kaua'i region. The plan will direct public policy and land use decision making to address growth management and embrace themes of sustainability, urban form, and resource protection.

## 1.1 PLANNING AREA

The boundary of the South Kaua'i Community Plan planning district (Planning District) generally follows the Kōloa judicial district boundary except along the western boundary which is defined by Wahiawa Gulch. The eastern boundary follows Hā'upu mountain ridge, Knudsen Gap, and Mount Kahili (Figure 1-1). The Planning District includes the towns of Po'ipū, Kukui'ula, Kōloa, 'Ōma'o, Lāwa'i, and Kalāheo and encompasses an area of approximately 31,300 acres (49 square miles). It is home to the second largest population on the island with 11,000 residents.

Figure 1-1: South Kaua'i Planning District

## 1.2 PLANNING PROCESS

There are four major steps in the development of this community plan (see Figure 1-2). The first involves background research and developing an understanding of the community's core values and existing conditions. This information was compiled into a Community Profile that is available as a separate document. The second step includes the development of vision statements for each of the major communities and the Planning District as a whole. Alternative scenarios were also investigated. Step three narrows down the alternatives into a preferred development scenario with accompanying policies, guidelines, priorities, and action plans summarized into a draft community plan. The final step involves the adoption process which includes Planning Commission and County Council review and approvals.

Figure 1-2: Four Step Planning Process

## 1.3 COMMUNITY OUTREACH

Community involvement is critical to helping the planning process create an informed vision for the future of South Kaua'i. Initiated in April 2013, this plan is the result of an extensive public outreach process that allowed for community input at various stages of plan development. A summary of the community outreach process is provided in Appendix A of the South Kaua'i Community Plan.

### 1.3.1 Citizens Advisory Committee

As part of the planning process a Citizens Advisory Committee (CAC) was formed to provide balanced representation from different community and business interests as well as representatives from the different towns within the planning area. The 15-member Citizens Advisory Committee was appointed by the Mayor and tasked to advise the project team in the development of the community plan. They have been instrumental in developing the land use and multimodal transportation maps and various concepts presented in this report. Eleven CAC meetings were held throughout the planning process and the CAC has reviewed and commented on drafts of this report. The community plan is a compilation of their vision as representatives of their beloved South Kaua'i communities and the desire for a better tomorrow for generations to come.





Figure 1-3: Community Outreach Timeline

### 1.3.2 Public Meetings

Community input and comments were sought at various times and locations from South Kaua'i residents and stakeholders. First, a series of public kick-off meetings were held. 6,326 "wish cards" were mailed as invitations to the events in Kōloa, Kalāheo, and Po'ipū.

Then, a series of small group meetings and interviews were conducted. The Kōloa Plantation Days provided another opportunity for community input. Next, community members participated in a 3-day intensive design workshop to help develop alternative plan scenarios. Lastly, the planning process concluded with a public open house meeting to share the draft plan prior to Planning Commission and County Council meetings required for adoption. Figure 1-3 shows the schedule of public events woven between the CAC meetings and deliverables.

*Mapping stations at the kick-off meetings provided an opportunity for the public to identify issues and opportunities through the region. (Photo Credit: Dennis Fujimoto/The Garden Island)*

### 1.3.3 Online and Print Outreach

***Website*** – A website was created as a way to easily disseminate information and updates about the plan to the community. The website provides an overview of the plan, links to resources, document downloads, a mailing list sign-up, calendar of events, and an image gallery. The address is: www.southkauaicp.com.

***Surveys*** – Public surveys were administered to understand the most important elements of the plan as identified by the community. The online versions posted were identical to the printed surveys distributed at workshops and events, and the results were tabulated together. Two online surveys were distributed through the South Kaua'i community plan website and hosted by SurveyMonkey.com.

***Photo Campaign*** – An Instagram photo campaign was launched at the Kōloa Plantation Days festival to provide another way for the younger community to get involved in the planning process. The online photo campaign was initiated to attract a larger audience and expand community outreach. Entrants were asked to submit photos via Instagram showing their most cherished places in South Kaua'i or themed places as determined by the project team. Winning photo submissions were selected and are featured here in the South Kaua'i Community Plan.

***Wish Cards*** – As noted, 6,326 wish cards were mailed to all South Kaua'i residents as invitations to the three public kick-off events. The cards asked residents to express their "wish for South Kaua'i." Some participants wrote text descriptions, others drew pictures. Index cards, distributed at the community meetings, served the same purpose.

***Social Media*** – The County of Kaua'i Planning Department's Facebook page was used as a platform to keep the community informed and updated of the planning process and to gain feedback.

# 2 COMMUNITY VISION

## 2.1 VISION STATEMENTS

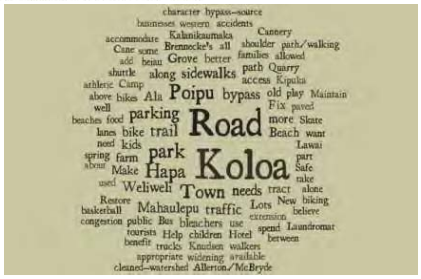
The vision statements for the overall South Kaua'i Planning District and the five individual towns were developed from the nearly 700 individual comments collected during the community kick-off events and outreach. "Word clouds" generated from the comments highlighted the most important issues and inspired the statements. The overall vision for the South Kaua'i Community Plan region is provided below. The vision statements for the individual towns are shown in bold in the following sections and capture the unique hopes for the future of each town. The current vision statements are followed by the Kaua'i General Plan's vision statements from the 2000 update, shown in italics, and the word clouds.

> **South Kauai** is comprised of **distinct rural communities**, each embracing its own **rich cultural, natural, and historic heritage**, but **well-connected** through safe and efficient **transportation networks**. Balanced, responsible development enhances existing communities, preserving the **local rural lifestyle** that embodies South Kaua'i and is cherished by residents and visitors alike.

### 2.1.1 Kōloa

**KŌLOA will be a thriving commercial and residential community that maintains its rural feel and historic "old town" charm by preserving, enhancing and protecting its vast cultural treasures.**

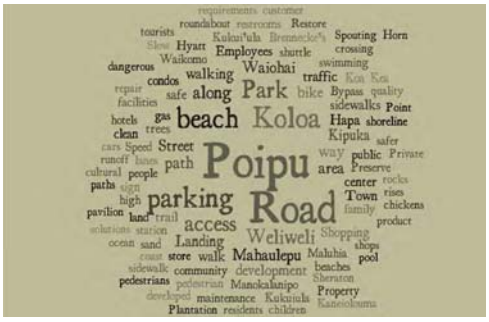
*Kōloa's history is preserved through the plantation/western architecture in the town core, its historic churches, and other historic buildings. In the town core, renovations and new buildings follow the style of "Old Kōloa Town." Shaded by building canopies and large trees, pedestrian walkways connect "pockets" of public parking at each end of town. The town provides Kōloa and Po'ipū residents with vital services such as grocery stores, the Post Office, and the Neighborhood Center. Both visitors and residents are also attracted to Kōloa because of its unique shops, restaurants and taverns. Outside of town, the former Kōloa Sugar Mill is in active use as a light industrial center and a food processing and packing facility. Coffee, papaya and other export crops are being grown on former sugar lands.*




### 2.1.2 Po'ipū

**PO'IPŪ will be a world-class, sustainable resort destination serving residents and visitors alike, developed responsibly, with clean, healthy beaches and ocean environments, welcoming parks and preserved heritage resources, all well-connected and accessible to everyone.**

*Po'ipū is a beach resort that accommodates both a residential community and the island's largest Visitor Destination Area. Supported by the growing community of Kukuiula to the west and by historic Kōloa Town to the north, Po'ipū is home to about 40 percent of Kaua'i's resort accommodations and is a major center of employment. Po'ipū is known for its many outdoor recreation opportunities, afforded by its beaches, surf breaks, diving spots, golf courses, and tennis facilities. Bicycle tours use old agricultural roads belonging to Grove Farm and McBryde. Walkers, joggers and bicyclists enjoy the continuous pedestrian/bicycle pathway that runs along the shoreline from the Spouting Horn to Māhā'ulepū.*



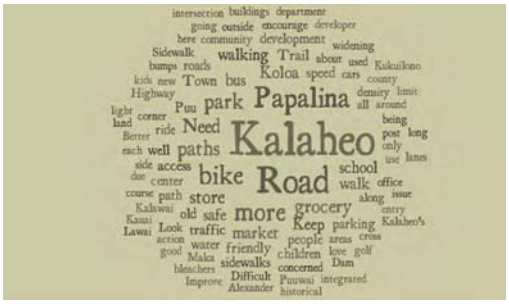

### 2.1.3 Kalāheo

**KALĀHEO will remain as a residential community enhanced by a neighborhood-scaled commercial center and supported by small local businesses.**

*In Kalāheo, numerous homes dot the hillsides mauka of town and around Kukuiolono Park. The population of Kalāheo is growing, as homestead and agricultural subdivisions created in the 1970's and '80s are built out with homes. In the town center, business properties are gradually being renovated with building designs supporting the paniolo theme. Public parking lots help to relieve traffic congestion, and sidewalks encourage people to walk around town. Businesses have expanded mauka and makai of Kaumuali'i Highway along the larger intersections. An active business association promotes the paniolo town theme and sponsors an annual town celebration. On the western edge of town, near Brydeswood, a shopping center with a large grocery store helps to provide for the needs of a growing population.*








### 2.1.4 'Ōma'o and Lāwa'i

**'ŌMA'O will maintain its value as a small rural residential community.**

**LĀWA'I will remain a rural crossroads with a limited commercial area centered on the Post Office and Old Cannery.**

*Ōma'o and Lāwa'i are valued as small rural residential communities. Pasturelands, hills and stream valleys give variety to the landscape and create separation between settlements, preventing the appearance of sprawl. The small commercial area around the old Lāwa'i Cannery is developed with shops and services that serve the nearby residential neighborhoods, as well as people traveling along Kaumuali'i Highway or Kōloa Road. Edges around the existing communities are maintained, preventing sprawl. A scenic roadway corridor along Kōloa Road maintains separation between Kōloa and Lāwa'i.*

## 2.2 GUIDING PRINCIPLES

The vision for South Kaua'i will be implemented through the following guiding principles.

1. **Watershed Management** - Manage the watershed mauka to makai in recognition of the ecosystem services and interrelatedness of nature.

2. **Cultural Stewardship & Interpretation** - Protect and care for the natural, historic, and cultural features as living sites. Weave these rich resources into a story of the region, creating a sense of place that connects people to the past and allows them to be integrated into modern life.

3. **Hazard & Climate Risk Management** - Prepare for potential impacts due to natural hazards and climate change.

4. **Compact Walkable Neighborhoods** - Focus growth on compact, defined settlement areas to reduce sprawl, enhance the sense of community, maintain the rural character of the place, and preserve open space. Develop Kōloa, Kalāheo, and Po'ipū Gateway town cores as vibrant mixed use places in concert with their historic character and their community context.

5. **Multimodal Transportation System** - Develop a multimodal pedestrian-friendly transportation system to reduce dependence on the automobile, improve safety, and promote a healthy lifestyle.

6. **Sustainable Resorts & Tourism** - Develop the Po'ipū Resort area as a sustainable visitor destination—one that provides eco-friendly products and services, leverages local businesses, relies less on cars, and is centered on a vast historic area and culturally rich coastline.

7. **Economic Development Opportunities** - Emphasize the competitive advantage assets of the Planning Area--sandy beaches, ocean conditions and resources, sunny climate, photovoltaic (PV) energy potential, natural and cultural points of interests, irrigated important agriculture land, and existing network of trails and roads. Encourage local food production, small business development, and workforce development.

8. **Diversity of Housing Types** - Support workforce housing development within and around town cores.

9. **Public Infrastructure and Facilities** - Prioritize to meet basic needs and support economic development.

# 3 COMMUNITY PROFILE

The Community Profile summarizes available information to describe the existing conditions of the South Kaua'i Community Plan Planning District. This information, which was gathered during the initial phase of the process, provided an objective foundation to analyze issues, develop a vision, and brainstorm alternative scenarios and policies. The following sections describe the rich history, natural resources, and the existing conditions of the Planning District.

## 3.1 CULTURAL AND HERITAGE RESOURCES

In her book, *The Kaua'i Album*, Carol Wilcox states that "the history of Kōloa is in many ways Hawai'i's history in a microcosm" (1981). In fact, Wilcox's statement can apply to all of South Kaua'i, from Kalāheo to Lāwa'i to Kōloa and Po'ipū. South Kaua'i was home to a large pre-contact population that supported itself through a unique agricultural system. It is the setting of numerous mo'olelo, or legendary stories, and a few examples are notable for their association with some of the region's prominent geographic features. It is the birthplace of Prince Kūhiō and the home of eminent pre-contact royalty. It was an important port for the whaling and sandalwood industries and hosted the first commercial sugar mill in Hawai'i. Today, it attracts thousands of tourists annually to its shores and world-class resorts. South Kaua'i provides a rare opportunity to share the story of Hawai'i by experiencing the features of a single region.

Figure 3-1 shows the richness of South Kaua'i's history. A list of these sites is provided in Appendix B of the SKCP report.

**Figure 3-1: Heritage Resources Map**

More than 1,000 archaeological sites have been documented within the Planning District. Archaeological evidence indicates that most of the ahupua'a was home to a number of traditional Hawaiian activities such as agriculture, habitation, transportation/pathways, religious activities including burial interment, and resource gathering. South Kaua'i has a large number of heiau, the most significant of which include Kāneiolouma in the ahupua'a of Kōloa, Kāne'aukai in Weliweli, Wai'ōpili in Māhā'ulepū, and the destroyed Kukuiolono ("Lono's light") in Kalāheo. Remnants of the more recent sugar and ranching industries, such as ditches, flumes, sugar mills, pipelines, barbed wire fences, stone walls, and structural foundations, also appear frequently in the archaeological record of the ahupua'a.

**Figure 3-2: South Kaua'i Ahupua'a and Registered Historic Places**

Within the Planning District, there are five sites on the Hawai'i Register of Historic Places, which formally recognizes districts, sites, structures, buildings and objects and their significance in Hawai'i's history, architecture, archaeology, engineering and culture (Figure 3-2). They are:

- Wahiawa Petroglyphs (SHPD #30-09-3169)
- Lāwa'i Lava Tubes (SHPD #30-10-3071, -3072)
- Kōloa Lava Tubes (SHPD #30-10-3075)
- Old Sugar Mill of Kōloa (SHPD #30-10-9302)
- Kalāheo School Campus (SHPD #30-10-9391).

The Old Sugar Mill of Kōloa is also listed on the National Register of Historic Places as a National Historic Landmark.





The County of Kaua'i is also engaged in a cultural and historical project called "Kaua'i Nui Kuapapa: Talking about Our Island" to identify the borders of the original six moku of Kaua'i and Ni'ihau, as well as the estimated 54 ahupua'a land divisions. The South Kaua'i Planning District is a portion of the Kona Moku. The moku and ahupua'a boundaries may differ considerably from the modern boundaries as they will be based on maps and information from the early 1800s to reflect King Kaumuali'i's era. The maps will be tied to historical and cultural information, which will be made available via a public information app linked to signage posted at moku and ahupua'a boundaries. The information will also be integrated into Kaua'i public school curriculum.

## 3.2 PHYSICAL ENVIRONMENT

South Kaua'i has a vast physical environment, ranging from the top of Kapalaoa Summit (3,267 feet) down to the plains where it gently slopes out to the coastline. Hāupu Ridge is the dominant topographical feature on the east side of the Planning District, rising approximately 2,300 feet above mean sea level.

The geology of the Planning District is dominated by cinder cones (pu'u), ash beds, and olivine deposits resulting from the Kōloa Volcanic Series, which occurred 1.5 million years after the island's main shield-building phase. Other areas of geological interest include the Makauwahi Cave, which is the largest limestone cave in the state of Hawai'i, and Spouting Horn, a blowhole originally called Puhi (eel) located just east of Kukui'ula Bay.

The soils of the Planning District are primarily Oxisols, which are reddish in color, resistant to weathering, and have very low native fertility. Just over a quarter of the Planning District's acreage is considered "highly erodible land" and much of the remaining land as "potentially highly erodible land." A portion of the Planning District has been classified as having a high level of potential agricultural productivity. Most of the District has been designated as Important Agricultural Lands under HRS Chapter 205, Part III.

There are two vegetation zones in the Planning District: wet forest above the 300' elevation and lowland dry and mesic forest below 300'. Most of the dryland and mesic forest has been transformed by human activity, but a significant portion of the native wet forest and remnants of dry native forest and shrubland remain. The U.S. Fish and Wildlife Service identified both plant and invertebrate "critical habitats" in the Planning District. Invasive alien species are prevalent throughout the Planning District, even in protected critical habitat areas, and continually threaten the integrity of native biodiversity. There are also seven Exceptional Trees designated in South Kaua'i and protected by ordinance from any damage or removal (KCC §22-5). They are mapped in Figure 3-2 and listed in Table 3-1. They are also included in the SKCP land use map for reference.

**Table 3-1: South Kaua'i Exceptional Trees**

| No. | Tree | Location |
|---|---|---|
| K-2 | Tree Tunnel *(Eucalyptus Robusta)* | Both sides of Maluhia Road (TMKs 2-7-02:01 and 2-8-01:05) |
| K-5 | Baobab (*Adansonia digitata*) | Behind Kōloa Missionary Church, southeast corner (TMK: 2-8-10:01) |
| K-8 | Earpod (*Enterlobium cyclocarpum*) | In front of Kaua'i Mortuary on Po'ipū Road (TMK: 2-8-10:45) |
| K-20 | Monkey Pod (*Samanea saman*) | Behind old Yamamoto Store near river (TMK: 2-8-07:16) |
| K-21 | Monkey Pod (*Samanea saman*) | Honpa Hongwanji Mission and Kōloa Early School (TMK: 2-8-04:56) |
| K-22 | Monkey Pod (*Samanea saman*) | Honpa Hongwanji Mission and Kōloa Early School (TMK: 2-8-04:56) |
| K-23 | Monkey Pod (*Samanea saman*) | Behind Kōloa Early School (straddles TMKs 2-8-04:03 and 53) |

Several designations and management systems provide various degrees of protection of the Planning District's natural resources. The Conservation District encompasses nearly all of the remaining native vegetation. Within the Conservation District is the Kanaele Preserve, the Lihu'e-Kōloa Forest Reserve, and land managed by the Kaua'i Watershed Alliance.

Due to its large size and wide range of elevations and microenvironments, the climate of the Planning District is quite varied. Located on the drier, leeward side of the island, the mean annual rainfall in the Planning District ranges from 35" at the coast to 160" at the highest mauka elevations. During the summer months (May-September), the sun is higher in the sky, temperatures are warmer, and the trade winds occur more steadily. The winter months (October-April) are cooler, trade winds are less frequent, and wide-spread storm rainfall is more common. Brief periods of intense rainfall can lead to flooding and soil erosion. The rainfall intensity for a 10-year storm in Kōloa is approximately 2.5 inches per hour.

The Planning District has six watersheds with eleven streams: three perennial streams and eight intermittent streams. All of the perennial streams are listed as impaired by the State Department of Health because they do not meet certain state water quality standards. There are two large reservoirs in the Planning District: Alexander Reservoir, which is currently home to a 1,000 kilowatt hydroelectric power plant, and the Waitā Reservoir, which was once a marsh and is fed from Ku'ia Stream.

Groundwater occurs as basal, perched (water bodies "resting" or "settled" within rock), and most likely dike-impounded water. The Planning District is mostly encompassed by the Kōloa Aquifer System with a small portion in the Hanamā'ulu Aquifer System. The estimated sustainable yield of the Kōloa Aquifer System is 30 million gallons per day (MGD), and current pumpage is estimated at only 0.342 MGD. However, the State Commission on Water Resource Management warns that due to Kaua'i's geology, it can be difficult to generate a steady supply of water by pumping water from the aquifers.

The energy generating potential of the solar and wind resources of the Planning District is significant. Solar radiation in the Planning District is among the highest on the island, ranging from 300 cal/cm2/day in the mauka regions to 450-500 cal/cm2/day along the coast. Tradewinds blow 70% of the time with high-wind areas at the crests of lower mountain ridges.

## 3.3 COASTAL ENVIRONMENT

The south-facing Planning District generally has higher surf during the summer months from South Pacific swells and occasionally during the winter months from Kona storms.

For most of the nearshore waters of the Planning District, the State Department of Health (DOH) water quality classification is Class A. Between Ho'ai Bay and Makahū'ena Point, the DOH classified the nearshore waters as Class AA, which are to "remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions." In Class A waters, the best degree of treatment is required and the discharge must be compatible with recreational uses and protection of fish, shellfish, and wildlife. Under the inland water classifications, Class I waters similarly have the goal of remaining as pristine

According to the 2009 study performed by the Coastal Geology Group from the UH School of Ocean and Earth Sciences and Technology (SOEST), shoreline change rates along South Kaua'i shorelines ranged from a small amount of accretion to erosion at 1-2 feet per year. Rocky shorelines and other stable shorelines were not included in the study.

Existing shoreline public access points are shown in Figure 3-3. There are seventeen accesses with legal documents, which give the public the right to use the accesses, or easement documents, which are close to being recorded. The map also includes accesses that have easement documents executed (or signed) but not recorded.

Figure 3-3: Existing Public Shoreline Accesses

## 3.4 BUILT ENVIRONMENT

South Kaua'i is comprised of five distinct towns—Kōloa, Po'ipū, Kalāheo, Lāwa'i, and 'Ōma'o. New development in Kukui'ula extends Po'ipū to the west.

***Place Types.*** Very few of the towns are considered walkable at this time due to limited and disconnected sidewalks, few marked pedestrian crosswalks, and the barrier of Kaumuali'i Highway. A map of the sidewalks inventoried in 2010 is provided in Figure 3-4.

Most of the towns have a rural character with a small commercial and retail area consisting of restaurants, tourist-oriented shops, food markets, and other small businesses. Po'ipū-Kukui'ula and pockets of Kalāheo have the most potential for larger, taller developments depending upon infrastructure service. Kōloa, 'Ōma'o, and Lāwa'i are restricted to smaller-scale infill development.

Figure 3-4: Existing Sidewalk Inventory (Kaua'i Planning Department 2010)

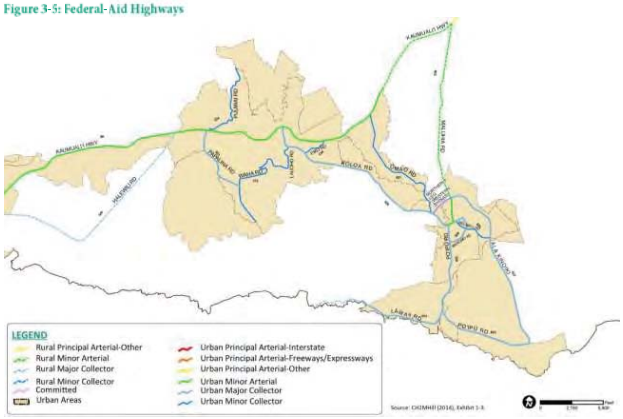
***Roads.*** The Planning District is served by Kaumuali'i Highway (Route 50), one of two major highways on Kaua'i. Kaumuali'i Highway, a two-lane state arterial, begins at its intersection with Kūhiō Highway (Route 56) in Līhu'e and ends at Mānā on the west side of Kaua'i. Between Puhi and Līhu'e, the highway has been widened to 4 lanes. It is the only state or county roadway categorized as a National Highway System facility within the Planning District. However, there are other public roadways eligible for Federal Highway Administration (FHWA) funding, called federal-aid highways. They are listed in alphabetical order below and shown in Figure 3-5:

- Ala Kinoiki
- Kōloa Road
- Halewili Road
- Kaumuali'i Highway
- Lāwa'i Road west of Kukui'ula Harbor
- Lauoho Road-between Waha Road and Kōloa Road
- Maluhia Road
- Māhā'ulepū Road-between Weliweli Road and Ala Kinoiki
- Northerly Leg of Western Bypass (committed to construction)
- 'Ōma'o Road
- Papalina Road
- Po'ipū Road
- Piko Road
- Pu'uwai Road
- Waha Road
- Waikomo Road
- Weliweli Road

There are two traffic signals in the Planning District: one at the Kaumuali'i Highway and Papalina Road intersection and the other at the intersection of Kaumuali'i Highway and Kōloa Road.

Previous roadway plans and traffic studies have proposed a number of improvements or additions to the road network in the Planning District. Most of these prioritized traffic flow over different modes of transportation in their analyses. The transportation study for the SKCP considers all modes of transportation for its analyses and is summarized in Section 4.3.

Figure 3-5: Federal-Aid Highways








***Public Transportation.*** The Kaua'i Bus is the only public transit system serving the island of Kaua'i and is managed by the County of Kaua'i Transportation Agency. Two of the agency's seven fixed route bus services operate within the South Kaua'i Planning Area—the Kekaha to Līhu'e mainline and the Kōloa Shuttle, which circulates through residential neighborhoods in Kalāheo, Kōloa and Po'ipū. Currently, riders must transfer in Kalāheo between the two lines and there is no service to 'Ōma'o (see Figure 3-6).

Figure 3-6: Existing Public Transit Routes

***Bike Facilities.*** The only districts on Kaua'i with any bicycle infrastructure are the Līhu'e and East Kaua'i Districts, and much of this infrastructure is disconnected. However, cyclists are allowed to use any of the island's public roads; some of which are fairly safe for bicycling, while others can be difficult. In South Kaua'i, Maluhia and Po'ipū Roads have high traffic volumes and/or high traffic speeds with little to no shoulder space (Charlier 2012).

***Pedestrian Facilities and Safe Routes to Schools.*** In 2007, the Kōloa-Po'ipū Area Circulation Plan analyzed existing pedestrian facilities and identified Kōloa Town safety improvements as the highest priority, primarily to provide safe passage to students walking to and from Kōloa School. They recommended adding sidewalks along Waikomo Road and Po'ipū Road for Kōloa School students and improving sidewalks through the downtown core. It also recommended adding sidewalks along all of Po'ipū Road, most of Ala Kinoiki, and Ho'owili Road between Po'ipū Road and the Makai Promenade.

The principal at Kalāheo Elementary has voiced a similar concern with the narrow sidewalk on Pu'u Road and no sidewalks on the lower part of Papalina Road from Waha Road leading in to town.

The County of Kaua'i has been successful in acquiring Safe Routes to Schools (SRTS) funds for pedestrian and bicycle improvements for South Kaua'i as well as other communities around the island. Within the Planning District, SRTS has funded the installation of rapid flashing crosswalk beacons at Kalāheo Elementary School, and the installation of lighted crosswalk systems and the restriping of Po'ipū Road in front of Kōloa Elementary School to add a bike lane and paved shoulder. Community support of existing and proposed SRTS infrastructure on Kaua'i has been very strong. Both Kalāheo and Kōloa Elementary Schools have active SRTS programs that aim to educate students and encourage both walking/biking to school and the installation of SRTS infrastructure.

### 3.4.1 Infrastructure & Utilities

#### *3.4.1.1 Water*

The Kaua'i Department of Water (DOW) provides potable water services to all five towns within South Kaua'i. Water in the Kalāheo-Kōloa area is supplied by twelve underground sources. It is pumped, treated, and stored in fifteen tanks dispersed throughout the region.

In 2011, water consumption in the Planning District was roughly 3 MGD. DOW's Water Plan 2020 forecasts South Kaua'i water usage to be approximately 5 MGD in 2020 and approximately 6.8 MGD in the year 2050. See Table 3-2. A number of new water supply related projects are being developed in the South Kaua'i area to work on meeting this projected demand including storage and transmission facilities.

Table 3-2: Water Use 2011 Consumption and 2020/2050 Forecast

| Location | Consumption (GPD) | | |
|---|---|---|---|
| | 2011 | 2020 | 2050 |
| **Kalāheo** | 511,000 | 746,000 | 902,000 |
| **Lāwa'i-'Ōma'o** | 299,000 | 458,000 | 564,000 |
| **Kōloa** | 329,000 | 798,000 | 1430,000 |
| **Po'ipū** | 1,844,000 | 2,953,000 | 3,970,000 |
| **Total** | **2,983,000** | **4,955,000** | **6,866,000** |

Perennial streams and man-made ditches channel water to various non-potable reservoirs in the South Kaua'i area. Twenty-one reservoirs, the largest of which is the Waitā Reservoir, provide non-potable water for irrigation of South Kaua'i's lands. In addition to the reservoirs, an estimated 0.47 MGD of wastewater was recycled in 2013 and used, in combination with surface water, for landscape irrigation and golf course water features.

#### *3.4.1.2 Wastewater*

All wastewater generated in South Kaua'i is treated by individual and private systems. There are twenty-five private small packaged wastewater treatment plants in the Kōloa-Po'ipū area that serve resorts, hotels, and apartments. Most of the treated wastewater is recycled and used for irrigation at golf courses or discharged to injection wells. Future development

will require added capacity or construction of a new facility. Large capacity cesspools, septic tanks, and cesspool systems are also used for wastewater treatment and disposal throughout South Kaua'i, primarily in older residential communities.

#### 3.4.1.3 Drainage

Developed areas throughout the South Kaua'i region have gutters and storm drain systems. However, the Planning District is primarily rural with stormwater generally sheet flowing and percolating into the ground during smaller rainfall events or channeled via swales and culverts either natural or manmade to streams that ultimately discharge into the Pacific Ocean.

There is an existing flooding problem at the makai end of Manoʻokalanipō, near the corner of Hoʻone and Hoʻowili Roads, in Poʻipū. The area is prone to flooding because it is in a low-lying area and gravity flow to the downstream beach park is not accessible. The Department of Parks and Recreation has been in communication with the US Army Corps of Engineers with regards to the problem and received some recommendations and possible solutions. Unfortunately, the cost estimates for the proposed solutions were extremely high and flooding continues to occur with heavy rainfall events.

#### 3.4.1.4 Solid Waste

Kaua'i County collects all residential curbside solid waste once per week and transports it to one of four transfer stations where it is compacted and taken to the Kaua'i County's Kekaha Landfill. Starting Summer 2016, all residential refuse collection will be automated. Residents will be required to select one of two cart sizes: 96 gallons or 64 gallons. Commercial establishments must contract independently with a private hauler to collect and haul solid waste, or they can transport their waste directly to a refuse transfer station. In 2013, the South Kaua'i Planning District generated the most solid waste in tons per year compared to other planning districts. The high solid waste generation is due in part due to the high number of hotel and resort condominiums as well as large- and small-scale agricultural activities in the area. The County has plans to offer automated curb-side green waste collection island-wide in the coming years, to coincide with curb-side recycling collection. Currently, there are no locations in the South Kaua'i district that accept green waste.

Garden Isle Disposal is contracted by Kaua'i County to operate and maintain the county's recycling program, which includes newspaper, plastic, glass, aluminum cans, and cardboard. Beverage containers (aluminum cans and glass/plastic bottles) can be recycled for a 5-cent refund, as part of the State's HI-5 beverage container redemption program. The County does not provide curbside collection, but there are two Residential Recycle Drop Bins in South Kaua'i. Commercial establishments can recycle materials, including cardboard, newspaper, office paper, plastic, HI-5 beverage containers, and tires, by contracting Garden Isle Disposal or hauling their recyclables to the Kaua'i Resource Center in Līhu'e.

#### 3.4.1.5 Power and Communications

Kaua'i Island Utility Cooperative (KIUC) provides island wide utility electric service through a combination of fossil fuel burning power plants, hydroelectric power plants and large scale solar energy systems. Currently, renewables generate approximately 15% of the island's electrical energy. Three utility companies provide telecommunications services for Kaua'i: Hawaiian Telcom, Oceanic Time Warner Cable, and Sandwich Isles Communications.

### 3.4.2 Parks & Recreation

The Planning District contains 110.66 acres of county parkland that includes one passive park, six neighborhood parks, two district parks, and three beach parks. Some of the notable county-owned parks include Kōloa (Knudsen) Park, Kukui'ula Harbor Park, Spouting Horn Beach Park, Kalāwa'i Park, and Poʻipū Beach Park. Some of the non-county-owned parks and recreational resources include the Kōloa Heritage Trail, Māhāʻulepū Heritage Trail and Coastline, Prince Kūhiō Park, and the Wahiawa Mauka State Park Reserve (County of Kaua'i Department of Parks and Recreation). Additionally, the National Tropical Botanical Garden (NTBG)—known for its stone walls, taro patches, and abundance of plants—is located in Lāwa'i Valley and a portion of the Wahiawa Mauka State Park Reserve is located in the northern part of the Kōloa-Poʻipū region. The Planning District also has two Neighborhood Centers in Kōloa and Kalāheo which include kitchen facilities and serve as venues for community meetings, classes, and large gatherings. Poʻipū Beach Park Mauka Preserve is a special use area for the restoration of Kāneiolouma Heiau.

There are three golf courses within the Planning District, all of which are privately owned: Kukuiolono Park and Golf Course, the Kiahuna Golf Club, and the Poʻipū Bay Golf Course, which was home to the PGA Grand Slam of Golf from 1994-2006.

### 3.4.3 Public Safety and Services

***Police.*** The Planning District is under the jurisdiction of the Kaua'i Police Department's 311-square mile Waimea District, which employs 28 officers who operate out of the Kōloa Sub-station, the only police station in the District. It is located at the Kōloa Neighborhood Center.

***Fire.*** There are two County-operated fire stations in the Kōloa region. The Kōloa Station is located near the roundabout on Poʻipū Road and the Kalāheo Station is on Kaumualiʻi Highway next to the neighborhood center. Only the Kōloa Fire Station has an emergency medical response unit (ambulance), but both stations are responsible for responding to emergency calls. The Kaua'i Fire Department also operates the Water Safety Operations Bureau, which provides lifeguard services and "promotes prevention and safety awareness to all persons who frequent…beaches and provides training for staff and public entities." Poʻipū Beach Park is the only area that is stationed with lifeguards within the Planning District.

***Medical.*** The clinics that specialize in neighborhood medical care include Wilcox Health's Kōloa Medical Clinic and Hawai'i Health Systems Corporation's Kalāheo Clinic. Hawai'i Health Systems Corporation anticipates opening a new clinic location in the Kukui'ula area. For more advanced or immediate services, South Kaua'i residents must travel to either the West Kaua'i Medical Center in Waimea or Wilcox Memorial Hospital in Līhu'e. Patients also fly or are sometimes airlifted to O'ahu hospitals for more advanced or critical care. According to a 2012 Department of Health study titled State of Hawai'i Primary Care Needs Assessment Data Book, Kaua'i County was designated a "Medically Underserved Population (MUP)."

***Schools & Libraries.*** The State of Hawai'i Board of Education divides Kaua'i into three complexes, each of which contains a high school and all of its feeder intermediate and elementary schools. Kalāheo Elementary falls under the Waimea Complex, headed by Waimea High School in Waimea, and Kōloa Elementary falls under the Kaua'i Complex, headed by Kaua'i High School in Līhu'e. Most public school students in the region attend one of the two elementary schools in the Planning District and then enroll in Kamakahelei Middle School in Puhi and Kaua'i High School in Līhu'e. Only about 25-30 percent of Kalāheo Elementary students stay within the Waimea Complex (Burkman, personal communication 2015). In general, the facilities at both Kōloa and Kalāheo Elementary Schools significantly exceed state standards. The only private school in this region is the K-12 Kahili Adventist School. The Kōloa Public Library is the only library located in the Planning District.

## 3.5 SOCIO-ECONOMIC CHARACTERISTICS

The following section includes data summarized from the 2010 US Census Bureau and the 2035 projections drafted by SMS Research & Marketing Services, Inc. for the County Planning Department's General Plan update (initiated in 2015).

### 3.5.1 Population Size

The Planning District includes two census county divisions (CCD): ʻEleʻele-Kalāheo (407) and Kōloa-Poʻipū (406), which roughly correspond to the Kōloa judicial district. The census designated places (CDP) in the Planning District include:

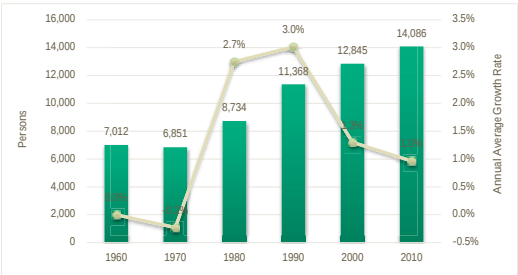




Poʻipū, Kōloa, ʻŌmaʻo, Lāwaʻi, and Kalāheo. In this section, "Kōloa District" refers to the combined census divisions (ʻEleʻele-Kalāheo (407) and Kōloa-Poʻipū (406)) rather than the judicial district.

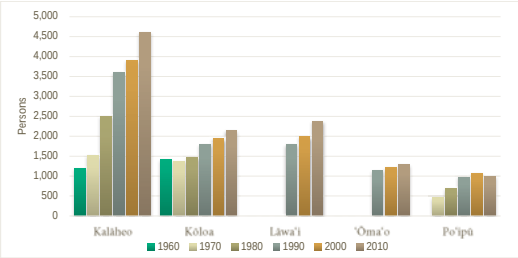
In 2010, approximately 14,000 people resided in the Kōloa District. This number represents a doubling of the population during the fifty-year period since 1960. See Figure 3-7. However, population growth in the Planning District has not exceeded the 20-year projection developed for the 1980 Kōloa-Poʻipū-Kalāheo Development Plan. The Plan estimated that population growth would occur at an annual average rate of four percent over a 20-year period, which is significantly more than actual average annual growth rate of two percent between 1980 and 2000 and the more recent one percent rate in the last two decades.

Figure 3-7: Kōloa District Resident Population, 1960-2010




Kalāheo has been the district's most populous CDP since 1970. At 4,595 residents in 2010, Kalāheo's population is more than double the population of the next largest CDP, Kōloa. See Figure 3-8.

Figure 3-8: Population Growth by Town, 1960-2010

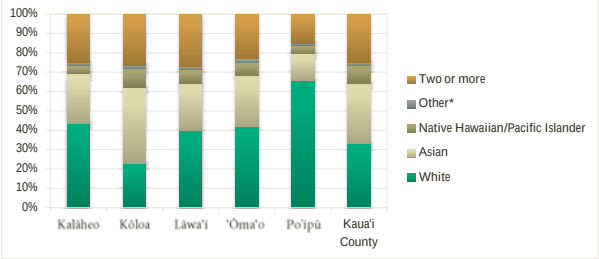



***Population Forecast.*** SMS's 2035 population forecast assumed that the Līhu'e Planning District will have the largest portion of the projected growth with South Kaua'i receiving higher than average growth and the rest of the districts relatively little growth. For South Kaua'i, the population is estimated to reach 16,855. In 2010, South Kaua'i had roughly 17.4 percent of the county population and is projected to have 19.2 percent of the 88,013 populace in 2035 (SMS 2014).

### 3.5.2 Population Characteristics

***Ethnic Composition.*** Since 1990, the largest racial group in the district has been White, followed by Asian with Japanese and Filipino populations comprising most of the latter. However, the breakdowns within each community and compared to the island as a whole differs widely. See Figure 3-9.

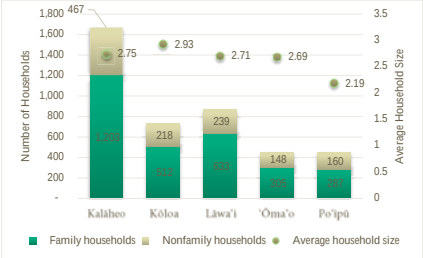
Figure 3-9: Racial Composition by CDP and for Kaua'i County 2010




*Black Alone, Alaskan Native/Native American Alone, Other Alone

***Age.*** Similar to the rest of the island, the Kōloa-Poʻipū CCD has an aging population. The median age for the CCD was 35 in 1970 and has steadily increased to 45 in 2010. The division is older on average compared to the county as a whole, which had a median age of 41.1 in 2010. There are also some dramatic differences in median age among the CDPs. Between 2000 and 2010, Kalāheo's median age decreased, while all other towns increased. In 2010, Kalāheo and Kōloa had the district's youngest median age of 36.0 and 36.9, respectively, while Poʻipū had the oldest median age of 57.2.

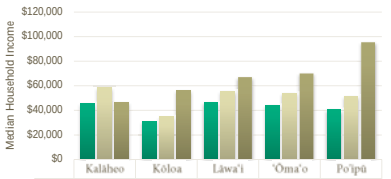
Figure 3-10: Number & Types of Households by Town, 2010




***Households.*** Between 1990 and 2010, the number of total households grew, but the average household size decreased in all CDPs. The average household size in all towns except Poʻipū was over 3 persons in 1990; by 2010, they were all below 3 persons. SMS noted a similar trend in their study and estimates that the number of

persons per household for the Planning District will remain relatively constant and be the lowest on the island in 2035 at 2.76 (SMS 2014). As a proportion of total households, family households decreased as the number of non-family households increased, including homes where the householder lives alone. Po'ipū has the lowest percentage of family households (35.8 percent) whereas nearly three-quarters of all households in Kalāheo, Kōloa, Lāwa'i and 'Ōma'o were family households in 2010. See Figure 3-10.

Figure 3-11: Median Household Income by CDP, 1989-2011




| | Kalāheo | Kōloa | Lāwa'i | 'Ōma'o | Po'ipū |
|---|---|---|---|---|---|
| 1989 | 45,348 | 31,207 | 46,050 | 43,873 | 40,500 |
| 1999 | 58,813 | 34,786 | 55,662 | 53,750 | 51,442 |
| 2011 | 46144 | 56,023 | 67,045 | 70,000 | 95,446 |

***Income & Poverty.*** Median household income for all CDPs except Kalāheo increased between 1989 and 2011 according to the American Community Survey (Figure 3-11). Po'ipū had the highest median income ($95,446) and the highest percentage of households earning over $150,000. 'Ōma'o and Lāwa'i displayed similar income distributions over time, while Kōloa went from having the lowest median household income of the CDPs in 1989 and 1999 to one higher than Kalāheo CDP.

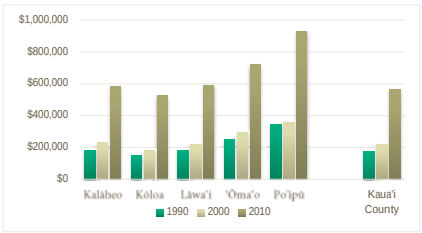
All of the CDPs except Kōloa were below the County of Kaua'i's average poverty rate of 7.2 percent. Lāwa'i had the lowest rate at only 1.9 percent. Kōloa's poverty rate was the highest at 10.2 percent as of 2011.

### 3.5.3 Housing Characteristics

Housing growth has significantly exceeded the 20-year growth projected in the 1978 Kōloa-Po'ipū Development Plan. The housing stock in the Kōloa District grew from 3,952 to 6,641 units between 1990 and 2010, an increase of 68 percent most of which occurred in Po'ipū. However, in the 2010 census, 86 percent of Po'ipū's housing stock was categorized as "seasonal." In 2010, Kalāheo had the largest housing stock with approximately 1,800 units, followed by Po'ipū (1,588), Lāwa'i (959), Kōloa (814), and 'Ōma'o (493). Over 80 percent of the housing units in Kalāheo, Lāwa'i, and 'Ōma'o are single family residences. In Kōloa, less than 60 percent are single family residences, and in Po'ipū, it is approximately 30 percent.

***Housing Costs & Affordability.*** Between 1990 and 2010, median housing prices increased in all the towns at a dramatically faster rate than the rest of the County (Figure 3-12). In 2010, Po'ipū had the district's highest median housing price at $928,600 while Kōloa had the lowest median price at $528,000 – just half of the Po'ipū price.

Figure 3-12: Median Value, Owner-occupied Housing Units, 1990-2010

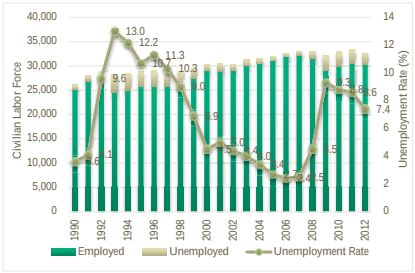



Rental costs also increased in all CDPs between 1990 and 2010. As was the trend with median housing value, Po'ipū also had the highest median rent in the district at $912 in 2000 and doubling to $1,802 in 2010, while Kōloa had the lowest median rent with $442 also nearly doubling to $861 in 2010.

### 3.5.4 Economy

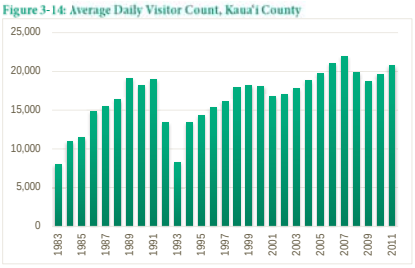
According to the 2010 Census, Kaua'i's labor force totaled 34,981 and had an unemployment rate of 5 percent (Figure 3-13). The historical data for Kaua'i County indicate an upwards trend in labor force growth, equating to 1.1 percent a year since 1990. Since 1993, county unemployment rates slowly declined to a low of 2.4 percent in 2006 but then soared to 9.3 percent in 2009 during the global recession. On the CDP level, in 2010, participation in the labor force ranged from 49 to 97 percent of the respective CDP population 16 years and older, compared to the County at 78 percent. Approximately 11 to 25 percent of the workforce in all CDPs is employed by the government, with the majority employed by the State. In all CDPs, about a quarter of the workforce was employed in sales and office occupations. Approximately 18 percent of all workers in the county's accommodation/food services/arts/ entertainment industry work in the Planning District. Sixteen of Kaua'i's Top 100 Employers are located in the district, according to a survey conducted by InfoUSA in 2008.

Figure 3-13: Annual Employment, Kaua'i County 1990-2012




Approximately 30 percent of the households of the Planning District CDPs received social security, but 40 percent of households in Po'ipū receive social security, reflecting its relatively older population.

Figure 3-14: Average Daily Visitor Count, Kaua'i County




***Travel to Work.*** In Kalāheo, 'Ōma'o and Lāwa'i, 86 to 89 percent of residents worked outside of their town and had to commute to work while in Kōloa and Po'ipū, 25 and 40 percent, respectively, were employed locally. Overwhelmingly, the primary means of commuting is automobile travel. Approximately 1 to 5 percent of the workforce in the Kōloa District walked to work, except in Kalāheo and Po'ipū where no one walked to work.

***Tourism.*** During an average 24-hour period in 2012, 22,318 visitors were present on Kaua'i. Since 1983, Kaua'i's average daily visitor count (ADVC) grew from approximately 8,000 visitors to nearly 22,000 visitors in 2007. See Figure 3-14. It is projected that Kaua'i County's ADVC will steadily increase to 27,000 in 2035 according the latest estimates from DBEDT.





### 3.5.5 Visitor Units

According to the Hawai'i Tourism Authority's (HTA) 2014 Visitor Plant Inventory (VPI), the greatest number of visitor units on the island are located in the Po'ipū-Kukui'ula area and account for roughly 36 percent of Kaua'i's total inventory. There are seven anticipated resort projects in the district that are all located in the Po'ipū-Kukui'ula area, and two undeveloped but residentially zoned properties within the VDA. If buildout of all projects occur, an additional 1,961 units could be added to the area. While this is unlikely to occur in the next few years, buildout is possible within the 20-year planning horizon of the Plan. Buildout represents an increase of 64% from the year 2014 visitor unit total in the region.

For South Kaua'i, between 3,877 and 4,406 visitor units will be required by 2035 (SMS model 2014). With an existing 3,065 visitor units in 2014, the difference between the forecasted and existing number of visitor units is between 812 and 1,341 units. By applying SMS's medium estimate of an average of 70 percent occupancy rate to the number of permitted and potential visitor units (1,961), the net difference between the projected required number of units and permitted units is between 561 and 32 units. Depending on how many of the permitted units are actually built, especially at Kukui'ula and Pilimai at Po'ipū, and the two zoned but not permitted parcels, the number of visitor units could be relatively close to the projected need on the high side of the projections. Should these developments stall or be lower than expected, additional permitting for visitor units may be required. On the low side of the projections, there is a potential excess of 561 units.

## 3.6 NATURAL HAZARDS & CLIMATE RISKS

The following sections summarize information from the County's 2009 Multi-Hazard Mitigation Plan Update, the State Civil Defense (SCD) website, the Federal Emergency Management Agency (FEMA) website, and the State Department of Land and Natural Resources website as they relate to the South Kaua'i Planning District.

***Hurricanes.*** Kaua'i has sustained two direct hits from hurricanes since reliable recordkeeping began in 1950—'Iwa in 1982 and 'Iniki in 1992. Both caused extensive damage to South Kaua'i, particularly in Po'ipū. However, redevelopment following both storms occurred in precisely the same locations resulting in a once again densely developed shoreline although decisions were made by some developers to locate golf courses closer to the shoreline and increase building setbacks.

***Tsunami.*** All Kaua'i coastlines have observed tsunami run-up heights of over ten feet, which caused significant damage and historically, loss of life. The tsunami evacuation zones were last updated in 2013.

***Earthquakes.*** According to historical records, the history of earthquakes in Kaua'i has been low and Kaua'i is considered the least vulnerable to earthquakes of all the major Hawaiian Islands. However, there is always a concern that an earthquake in Hawai'i or somewhere within the Pacific Rim could generate a tsunami or cause enough damage elsewhere to interrupt the supply of goods and services to Kaua'i.

***Landslides & Rockfalls.*** The construction of Kaumuali'i Highway through Kalāheo and Lāwa'i required cutting into hills, and portions of the graded lands have slid and resulted in rockfalls. Destruction of roads from landslides could result in cutting off vehicular access, which could present a major problem because of the lack of redundancy and alternative routes in Kaua'i's road system. In South Kaua'i, the old cane roads are relatively well maintained due to their continued use by agricultural operations and provide potential emergency relief routes should something cut off access on the highway.

***Flooding.*** Flooding can occur from excess rainfall, storm surges, high tide wave action, unmanaged drainage systems, or sea level rise. Stream flooding on Kaua'i is characterized by flash floods, as well as prolonged flooding associated with slowly passing rainstorms that saturate the soils. Flooding in the Planning District has historically occurred at the Po'ipū Beach Park parking lot, in Kalāheo Stream, in Po'ipū and Kōloa due to overland flow, and along the coast due to tsunami run-up.

***Dam Failures.*** Dams and reservoirs in Hawai'i are used for agriculture, drinking water storage, flood control, recreation, and various other purposes. Approximately 23 regulated and 7 unregulated dams as defined under the Hawai'i Dam and Reservoir Safety Act of 2007 are located within the Planning District. The State DLNR Engineering Division's Dam Safety Program is charged with carrying out the requirements of the Act including dam safety inspections of all state regulated dams, working with owners to develop or update their Emergency Action Plans, reviewing permit applications, providing training, and regulating and promoting dam safety statewide.

***Coastal Hazards, Climate Change, Shoreline Erosion, & Sea-Level Rise.*** Sea level around the island of Kaua'i is currently rising at an average rate of 1.53±0.59 mm/year, or about 6 inches/century, and, unlike global records, accelerated sea level rise has not yet been detected in the Hawai'i tide gage records (Sea Grant 2013). Potential impacts of sea level rise include increased coastal erosion rates, flooding, and wave inundation, drainage issues and groundwater inundation, as well as increased vulnerability to hurricanes and tsunami (Sea Grant 2013).

According to the Kaua'i Climate Change and Coastal Hazards Assessment (KC3HA) prepared by the UH Sea Grant College Program, the four key coastal hazard impacts for Kaua'i are: 1) coastal flooding and wave inundation, 2) erosion, 3) inland (stream) flooding, and 4) wind. All of these impacts can be generated by a variety of hazard events or processes and all are exacerbated by climate change and associated sea level rise. Scientific studies also indicate that climate change may increase tropical cyclone frequency, result in unpredictable rainfall and weather patterns, increase ocean acidification, and cause coastal ground saturation and migration and expansion of wetlands (IPCC 2014; PIRCA 2012). The consequences of these hazard impacts can be seen in increased runoff, landslides, beach loss, and slope failures, all of which can affect the community. Mitigation programs, policies, and practices should be designed around these impacts and consequences, not just the event that causes them (Sea Grant 2014). Kaua'i's primary focus on mitigating impacts from climate change and coastal hazards has been adaptation and a reduction on the dependence on fossil fuels.

UH SOEST estimated that changes along South Kaua'i's shorelines ranged from a small amount of accretion to erosion at 1-2 feet per year. However, erosion rates may increase with sea level rise. Recently, sand erosion at Po'ipū Beach has been a particularly major concern for residents and the visitor industry. For long term solutions to the problem, the County of Kaua'i Department of Parks and Recreation commissioned a study completed by Sea Engineering, Inc. in March 2013 to understand the coastal processes at Po'ipū Beach and determine how to restore the beach to its 1975 location. Maintenance of the tombolo, beach nourishment, construction of a new rock rubblemound structure at the Keiki Pool, and restoring the vegetation line seaward to its pre-'Iniki location were recommended.

***Droughts.*** Drought impacts vary in timing and severity, but can be generally categorized into three sectors: water supply; agriculture and commerce; and environment, public health, and safety. According to a recent report from the US Drought Monitor, the southern coastal areas of Kaua'i were experiencing "Abnormally Dry" conditions as of December 2014.

***Wildfires.*** After Hurricane 'Iniki devastated Kaua'i's wild land areas in 1992, and the windblown debris increased fuel and potential for fires, the Kaua'i Wildfire Prevention Analysis and Plan provided a wildfire risk assessment for the island in 1994 and 1995. Geographic areas were assessed according to the potential for wildfire prevention risk and vulnerability. The following areas within the Planning District were assessed as described in the table below.

| *Area Name* | *Risk* | *Hazard* | *Value* |
|---|---|---|---|
| **Kōloa/Mauka** | Low | Moderate | Moderate |
| **Kōloa/Makai** | High | High | High |

*Source: County of Kaua'i (2008, 2012); DLNR, Division of Forestry and Wildlife, Fire Management Program (2007); ESRI, ArcGIS World Topographic Basemap (2013).*

***Critical Facilities & Shelters.*** State of Hawai'i Public Emergency Shelters in the Planning District include:

- 'Ele'ele Elementary School [Special Needs + Pet Friendly + General Population] (652 permissible occupants)
- Kalāheo Elementary School [Special Needs + Pet Friendly + General Population] (964 permissible occupants)
- Kōloa Elementary School [Special Needs + General Population] (884 permissible occupants)

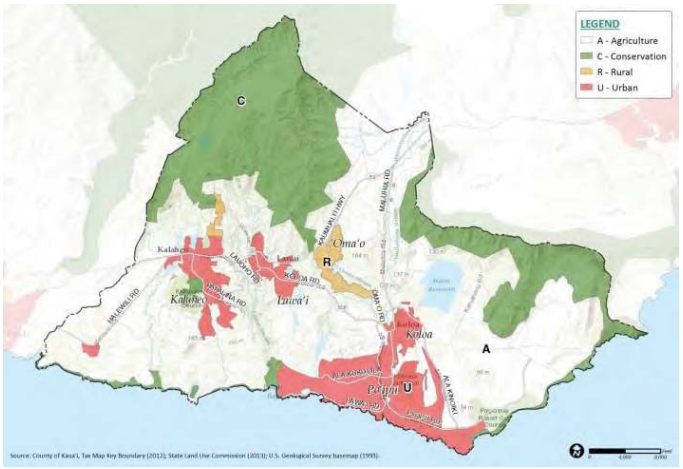
In addition, hotels with more than 500 rooms have been consulted as partners to provide shelter spaces for visitors in addition to their guests. It has been several years since evacuation and safety plans have been updated at area resorts. There is also concern that many visitors now stay at individual vacation units which may not have a way to broadcast emergency information or to provide directions to their guests.

## 3.7 REGULATORY CONTEXT AND EXISTING LAND USE

### 3.7.1 Regulatory Context

***State Land Use Districts.*** Approximately 70 percent of the Planning District's land is in the Conservation District. Of the remaining 30 percent, the Agricultural District covers 29 percent, the Rural District covers less than one percent, and the Urban District covers just over one percent. Of the six planning districts on Kaua'i, only Līhu'e has more land under the Urban District. See Figure 3-15.

Figure 3-15: State Land Use Districts

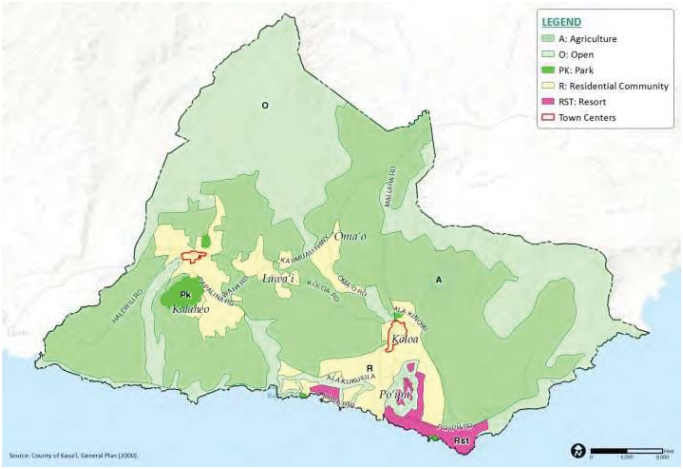



***County of Kaua'i General Plan.*** The County General Plan Land Use Map depicts policy for long-range land uses and was last updated in 2000. Kalāheo and Kōloa are designated as Town Centers and the Residential Communities correspond to the Urban State Land Use District in Kalāheo, 'Ōma'o, Lāwa'i, and Kōloa and the Rural State Land Use District for 'Ōma'o. The Po'ipū-Kukui'ula area is one of Kaua'i's three primary resort destinations and contains the highest number of visitor units on the island.





Figure 3-16: General Plan Land Use Map




***Kōloa-Po'ipū-Kalāheo Development Plan.*** The Kōloa-Po'ipū-Kalāheo Development Plan, last updated in 1978, is one of six regional plans that establishes specific guidelines to carry out the long-range development goals and objectives of the County General Plan. This South Kaua'i Community Plan updates the maps and land use policies of that plan.

***County Zoning.*** Forty-one percent (41%) of all zoned lands within the Planning District are zoned Agricultural. The next largest areas are zoned "Conservation" (28%) and "Open" (22%). Approximately 2,500 acres, or eight percent (8%) of the Planning District, is zoned Residential. Resort (123 acres), commercial (97 acres), and industrial (28 acres) zoned lands together make up less than one percent of the Planning District.

***Special Management Area & Shoreline Setback Area.*** The Special Management Area (SMA) boundary generally follows the General Plan's Open designation along the shoreline. In Po'ipū, the SMA boundary follows Po'ipū Road, extends mauka of Prince Kūhiō Park, and roughly parallels Lāwa'i Road west of Kōloa Landing. The depth of the no-build shoreline setback is a minimum of 40' and can extend up to 100' based on average lot depth or 100 times the annual coastal erosion rate for structures with a building footprint greater than 5,000 square feet. The County is currently amending the shoreline setback ordinance so these requirements may change in the near future. See Figure 3-18.

Figure 3-17: Zoning

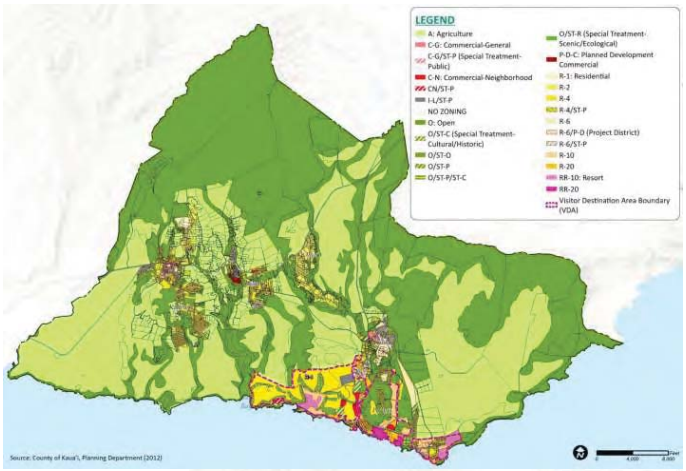
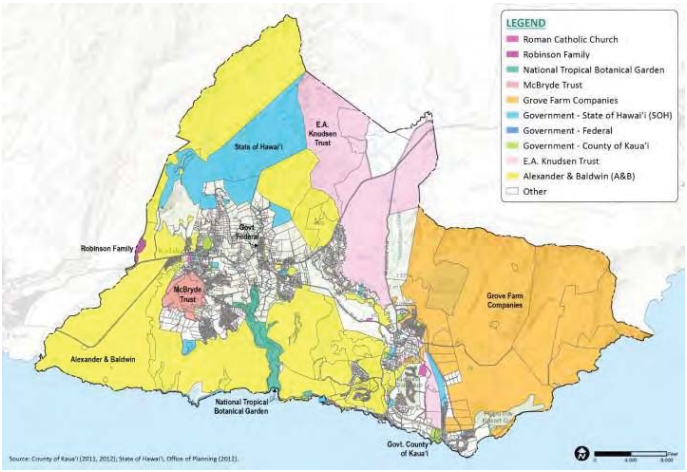


Figure 3-18: Special Management Area

### 3.7.2 Existing Land Use

***Landownership.*** Three private landowners own approximately 61.5 percent of the land within the Planning District. Alexander & Baldwin owns 9,999 acres (31.9%) in the western portion of the Planning District. Grove Farm Company and its affiliated companies own 7,699 acres, or 24.5% of the Planning District. The Eric A. Knudsen Trust owns 1,603 acres (5.1%). State, county, and federal land comprises only about seven percent (7%) of the District's land. The remaining 31.5 percent is a variety of smaller private or nonprofit landowners. See Figure 3-19.

**Figure 3-19: Major Landowners**




***Development Trends.*** Historically, an average of 75 lots were created through subdivision on an annual basis in the Planning District. In 2006, this number skyrocketed to over 400, but declined precipitously to below 50 in 2007. In 2009, no lots were approved to be subdivided.

The County Zoning Ordinance (CZO) requires vacation units to be located within defined visitor destination areas (VDA) (CZO §8-17.2 & -17.8). The majority of vacation units on the island are in the Planning District, specifically the Kōloa/Po'ipū/Kukui'ula area. Time-share units and multi-family vacation units existing prior to September 22, 1982 and located outside a VDA are considered legally nonconforming uses (CZO §8-17.5); single-family vacation units existing prior to March 7, 2008 are legally nonconforming uses provided they are Holders of a Non-Conforming Use Certificate (CZO §8-17.10).

Projects entitled but not yet built within the Planning District include resort, commercial, residential, and mixed-use (commercial and residential) totaling approximately 1,000 housing units, 2,100 transient accommodation units, and over 120,000 s.f. of commercial space. These projects are located in Kōloa, Po'ipū, and Kukui'ula, with one project in Kalāheo. Affordable housing projects in the Planning District include 208 rental units in Kōloa, 28 elderly rental units in Kalāheo, 111 for-sale units in Kalāheo (13 for-sale units expired in Po'ipū), and 37 self-help units in 'Ele'ele that falls outside but in proximity to the Planning District. With the median housing value in the Planning District at $416,200, only about 50% of the properties are affordable to a family earning 140% of the County's median income.

***Important Agricultural Land Designations.*** In the Planning District, the State Land Use Commission has approved petitions from Grove Farm and Alexander & Baldwin to voluntarily designate a total of approximately 6,000 acres as Important Agricultural Land (IAL). See Figure 3-20.

**Figure 3-20: Important Agricultural Lands, as of 2013**

# 4 POLICES & GUIDELINES

## 4.1 LAND USE

The County of Kaua'i Comprehensive Zoning Ordinance (CZO), Ordinance No. 935, and accompanying zoning maps prescribe the allowable uses of land for the County of Kaua'i. The CZO identifies the various zoning districts, the uses allowed within each zoning district, and the applicable development standards and procedures within each zoning district. The South Kaua'i Community Plan Land Use Map illustrates the desired long-range land use pattern for the South Kaua'i Community Plan area through 2035 (Figure 4-1). It supports the community's vision and is intended to be at a level of detail between the County's broad-brush General Plan land use policies and the detailed development of the zoning districts. The CZO is the County's underlying zoning code and shall apply within the Planning District. However, the only exceptions will be within the proposed Special Planning Areas (SPAs) as described below and in the adopted South Kaua'i Form-Based Code (FBC). Within the SPAs, the development standards of the CZO would be overridden by the FBC.

### 4.1.1 Walkable Mixed-Use Special Planning Areas

In order to accommodate the growth projected for South Kaua'i and to fulfill the community's wishes for safe, pedestrian- and bike-friendly roadways, new SPAs are recommended for specific areas where compact, walkable communities are desired in both new and existing town cores and nodes. The purpose of these SPAs is to identify where projected residential growth and supporting mixed-use commercial uses will be directed. These areas are either infill areas or areas that are appropriate for future development based on their proximity to employment and/or town centers and transportation networks. These SPAs will be required to follow the design and land use standards detailed in the FBC regardless of the underlying zoning. These areas are also tied together by multimodal transportation networks within South Kaua'i to preserve the rural feel of the region and encourage people to walk, bike, and ride transit for a healthier lifestyle.

There are six areas where the proposed Special Planning Areas will be applied within South Kaua'i:

- Kōloa Town
- Kalāheo Town
- Po'ipū Roundabout
- Lāwa'i Cannery
- Po'ipū Gateway Mixed-Use Village
- Numila

The areas within the three SPAs with Regulating Plans and transects are further classified into "Neighborhood Center," "Neighborhood General," or "Neighborhood Edge" on the Land Use Map to highlight the cores of these communities and the transition to the surrounding areas. These land use designations are used primarily for those areas within the SPAs.

- **Neighborhood Center.** A small-scale, low-rise, mixed-use center of commerce, residential, and community activity in rural character and setting in which principal establishments are oriented to the street. Land use mixtures may include retail, office, and dining establishments, compatible service businesses and light industry, and residential uses. Commercial activity is concentrated along street frontages in typically "main street" settings.
- **Neighborhood General.** A small cluster of small-scale, low-rise commercial and service businesses which serve primarily the immediate community. Its primary visual appearance is rural residential in character. Buildings are generally compatible in scale and form with adjacent residential areas.
- **Neighborhood Edge.** Primarily single-family homes or small-scale multi-family residential in single-family building form in which rural development standards are employed and provisions for pedestrian circulation, landscaping, and open space are emphasized.

Only those areas within the SPAs and transect designations shown in the Regulating Plans will be required to follow the FBC.

The three future SPAs which are intended to have Regulating Plans detailed with transects at a future time are labeled either as a **Large Village** or a **Small Village** on the Land Use Map based on the characteristics of their envisioned built form and relationship to the other walkable communities within the South Kaua'i Planning District.

These places types are general placeholders for the future SPAs until their Regulating Plans with transect zones are determined. These areas are colored in two shades of purple on the Land Use Map. As noted, additional master planning efforts must be completed to determine what suite of transect zones would be appropriate within its boundaries based on the requirements set forth below. They also will be required to use the transect zones defined in the South Kaua'i FBC. The Po'ipū Gateway Mixed-Use Village is classified as a Large Village and Lāwa'i Cannery and Numila are classified as Small Villages. Not all of the parcels within these SPAs will necessarily change dramatically in terms of land use or form. In fact, the whole point of the FBC is to be consistent and compatible with the existing building forms and uses. Preservation and reuse of historic buildings are also highly recommended.

#### *4.1.1.1 Kōloa Town*

Kōloa's main street is one of the most successful walkable centers of all Kaua'i despite the lack of continuous sidewalks and busy trafficked streets. Kōloa's town core has character, with a canopy of monkeypod trees and covered porch commercial buildings, bisected by Waikomo Stream. The center, primarily along Kōloa Road between Po'ipū Road and Waikomo Road, is arranged compactly and although on-street parking is currently a bit haphazard, it does provide a buffer for pedestrians along the storefronts, enabling Kōloa to support a thriving pedestrian environment.

In order to support and encourage this compact pattern and prevent Kōloa from sprawling outwards, future growth in this area is envisioned as tighter and denser within the town core. Mixed-use commercial is encouraged within the Neighborhood Center and an estimated 450 new residential units are required through 2035. Building heights will remain two stories maximum, respecting the Historic Kōloa Town Core Special Treatment-Cultural/Historic District (KCC §10-6.3(d)).

#### *4.1.1.2 Kalāheo Town*

Kalāheo's town core centers mainly on the highway between Papalina and Hokua Roads and makai to Pu'u Road. Kalāheo Elementary School borders this area on the east and Kalāheo Gulch on the west. Safer pedestrian and bicycle networks is the main focus of this area, connecting the neighborhoods with the school, the Kalāheo Neighborhood Center, Kalawai Park, and commercial uses along the highway. The community has voiced the desire to have a local market or grocery store in Kalāheo and some potential locations include vacant or redeveloping properties along the highway. Due to the limited infrastructure available in the area, primarily the lack of a centralized wastewater treatment facility, only 50 new residential units are projected for this area through 2035.

#### *4.1.1.3 Lāwa'i Cannery*

The future Lāwa'i Cannery SPA encompasses approximately 18 acres makai of Kōloa Road and includes existing commercial uses and the former cannery properties currently zoned PD-C. No growth has been allocated for the area but it is designated as a Small Village as there are several businesses that attract activity to this crossroads. The area will require additional master planning to determine which transects would be appropriate. However, improved pedestrian facilities, safer parking areas, and the ability to redevelop the area without undergoing the Project Development process could help

the area transform into a walkable core at the crossroads. A multi-use path is also recommended to continue along Kōloa Road to Piko and Oyama Roads, which intersect the highway at the Lāwa'i Post Office bus stop locations.

#### *4.1.1.4 Po'ipū Roundabout*

The beautifully landscaped Po'ipū Roundabout on Ala Kalanikaumaka, Lāwa'i, and Po'ipū Roads has quickly become a visual landmark for the community. The Shops at Kukui'ula adjacent to the roundabout on the southwest quadrant has also become a center of activity for the community and is recognized by the CAC as having desirable architectural form. Its internal public space is busy with pedestrians and convenient for activities such as farmers markets. Because of this, the areas immediately surrounding the roundabout and the pedestrian paths have become popular. Encouraging medium-density mixed-use development around this node could make the community even more active and vibrant with pedestrians and cyclists. The Shops at Kukui'ula itself, however, is not included in the SPA due to existing restrictive covenants that dictate permitted uses and architectural design.

#### *4.1.1.5 Po'ipū Gateway Mixed-Use Village*

The Po'ipū Gateway Mixed-Use Village is envisioned to be a new mixed-use community with ample workforce housing located directly mauka of the Po'ipū resort district so people will be able to walk, bicycle, or take a short transit ride to and from work. Over 1,100 new residential units are allocated to the area for future growth and a mixed-use commercial center with a range of retail and services should be included to support the new community. Based on an estimate of the area required for park dedication for the 1,100 units, a roughly seven-acre park is shown conceptually along Ala Kinoiki, providing an open view to Pu'u Wanawana. There is also a 30 foot buffer around Pu'u Wanawana and a greenbelt or trail should be provided through the community connecting to Pu'u Hunihuni to keep that view corridor open as well. Potential park facilities could include a playground, active playfields, and a community center.

A separate master planning process will be required in order to determine the mix of transects that will apply. However, the CAC felt that this would be the only area within the planning district in which taller buildings up to 3 stories would be appropriate. The reasons include the proximity to the existing resort area, which already includes many 4-story buildings, and the need for affordable workforce housing in Po'ipū. Along the mauka and eastern edges, the transect zones should transition to T3 zones to blend into the surrounding agricultural areas. The Po'ipū Gateway Mixed-Use Village Floating Zone will be required to provide a minimum of 1,100 new residential units as a condition of plan approval.

#### *4.1.1.6 Numila*

Numila is an area currently located within the State Land Use Urban District. Future master planning efforts will be required to determine the preferred suite of transects to apply in the area. It will also need to be integrated with the adjacent Future Growth Area related to the Hanapēpē-'Ele'ele Community Plan. Therefore, new residential units are limited to roughly 150 units based on existing entitlements.

### 4.1.2 Natural

The intent of the Natural land use designation is to preserve or maintain undeveloped areas such as mountain ridges, coastal bluffs, sand dunes, and beaches as well as protect the State Land Use Conservation Districts, the forest reserves, critical habitats of endangered native plant and wildlife, and archaeological preserves. It also includes the National Tropical Botanical Garden's Lāwa'i Kai Special Subzone of the State Land Use Conservation District, Nōmilu Fishpond, the lower reaches of Kalāheo Gulch, and much of the Māhi'ulepū coastline from Makawehi Bluffs to Kawailoa Point. It also includes the area around Makauwahi Cave and Waiopili Heiau. It otherwise excludes lands in Agriculture, or designated as Important Agricultural Lands (IAL) under Hawai'i Revised Statutes (HRS) Chapter 205 Part III, or lands classified as Park and Recreation which includes both public and private parks and recreational facilities.

Lands designated Natural shall remain predominantly free of development involving buildings, non-permeable paving, and other construction. With the exception of kuleana, any construction that is permitted shall be clearly incidental to the use and/or maintenance of the lands and designed to blend in with the natural character of the surrounding area. Protection, restoration, management and maintenance, research, education, and managed public access are the recommended uses within the Natural lands. Where it overlaps existing zoning districts with any development potential or density, the underlying development rights should be allowed to either shift to more appropriate locations or be purchased and valued based on existing entitlements to avoid takings issues.

Since the land use policy is the most restrictive of all the SKCP land use designations, lands designated as Natural include specifically identifiable features that meet the criteria of the particular types of lands enumerated below:

- Conservation District Areas
- Watershed Areas
- Forest Reserves and Preserves
- Dune Lands and Beaches
- Critical Habitat
- Lāwa'i Kai Special Subzone
- Archaeological Preserves/Cultural Resources

### 4.1.3 Agricultural

Lands designated Agriculture shall include: lands in active agricultural use or lands with potential for agriculture, silviculture, or aquaculture. In addition, these uses range in scale from large agricultural fields, to taro lo'i and small papaya farms. Residential development that occurs is on large lots and is a secondary use to the agricultural uses of the land (Opticos) and must qualify as a "farm dwelling" or "employee housing" as defined per HRS §205-4.5(4) and HRS §205-45.5 for those on Important Agricultural Lands (IAL).

There are two types of Agricultural land uses designated on the Land Use Map:

**Agricultural (IAL).** The Land Use Map indicates areas currently classified as Important Agricultural Lands as crosshatched Agricultural lands. It includes all lands designated IAL to date by the State of Hawai'i Land Use Commission (HRS 205 Part III) which includes the lands successfully petitioned by Alexander & Baldwin (A&B) and Grove Farm Company.

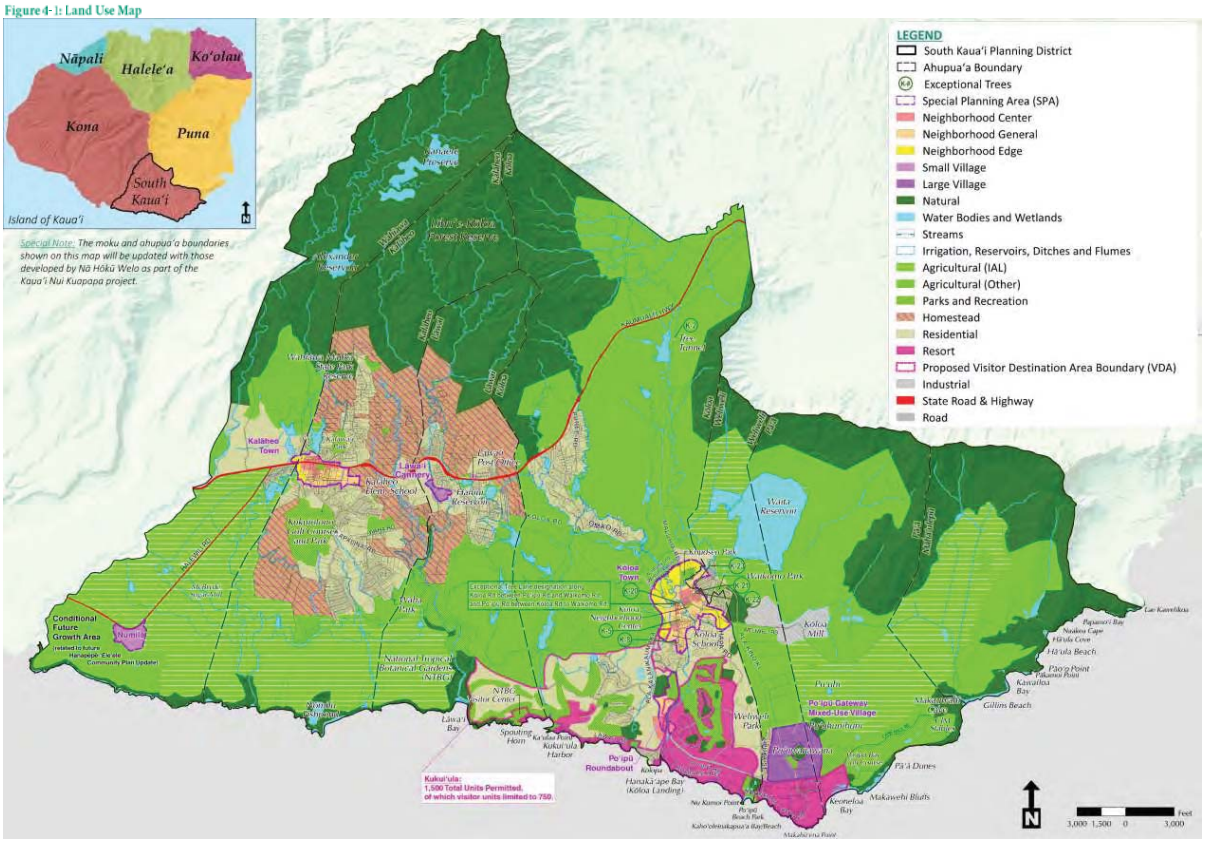
The purposes of Important Agricultural Lands are: (1) conserving and protecting agricultural lands; (2) promoting diversified agriculture; (3) increasing agricultural self-sufficiency; and (4) assuring the availability of agriculturally suitable lands (HRS §205-41). They are defined as lands that (1) are capable of producing sustained high agricultural yields when treated and managed according to accepted farming methods and technology; (2) contribute to the State's economic base and produce agricultural commodities for export or local consumption; or (3) are needed to promote the expansion of agricultural activities and income for the future, even if currently not in production (HRS §205-42(a)). Once identified, these lands cannot be reclassified except under a super-majority vote of both houses of the state legislature.

**Agricultural (Other).** Other agricultural lands outside of the IAL are also designated on the map. They include the lands classified as State Land Use Agricultural District outside of the Natural, Homestead, and Parks & Recreation land use designations. Large, contiguous agricultural lands adjacent to designated IAL are also prioritized.





Figure 4-1: Land Use Map



### 4.1.4 Parks and Recreation

The lands designated as Parks and Recreation include both public and private parks and gardens, and recreational facilities, including beach parks, golf courses, playgrounds, playfields, and district parks. There are approximately 72 acres of public Parks and Recreation land in the Planning District and 35 acres of private Parks and Recreation land. It also includes areas designated as future parks such as the 20-acre community park site at Kukui'ula and the roughly 7-acre future park designated at the Po'ipū Gateway Mixed-Use Village. The National Tropical Botanical Garden in Lāwa'i comprises 202 acres of Parks and Recreation land.

#### *4.1.4.1 Opportunities for Future Parks or Protected Areas*

For several decades, Māhā'ulepū has long-acted as a recreational resource thanks to the landowner's commitment to the community to provide access and maintain the area as a natural, cultural landscape, but also has been an area of concern to the community due to its development potential. The 2000 General Plan acknowledged that the landowner's then proposal for low-scale resort development conflicted with the desire of community and environmental groups to preserve the area's natural quality, but recognized the need for balance. The 2000 General Plan's stated policy for Māhā'ulepū is:

> *Involve the community in planning for the future of Māhā'ulepū. Planning should take into consideration various interests and factors, including but not limited to: the long-term need for managing Māhā'ulepū lands to preserve their significant natural and cultural features; the owner's desire to develop revenue-producing uses in a way that is sensitive to the area's unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park. (GP 2000)*

Although admittedly not an exhaustive list, the 2000 General Plan called out two options for the area: allowing some development in exchange for a park and/or preservations areas, and purchase of the land for a State park.

A community group, Mālama Māhā'ulepū, was formed in 2000 for the purpose of working to preserve the natural and cultural resources of Māhā'ulepū, primarily by keeping the area relatively undeveloped but with agricultural, educational and recreations uses. Since then they have played an active role in educating the community about Māhā'ulepū's special resources and have garnered community support for preservation. The County Council passed a resolution in 2001 supporting a collaborative planning effort to explore preservation options for the area. This was followed by a similar resolution in the State House of Representatives and Senate.

During the SKCP planning process, the community voiced a desire to secure permanent public access to the shoreline. Vehicle access is provided down a private dirt road which is secured via gates that are locked at sundown. Pedestrian access is provided on hiking trails that begin at Keoniloa Bay Park. These unmarked trails traverse the perimeter of the golf course and seabird habitat areas. Securing permanent public access via the private road and trail system is desired. However, public access should also be managed to minimize impacts to sensitive environmental and cultural resources, and to ensure public safety.

##### 4.1.4.1.1 Permanent Vehicle Access

The private road is maintained by the landowner and is part of a network of unpaved roads providing access to agricultural lands throughout the valley. It is directly adjacent to existing agricultural activities. If, through fair valuation, the landowner is willing to dedicate the roadway to the County, the road would have to be constructed to County standards. Not only is the cost of constructing a two-mile road very high, but a paved road might conflict with the natural qualities of the area and would likely dramatically increase use of the area.

##### 4.1.4.1.2 Permanent Trail Access

Another goal is to secure permanent public access along the coastal paths, also known as the Māhā'ulepū Heritage Trail. Discussions will have to consider that the trail traverses sensitive natural and cultural resources, including fragile landforms vulnerable to foot traffic. Security for the golf course and Makauwahi Cave should be considered too. If there is a need to obtain legal ownership of public accesses, options for potential conservation easements and/or future acquisition at fair market value via non-profit organizations such as the Hawaiian Islands Land Trust or Trust for Public Land should be explored to preserve the coastal areas.

##### 4.1.4.1.3 Potential Park or Protected Area

In addition to securing permanent public access, protecting the coastal area's natural, cultural and recreational resources in perpetuity is the ultimate goal. This could occur via the establishment of a conservation easement, or acquisition of the property for a park or other managed protected area. Such action could resolve access concerns while providing the framework for improved management of human impacts on the area's environmental and cultural resources. A conservation easement is a voluntary agreement made with a landowner to remove all development rights in a specific area, usually though the purchase of development rights (PDR) or transfer of development rights (TDR). Another option is the fair market acquisition of the coastal area by a government or non-profit entity for a park or protected area. Some cursory steps have been taken to explore this option.

The National Park Service also performed a reconnaissance survey in 2008 to locate a potential national park in the coastal area from Māhā'ulepū to 'Alekoko Fishpond in Līhu'e. Based on their preliminary evaluations, the report concluded that, "The National Park Service Pacific West Region recommends that a Special Resource Study be authorized under the stipulations of Public Law 105-391, so long as it focuses on nontraditional management alternatives that a) involve local partners and b) include options for continued farm and ranch operations on private agricultural lands." (NPS 2008) The National Park Service specified that it is the coastal and mountain areas in the Māhā'ulepū Watershed that have qualities of national significance. If acquisition by a government entity is desired, it would require subdivision of large parcels to facilitate such transaction. This would allow the private agricultural activities in the valley and on agriculturally-zoned lands to continue operations. Similarly, further discussions should occur to maintain public access along recreational paths throughout the Planning District and to the coastal areas where sensitive natural and cultural resources are not threatened and where public safety can be ensured.

### 4.1.5 Water Bodies and Wetlands

The Water Bodies and Wetlands designation includes all natural and manmade water bodies and watercourses. It highlights the manmade features or those reservoirs used for irrigation purposes in a darker blue running dashed line in Figure 4-1. These water features support the natural and agricultural environments as well as sustain South Kaua'i's communities. A comprehensive water planning strategy for the entire Planning District should be supported. Rather than relying on piecemeal, development-specific plans that may be limited in scope to the property at issue without due consideration of related impacts off-site throughout the system as a whole, this strategy should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. The elements of the water system highlighted in the plan include:

- Wetlands
- Streams
- Floodways
- Irrigation, Reservoirs, Ditches, and Flumes





### 4.1.6 Residential

The lands included within the Residential designation shall be used predominantly for primary residential housing. While some mixed use is permitted via zoning permits, these areas consist mainly of single-family and lower density rural communities and fall outside of the areas designated as SPAs for the FBC.

There are two Residential designations on the Land Use Map:

**Residential.** The Residential land use designation generally follows the County's existing residentially zoned lands and the General Plan Residential Community designation with small modifications as delineated in Chapter 6. Added to these, is the Brydeswood agricultural subdivision west of Kalāheo. Residential lands consist mainly of single-family homes in rural settings.

**Homestead.** There are numerous homestead lots within South Kaua'i, mainly in Kalāheo and Lāwa'i, created in the early 1900s under the 1895 Land Act. Conveniently, the census designated place boundaries for Kalāheo, Lāwa'i, and 'Ōma'o encompass these homestead lots. The State Land Use Law requires residential dwellings within the State Land Use Agricultural district to be "farm dwellings, " meaning that the occupant needs to earn income from agricultural use of the land (HRS §205-4.5(a)(4)). However, single-family dwellings are permitted on lots existing before June 4, 1976 (HRS §205-4.5(b)). Lands mapped as Homestead are included within this designation although the underlying zoning and State Land Use District are Agriculture because they are entitled to residential use and many parcels have long been developed with single-family residences.

### 4.1.7 Resort

For the lands within the Resort designation, the primary use shall be for housing and serving visitors to Kaua'i as well as the commercial and public facilities that serve visitors or support the visitor industry. Lands designated Resort may also be used for residential purposes, including resort employee housing.

It includes lands that are zoned Resort (RR) and the Resort areas from the General Plan Land Use Map with the exception of the Natural, Water Bodies, and Parks and Recreation designations.

All new Resort designated land is intended to amend the VDA boundary on the zoning maps for increased consistency between long-range land planning, zoning, and actual use. There may be some remaining permitted non-conforming vacation rentals scattered within the Residential land use designation. However, because there was no cohesive group of visitor units, they were not included in the Resort designation. The proposed VDA boundary is shown as a dotted pink line on the Land Use Map (Figure 4-1).

### 4.1.8 Industrial

Roughly 160 acres around the old Kōloa Mill Site is designated as Industrial on the Land Use Map. The Planning District currently does not have any industrially zoned land. However, to support the growing agricultural uses in the district and to encompass the existing solar farm and the potential site for a regional wastewater treatment facility, the Industrial lands shall be predominantly used for agricultural support facilities and renewable energy. These lands are located away from Residential and Resort uses yet close to Agricultural lands and major roads, Weliweli Road and Ala Kinoiki, for convenience.

The Industrial land use designation allows for facilities for processing, construction, manufacturing, transportation, wholesaling, storage, or similar economic activities, and accessory or supporting facilities which directly enhance their viability. It is recommended that zoning for this area be amended to I-G (General Industrial).

### 4.1.9 Future Growth Area related to the Hanapēpē-'Ele'ele Community Plan

The Future Growth Area related to the Hanapēpē-'Ele'ele Community Plan is a general designation for an area envisioned by A&B Properties, Inc. to be a master planned community supporting the growth of 'Ele'ele and Port Allen. Because of the boundary shift between planning districts, it falls within the South Kaua'i planning district. On the Land Use Map, it is shown as a placeholder and will be further defined as part of the future Hanapēpē-'Ele'ele Community Plan update. No projected residential growth for South Kaua'i has been allocated to the area as a part of this community plan update and the zoning will not be amended as part of this plan. It is therefore left in Agriculture on the Land Use Map. Its rough boundaries are shown as a placeholder and the area will be further defined during the future Hanapēpē-'Ele'ele Community Plan update.

## 4.2 WALKABLE MIXED-USE COMMUNITIES

The Walkable Mixed-Use Communities section identifies policies to enhance existing communities with pedestrian-friendly development. By locating commercial and retail establishments convenient to residential areas, alternatives to driving, such as transit, walking, and biking, once again become viable. Potential redevelopment is concentrated in the Special Planning Areas identified in Section 4.1.1. More detailed development requirements are provided in the FBC. The main goal is to focus growth to compact, defined settlement areas to enhance sense of community, improve conditions for walkable communities, maintain rural character of the place, and preserve open space.

### 4.2.1 Compact Walkable Neighborhoods

a. Improve Kōloa, Kalāheo, and Po'ipū town core areas as vibrant mixed-use places.
b. Locate commercial areas containing a variety of establishments, personal services, professional offices, restaurants, grocery and retail stores within walking distance of where people live, work and play.
c. Locate community facilities, schools, parks, and recreational facilities within walking distance of primary housing.
d. Create a pedestrian- and bike-friendly environment in Kalāheo by providing continuous sidewalks and bike lanes along Kaumuali'i Highway.
e. Create a secondary main street environment in Kalāheo along Papalina Road fronting the commercial uses.
f. Provide a neighborhood grocery store in Kalāheo.
g. Kalāheo provides the most substantial commercial destination along the entire highway stretch between 'Ele'ele and Līhu'e. Businesses may be able to attract and cater to both local and regional commercial needs, for those regularly traveling through the community, while retaining the scale and character of Kalāheo.
h. Kōloa's main street is one of the most successfully walkable centers of all Kaua'i. Higher density within the town core in the form of tighter or smaller units while maintaining 2-2.5 story height limits will provide affordable housing while maintaining the historic character of Kōloa.
i. Tourism supports a good portion of commercial activity in Kōloa's commercial center; however, ironically, development that is solely tourist-oriented detracts from the charm and authenticity of a place. Safeguarding against this and balancing development that supports local residents and visitors alike is critical for Kōloa to preserve its greatest asset: its uniqueness of place.
j. The small business district around the old cannery in Lāwa'i could become more pedestrian-friendly and provide a mix of housing. The old cannery itself is large and underutilized as a self-storage facility; it could ultimately be a significant opportunity for reuse or redevelopment.

### 4.2.2 Distinct Rural Communities

a. Foster the unique sense of place within each community.
b. Maintain the distinction between each community by keeping the cores intact and making them the focus of any future growth. Future development should maintain the existing character and building form of each community.
c. Protect the rural character of the community from sprawling development. Sprawling development patterns between the different towns and especially between Kōloa and Po'ipū should be avoided to maintain the areas as distinct communities.

### 4.2.3 Housing Location and Options

a. Provide for a diversity of housing to accommodate various household types, incomes and family sizes. The ability to afford a place to live close to work, commercial services, and places to play fosters independence, allows income to be spent in other ways besides transportation costs, and builds community.
b. Focus the residential population to infill on vacant zoned land and strategic areas contiguous to existing settlements. Beyond the absorption within existing urban zoned land, the future population growth as projected by SMS through 2035 shall be directed to the following areas:
    - Existing Town Centers- Kōloa (24 percent) and Kalāheo (3percent)
    - Po'ipū Gateway (60 percent)
    - Numila (8 percent)
    - Homestead lots (5 percent)
c. Locate a mix of housing including workforce housing close to employment centers. The new Po'ipū Gateway Mixed-Use Village is an opportunity to locate a variety of housing options including higher-density workforce housing within walking and biking distance of the Po'ipū resort community, one of the largest employment centers on the island and the largest in the Planning District (CH2MHill 2014, Exhibit 3.3). The CAC envisioned this area to be the focus of the majority of future growth within the Planning District to preserve the character of existing historic towns. Over 1,000 housing units (60 percent of projected residential growth) has been allocated here. The CAC also envisioned this as the highest level transect in the Planning District.
d. Allow for a variety of accessory dwellings such as 'ohana units and "granny flats" within the SPAs.
e. Provide affordable housing, especially in the Kōloa-Po'ipū area, a major jobs center on the island, through policies and actions that ensure sufficient affordable housing in the region on a long-term basis.
f. Preserve affordable housing stock and provide options that support senior housing and aging in place.

## 4.3 CONTEXT-SENSITIVE TRANSPORTATION NETWORKS

According to the surveys and feedback received during the project kickoff, one of the most desired wishes for South Kaua'i is safer transportation networks, especially for pedestrians and cyclists and particularly around schools. The surveys and public meetings that were a part of the Kaua'i Multimodal Land Transportation Plan (2012) found that the transportation-related desires of the residents of Kaua'i can be summarized into five categories: safety, transit, bicycling, pedestrians, and local roads and streets. In the Planning District, residents identified the following as important transportation needs of their district:

- Safe streets for children to walk and bicycle
- Walk/bicycle facilities connecting homes to schools, parks, and beaches
- More frequent bus service
- Shelters at bus stops

### 4.3.1 Multimodal Roadway Network

The focus of the multimodal roadway network is system preservation and increasing facilities for pedestrians, cyclists, and bicycle and transit riders to encourage alternate means of getting around rather than using single-occupancy vehicles. Similarly, the County of Kaua'i recently completed the *Kaua'i Multimodal Land Transportation Plan* in September 2012 which targets zero growth in vehicle miles traveled through 2035 as its preferred scenario compared to a 19% increase in traffic levels and a 15% increase in average household transportation cost in the baseline scenario (Charlier 2012). In order to achieve this goal, more people will need to walk, bike, or take transit to their destinations and based on the feedback from the South Kaua'i communities, they are very much in support of making the roadways safer for pedestrians and cyclists. Therefore, in order to support and encourage this modal shift and to preserve the unique character of each of South Kaua'i's towns, the multimodal roadway network is designed to improve internal pedestrian and bicycle circulation within key areas of each town and to connect each town with each other along regional connector roads.

#### *4.3.1.1 Map Symbols*

Figure 4-2 highlights the multimodal roadway network proposed for South Kaua'i. The roadways in red are recommended to remain as two-lane roadways. Existing roundabouts are shown as an open red circle and proposed roundabouts are shown as a solid red circle.

Pedestrian facilities are shown in green with dotted green lines indicating sidewalks or pedestrian paths and green squares highlighting the need for safer pedestrian crossings at intersections. The solid green lines are where separated pedestrian/bike paths are recommended.

Bicycle facilities are shown in blue with solid blue lines recommending bike lanes on both sides of the roadway and dotted blue lines indicating bikes on the road shoulders or a signed shared bike route.

The recommendations are conceptual in nature and the detailed design for each of these improvements would follow via the County and State DOT's design and construction processes.

#### *4.3.1.2 Transportation Studies*

##### 4.3.1.2.1 Federal-Aid Highways 2035 Transportation Plan for the District of Kaua'i

According to the *Federal-Aid Highways 2035 Transportation Plan for the District of Kauai* report prepared by CH2MHill, most of the projected 2035 traffic on South Kaua'i roadways operate at Level of Service (LOS) C with a volume-to-capacity ratio, or V/C ratio < 0.8, or well-below existing roadway capacities. See Figure 4-3. The only exceptions were a few locations where projected daily volumes are at or exceed roadway capacity (LOS F):

- Kaumuali'i Highway between Halewili Road and Upa Road (although there are short sections which have a V/C of 0.8 - 1.0, or LOS D or E)
- Kaumuali'i Highway east of Maluhia Road
- Po'ipū Roundabout
- Intersection of Ala Kinoiki and Po'ipū Road

In order to solve these projected traffic failures, the plan only included solutions that could be funded via the Federal-Aid Highways program which eliminated transit improvements. It did not include any evaluation of mode shift from vehicles to transit, bicycle, or walking.





Figure 4-2: Multimodal Roadway Network

The recommended list of projects within the South Kaua'i Planning District from the Federal-Aid Highways 2035 Plan includes:

- Widening Kaumuali'i Highway to a divided 4-lane facility between Kōloa Road and Kalāheo Town
- Kaumuali'i Highway Improvements east of Kōloa Road
- Widening Po'ipū Road to include bike lanes, sidewalks, and intersection improvements between Lāwa'i Road and Ala Kinoiki
- Construction of the northern leg of the Western Access Road as a 2-lane, signed shared roadway from Kōloa Road to Maluhia Road

Figure 4-3: Projected Traffic, 2035

#### 4.3.1.2.2 Traffic and Transportation Study for South Kaua'i CP

In developing the multimodal roadway network for this South Kaua'i Community Plan, the traffic engineers, Fehr & Peers, were tasked to:

1. Confirm and update/adjust as needed, the Kaua'i long-range land transportation demand model used in the *Federal-Aid Highways 2035 Transportation Plan for the District of Kaua'i* report.
2. Include SMS's projected residential growth allocated to the Planning District.
3. Determine if maintaining the roadways shown in red on the multimodal roadway network map as two-lane roads would allow projected 2035 traffic with the allocated growth to flow at or below capacity (V/C ratio ≤ 1.0) without adding a new coastal bypass road that is in shown the 2000 General Plan stretching from Port Allen to Po'ipū (potentially undesirable due to cost, negative impacts to Lāwa'i Valley, encouraging unwanted continued private vehicle use, and potential increased development along the coast), and;
4. If not, determine which roadway segments would operate above capacity (V/C ratio ≥ 1.0) and why (e.g., is the majority of the traffic through-traffic or traffic internal to the Planning District?). Calculate how many trips would need to be shifted to other modes of transportation to have them operate at V/C ratio ≤ 1.0.
5. Provide preliminary analysis of alternative intersection designs for:
   a. Papalina Road and Kaumuali'i Highway in Kalāheo, and;
   b. Maluhia Road and Kōloa Road in Kōloa.

For purposes of this analysis, the observed and projected traffic volumes of a roadway segment are compared against its capacity to determine the V/C ratio. Fehr & Peers uses a daily V/C ratio for this study since it is used to evaluate the overall operation of a roadway for long-range planning purposes, similar to the CH2MHill study. This type of modeling, however, is generally not suitable for an evaluation of specific intersection designs which require the use of detailed modeling for peak hour operations.

In their analysis, Fehr & Peers calculated the existing roadway operations to be at or below capacity. However, projecting baseline traffic without the residential growth projected by SMS for 2035 shows that three segments of Kaumuali'i Highway exceed its capacity between Kalāheo and 'Ōma'o (Table 4-1).

Table 4-1: 2035 Traffic Projections without Residential Growth Allocation

| Roadway | Location | Volume | Capacity | V/C Ratio |
|---|---|---|---|---|
| **Kaumuali'i Highway** | **West of Papalina Road** | **21,600** | **19,800** | **1.09** |
| **Kaumuali'i Highway** | **Between Papalina Road and Kōloa Road** | **22,200** | **19,900** | **1.12** |
| **Kaumuali'i Highway** | **Between Kōloa Road and 'Ōma'o Road** | **21,400** | **19,800** | **1.08** |
| **Kaumuali'i Highway** | East of 'Ōma'o Road | 21,800 | 24,800 | 0.88 |
| **Maluhia Road** | North of Ala Kinoiki | 18,200 | 24,800 | 0.73 |
| **Ala Kinoiki** | East of Maluhia Road | 7,200 | 16,800 | 0.43 |
| **Ala Kinoiki** | North of Po'ipū Road | 11,100 | 16,200 | 0.69 |
| **Papalina Road** | South of Kaumuali'i Highway | 3,100 | 15,800 | 0.20 |
| **Kōloa Road** | South of Kaumuali'i Highway | 13,000 | 19,000 | 0.68 |
| **Kōloa Road** | North of Po'ipū Road | 9,500 | 22,200 | 0.43 |
| **Po'ipū Road** | South of Kōloa Road | 7,000 | 19,000 | 0.37 |
| **Po'ipū Road** | West of Ala Kinoiki | 11,500 | 15,800 | 0.73 |

***Note: Deficient segments shown in bold***
***Source: Table 6-1 (Fehr & Peers 2014) and Kaua'i 2035 Transportation Demand Forecasting Model (TDFM).***





When the SMS projected residential growth is added to the traffic model for 2035, the same three segments of Kaumuali'i are over capacity at slightly higher V/C ratios. The remaining roadway segments are well-below their capacities except the remaining segment of the highway which is nearing its capacity (V/C ratio = 0.94). See Table 4-2.

Table 4-2: 2035 Traffic Projections with Residential Growth Allocation

| Roadway | Location | Volume | Capacity | V/C Ratio |
|---|---|---|---|---|
| **Kaumuali'i Highway** | **West of Papalina Road** | **23,100** | **19,800** | **1.17** |
| **Kaumuali'i Highway** | **Between Papalina Road and Kōloa Road** | **23,500** | **19,900** | **1.18** |
| **Kaumuali'i Highway** | **Between Kōloa Road and 'Ōma'o Road** | **22,900** | **19,800** | **1.16** |
| **Kaumuali'i Highway** | East of 'Ōma'o Road | 23,400 | 24,800 | 0.94 |
| **Maluhia Road** | North of Ala Kinoiki | 21,000 | 24,800 | 0.85 |
| **Ala Kinoiki** | East of Maluhia Road | 7,200 | 16,800 | 0.43 |
| **Ala Kinoiki** | North of Po'ipū Road | 10,900 | 16,200 | 0.67 |
| **Papalina Road** | South of Kaumuali'i Highway | 3,600 | 15,800 | 0.23 |
| **Kōloa Road** | South of Kaumuali'i Highway | 14,200 | 19,000 | 0.75 |
| **Kōloa Road** | North of Po'ipū Road | 10,400 | 22,200 | 0.47 |
| **Po'ipū Road** | South of Kōloa Road | 7,000 | 19,000 | 0.37 |
| **Po'ipū Road** | West of Ala Kinoiki | 12,000 | 15,800 | 0.76 |

***Note: Deficient segments shown in bold***
***Source: Fehr & Peers, 2014***

Fehr & Peers also found that the collector roads internal to South Kaua'i will continue to operate at acceptable levels of service even with the projected growth. However, the traffic on the highway will continue to exceed modeled capacity. While the traditional approach for many traffic engineers and transportation planners would be to recommend the expansion of a roadway which is projected to operate deficiently, Fehr & Peers recognizes many factors which are unique to transportation in Kaua'i and reflect the context environment. These factors include:

- Widening significant sections of Kaumuali'i Highway would likely be extremely costly and have significant negative impacts on the adjacent properties and the environment.
- The study area currently lacks significant facilities for alternative travel modes; thereby forcing people to drive where they might otherwise want to walk, bike, or use transit.
- The widening of the roadway may not be fully compatible with recent long-range transportation planning efforts.
- The assessment of daily capacity often does not fully address the benefits of targeted improvements such as the addition of turn lanes, roundabouts, traffic signal upgrades, and other related strategies to increase capacity at intersections, which are the constraint points of the roadway network (Fehr & Peers 2014).

Fehr & Peers next analyzed the likely effects of targeted improvements and multimodal transportation policies which would moderate travel demand and minimize congestion. In their travel mode shift analysis, they estimated that approximately 1,800 daily vehicle trips would need to be diverted to use alternative travel modes along the highway. When typical auto occupancy factors are applied to this number of vehicle trips, it results in approximately 2,000 daily person trips that would need to change modes. Fehr & Peers also estimates that roughly 70% of the traffic on the highway through Kalāheo is through-traffic, traveling between Westside and areas east of the Planning District. Therefore, the first priority is to continue to support a mode shift of drivers passing through the Planning District to transit and support internal circulation with improved bicycle and pedestrian facilities.

However, while transit is one likely mode of diversion, Fehr & Peers warns it may not provide sufficient capacity for all of the 2,000 daily person trips. There may be a "saturation point" of those willing to give up their car regardless of the cost of gas or the convenience of transit. Any significant reductions in traffic volumes along Kaumuali'i Highway would therefore require some diversion of vehicular traffic to bicycle and pedestrian routes. According to data provided by the American Community Survey (ACS) for 2012, nearly 20 percent of all commute trips on the island of Kaua'i travel by car but have a work trip of 10 minutes or less. Trips of this distance are often able to be easily made by walking or bicycling if the facilities are present. By providing bicycle and pedestrian facilities where they currently do not exist, some level of diversion may be possible. An analysis of travel patterns on Kaumuali'i Highway indicates that as much as 10 percent of the vehicular traffic on these deficient segments of the highway are local as opposed to longer-distance through trips. Diverting a significant portion of these local trips is another way to reduce vehicle demand associated with the plan. (Fehr & Peers 2014)

Therefore, reducing vehicular demand along Kaumuali'i Highway will require implementing the multimodal transportation measures identified in Figure 4-2 along with a meaningful diversion of trips to transit. This diversion of transit trips can only occur if there is sufficient capacity in the transit system, which will require expansion of service along the Kekaha-Līhu'e Mainline route beyond what is provided today (Fehr & Peers 2014) as well as an increase in convenience for transit riders whether it is the scheduling or location of stops. The alternative of building additional roads such as the coastal bypass or widening roads are not ideal solutions for serving regional transportation needs as it will place a disproportionate burden on Kalāheo Town and Lāwa'i Valley to serve those west and east of these communities. It will also only serve those who are able to drive and who are typically inconvenienced when driving over a certain period of time (peak hour traffic) while the negative impacts (loss of natural and social communities) will be permanent. If an alternative east-west road is required for emergency bypass, the County and DOT should work with adjacent landowners to use existing agricultural roads near the highway. Another less impacting option would be to improve existing east-west roads to connect closer to existing towns and communities to minimize the impact to agricultural and natural areas and to discourage dispersing development along the coast.

#### 4.3.1.2.3 Scenic Roadway Corridors

Scenic Roadway Corridors are primarily designated in areas between towns where the surrounding lands are primarily designated Agriculture and Open. Where a Scenic Roadway Corridor is designated within a town or adjoins an area planned for urban use, the primary intent is to promote building setbacks, landscaping, and views of scenic features. Attention must also be given to the number of ingress and egress points along the highway, which, unless limited and carefully planned, will disrupt the free flow of traffic along the highway. Scenic Roadway Corridors are intended to provide design guidance but not to restrict the principal land uses of urban areas.

### 4.3.2 Public Transit

During peak hours, the buses often run at capacity and have been known to turn away riders because they are too full. To alleviate the problem, on March 17, 2014 the Transportation Agency added a new route (#150) between Kaumakani and Lihu'e. There are two runs in the morning and two runs in the afternoon, which have eased the crowded condition that was occasionally resulting in denying boarding to some riders at Kalāheo Neighborhood Center in the morning. The afternoon #150 route may be adjusted to begin in Waimea rather than Kaumakani because the peak ridership is usually Waimea High School students boarding at Ishihara Market in Waimea in the afternoon. The Kaua'i Transportation Agency is also planning to purchase slightly larger buses with a 35-40 passenger capacity in the next few years to service the mainline. This is compared to their current 29-33 passenger buses. (Kaua'i Transportation Agency 2014)

Public opinion regarding public transit, collected at workshops and with "wishcards", revealed that the top concerns include service efficiency and expansion (62%) followed by amenity improvements (29%). The proposed transit improvements aim to address these fundamental improvements. Service expansion was highly desired by the public. Four of thirteen related discussions revolved around a need for a bus stop along 'Ōma'o Road. These discussions were followed by improved shuttle service to connect Kōloa Town to Po'ipū and its beaches.

Figure 4-4: Proposed Bus Routes and Priority Shelter Locations

Amenity improvements ranked as the next top concern. 83% of these comments desired more bus shelters. As of April 2015, there are two bus shelters—one across the highway from the Lāwa'i Post Office, and one at the Kalāheo Neighborhood Center, which also serves as a park and ride facility (the only designated site in South Kaua'i) and a transfer stop for both the mainline and shuttle routes. The County of Kaua'i Transportation Agency will also install bike racks and trash receptacles at the bus shelter across the highway from the Lāwa'i Post Office and expects to start Phase II of shelter construction in early 2016. Phase II includes the bus stops at the Lāwa'i Post Office, Kōloa School, and at Po'ipū Road/Ho'owili Road. The Transportation Agency is currently finalizing a study on implementing and prioritizing additional bus stop shelters island-wide. Through this process, additional "priority" bus shelter needs were identified for the following stops: "Kukui'ula Store" (which will have two bus stops) and "Kiahuna Drive."

To address these community needs, the following changes are proposed for the Kaua'i Bus service and are illustrated in Figure 4-4.

- **Kekaha-Lihu'e Mainline:** Consider increasing the size of vehicle or increasing the frequency during peak hours to increase capacity and improve convenience to encourage increased ridership. As a rough estimate, to shift 50 percent or 1,000 person trips to transit during the peak morning and afternoon commute, fourteen to fifteen additional 50-passenger buses at crush capacity. Crush capacity describes the condition where there are passengers both seated and standing in a bus. If the buses ran during two 2-hour long peak periods (one in the morning and one in the afternoon), this would require the buses to run roughly every 30 minutes in both directions. To shift 70 percent, or 1,400 person trips, the amount of projected pass-through traffic, this would require twenty additional 50-capacity buses at crush capacity. These additional buses could run over extended periods or the intervals between buses could be shortened to 20 minutes depending on demand.
- **Kōloa Shuttle:** Shift the southbound leg of the route from Kōloa Road to 'Ōma'o Road and stop at Hale Kapuna Heritage Home, an assisted living care facility, in 'Ōma'o. This will provide the community-requested service to 'Ōma'o and a connection to Kōloa, Po'ipū, Kalāheo, and Lāwa'i. Only 0.3 miles will be added to the total distance traveled compared to its existing route. The proposed location also serves as a school bus stop. Construction of a bus pullout and shelter would serve multiple users. Increase frequency to improve convenience for employees. Consider adding a stop at Lāwa'i General Store on Kōloa Road to provide access to these businesses and future SPAs.
- **Po'ipū-Kōloa Shuttle:** Work with PBRA to extend and expand the Intra-Po'ipū Shuttle service to daily operations and provide a stop in Kōloa Town to serve visitors and residents alike. Adjust service hours to maximize ridership and improve cost-efficiency.

### 4.3.3 Parking

For public parking, the conceptual street designs provided in Section 4.3.4 show on-street parking wherever possible to supplement the existing parking lots and to organize the streetscape, providing a buffer for pedestrians between traffic and the proposed sidewalks. The 2000 GP Update's vision for Kōloa also included pockets of public parking at each end of town, which could also be pursued in partnership with existing landowners and businesses. A parking audit could be performed for Kōloa to take a detailed look at the number of available parking spaces and how many are truly needed to support the existing and projected businesses and residents in town. There may be opportunities to partner with newer developments such as Kōloa Rum and the Knudsen Trust to provide public parking as part of their projects.

Another concept is to charge for parking, both in private lots and at on-street parking stalls to discourage people from driving single occupancy vehicles and encourage them to carpool, walk, or bike. The fees collected from public parking could then be used for the installation and maintenance costs of the proposed streetscapes.





### 4.3.4 Conceptual Intersection Improvements and Street Sections

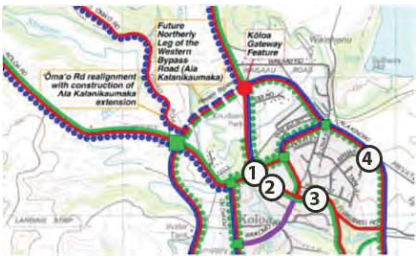
The following conceptual intersection improvements and street sections are organized by community and numbered to reference the locations on the key maps for Kōloa, Kalāheo and Po'ipū. As these are meant to be conceptual in nature, there may be multiple options for some street sections, providing different alternatives that can be refined during the design phase. Every attempt was made to stay within the existing rights-of-way to minimize impacts to the adjacent properties. Where additional space is required, this would be sought as easements primarily for pedestrian use or a shared use path.

#### *4.3.4.1 Kōloa*

Conceptual streetscape improvements for Kōloa Town focus on improving the pedestrian environment in this bustling town center and providing appropriate bicycle connections through and to town). Also, recent information from the State of Hawai'i Department of Education (DOE) indicates that over 80 percent of students live within one mile of school and according to a November 2012 parent survey, for those who live within walking distance but do not allow their children to walk or bike to school, the primary reasons are: 1) the lack of safe sidewalks or pathways (65 percent), 2) the amount of traffic along route (62 percent), and the speed of traffic (62 percent) (County of Kaua'i 2013). The sentiment for improved pedestrian and bicycle facilities was echoed in the community surveys collected at the South Kaua'i CP project kick-off.

There are two major streets in Kōloa that are being designed under separate efforts. Waikomo Road is currently being redesigned by the County with a variety of options considered ranging from narrowed vehicle lanes with a striped shoulder for pedestrians and cyclists to a one-way street. Po'ipū Road improvements are already planned from Kōloa Road to the Hyatt and estimated budgets are already on the STIP. The designs will be based on those developed during the County's Po'ipū Road Charrette held in May 2013. Figure 4-5 is the key map for road and intersection improvements in Kōloa.

Figure 4-5: Kōloa Key Map



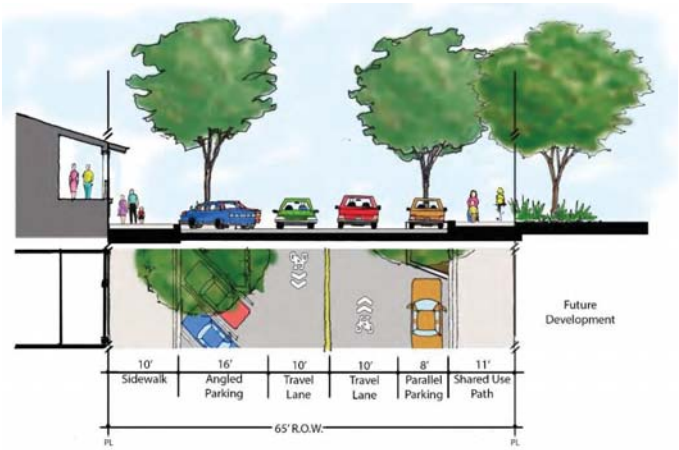

***Kōloa Road (1).*** The intersection of Kōloa Road and Maluhia Road is the heart of historic Kōloa Town. This is the iconic view recognized for its plantation-style storefronts, covered walkways, and busy streets. Unfortunately, there are currently no continuous sidewalks and only two marked crosswalks—one that leads right into Sueoka's parking lot and the other at the far eastern end by the post office. Pedestrians must weave between parked cars and oncoming traffic to walk to different establishments along Kōloa Road. If it rains, puddles often accumulate forcing pedestrians further into the vehicle lanes. Makeshift bulbouts and paths have been installed via flexible bollards to provide refuge for pedestrians. However, more could be done to improve pedestrian safety and their experience through Kōloa Town.

Figure 4-6: Conceptual Streetscape Improvements for Kōloa Town, Alternative 1

Figure 4-7: Conceptual Streetscape Improvements for Kōloa Town, Alternative 2

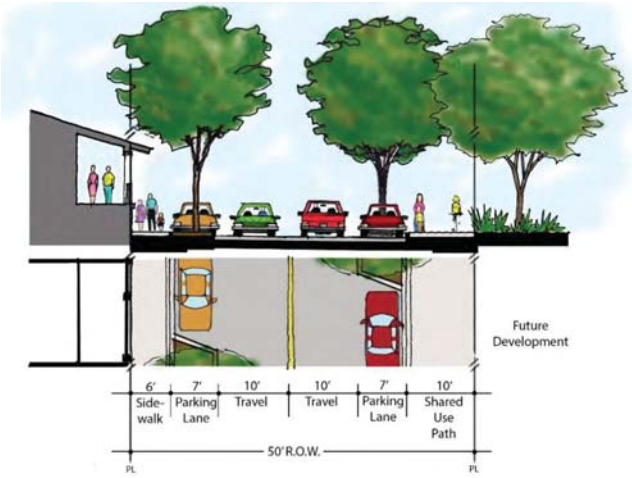
Figure 4-6and Figure 4-7 provide an overview of the potential improvements that could be made to the existing right-of-way (ROW) including a wider, continuous sidewalk on the makai side of the road, a shared use path on the mauka side of the road, on-street parking, and landscaped bioswales to help mitigate runoff. The ROW for Kōloa Road to the east of the Maluhia intersection is 65 feet wide which will comfortably accommodate a shared use path, sidewalks and angled and parallel parking. The main difference between the two plans is the inclusion of on-street parking in front of Sueoka's. Alternative 1 does not include parking in order to simplify traffic movements in the area since it is located at the end of Maluhia Road. The curb is extended to provide a larger pedestrian space with benches, landscaping, and signage to welcome people as they enter historic Kōloa Town. The angled parking along Kōloa Road is reverse-in for this alternative. In Alternative 2, the angled parking extends in front of Sueoka's to provide additional public parking and should remain head-in for safety through the T-intersection. There was disagreement between the traffic engineers, who felt Alternative 1 would be safer, and the County DPW, who felt traffic speeds would be slow enough to maintain the stalls in front of Sueoka's. In both alternatives, bicycles will share the roadway on Kōloa Road via sharrow lanes. See Figure 4-8.

Figure 4-8: Kōloa Road with Angled and Parallel Parking (Kōloa Key Map 1)




Where Kōloa Road narrows to a 50-foot ROW, the shared use path should be maintained on the mauka side of the road, but the makai sidewalk narrowed and on-street parking limited to parallel stalls with tree wells in bioswale bulbouts (Figure 4-9).

Figure 4-9: Kōloa Road with Parallel Parking (Kōloa Key Map 1)




An example of where similar pedestrian and bioswale improvements were made can be seen in Figure 4-29 and Figure 4-30 taken on Bainbridge Island off of Seattle, WA. For Kōloa Road, native plants and street furniture that will complement the existing historic buildings should be used.

***Weliweli Road Approaching Kōloa Town (2).*** For Weliweli Road just south of Kōloa Road, there are two alternative street sections—one with a 6 foot sidewalk, a 10 foot shared use path for both pedestrians and cyclists, and a 4 foot landscape strip, and the other with sidewalks, parallel parking on one side of the street, and bicycles would share the vehicle travelway. See Figure 4-10 and Figure 4-11. Alternative 1 provides a transition to the rest of Weliweli Road as it approaches Hapa Trail. However, the tradeoff is there is no on-street parking.

***Weliweli Road Connection to Hapa Trail (3).*** The concept for the next segment of Weliweli Road between Waikomo Road and Hapa Trail is to provide a shared use path and sidewalk as easements on the adjacent undeveloped land (Figure 4-12). This will provide a transition between the pedestrian/bike-only Hapa Trail and Kōloa Town where cyclists will need to slow down and be more aware of vehicle traffic and pedestrians. Street trees, landscaping, and parallel parking provide buffers between vehicles and the bike path and sidewalk fronting the new development.





Figure 4-10: Weliweli Road Approaching Kōloa Road (Alternative 1, Kōloa Key Map 2)

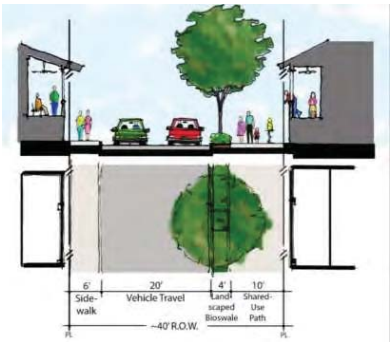



Figure 4-11: Weliweli Road Approaching Kōloa Road (Alternative 2, Kōloa Key Map 2)

If the easements on private property are not pursued, either Alternative 1 or 2 of the Weliweli Road section approaching Kōloa Road, whichever is selected, can be continued on this segment.

***Ala Kinoiki (4).*** There are two conceptual alternatives for Ala Kinoiki which has a 60-foot ROW—one that includes bike lanes and a 5 foot sidewalk on both sides of the street. The other has a separated 10 foot shared use path for pedestrians and bicycles with 5 foot shoulders on the roadway which could be used for commuter or higher-speed biking. See Figure 4-13. Landscaped bioswales and broad canopy street trees are included in both alternatives to provide drainage and filtration of runoff and shade along this major connector road. Native trees and plants are preferred as Ala Kinoiki is named in honor of the mother of Prince Jonah Kūhiō Kalanianaʻole, Princess Victoria Kūhiō Kinoiki Kekaulike. She was the daughter of Kauaʻi's last king, Kaumualiʻi, and sister of Queen Kapiʻolani.

Figure 4-12: Weliweli Road Connector to Hapa Trail (Kōloa Key Map 3)

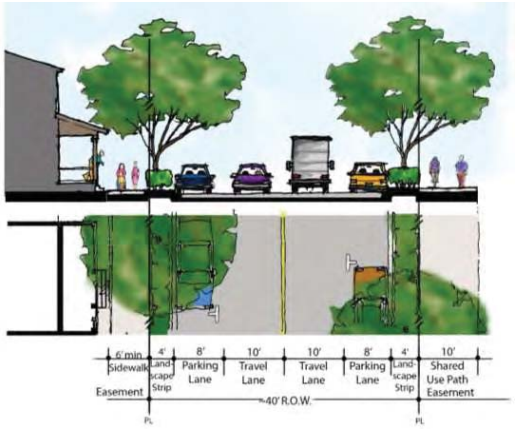
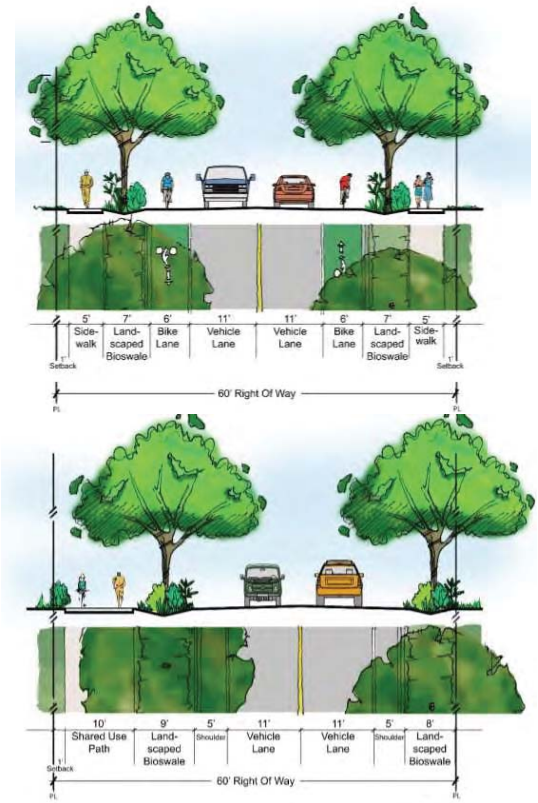


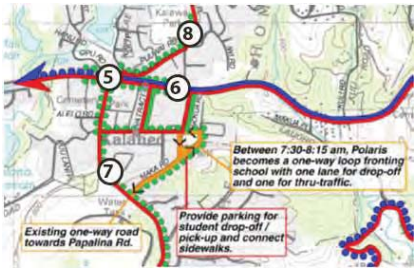
Figure 4-13: A la Kinoiki Alternatives (Kōloa Key Map 4)




### 4.3.4.2 Kalāheo

For Kalāheo, the proposed conceptual streetscape and street section designs strive to improve the pedestrian environment, particularly at the Papalina Road/Kaumuali'i Highway intersection, along the highway fronting the commercial establishments and Kalāheo Neighborhood Center, and on Pu'uwai Road leading to Kalawai Park. There are also different options for bicycle facilities.

Figure 4-14: Kalāheo Key Map




***Papalina Road/Kaumuali'i Highway/'Ōpū Road (5).*** A conceptual plan for the stretch of Kaumuali'i Highway between 'Ōpū and Pu'uwai Roads is shown in Figure 4-15. Several concepts were developed during the September 2013 design studio such as a roundabout, a double roundabout, and a peanut-a-bout. However, after Fehr & Peers reviewed the designs, the simplest design consisting of improved crosswalks and adjusted signal timing made the most sense in terms of cost and limiting impacts to surrounding properties.

The typical ROW width for the highway in this area is 60 feet. However, there is reverse-in angled parking in front of the Kalāheo Neighborhood Center which encroaches on the neighborhood center property. Street trees are provided in 4-foot tree wells on 8-foot sidewalks. If overhead utilities remain above ground, the location of the poles and trees should alternate to allow for clear ADA passage. Bike lanes are painted green for increased visibility and to visually narrow the travel lanes to slow traffic through Kalāheo Town (Figure 4-17).

Another potential modification to the proposed conceptual plan shown in Figure 4-15 includes moving the County bus stops on Papalina Road to Kaumuali'i Highway to reduce travel time lost on the Kekaha-Līhu'e mainline because of the turning movements off the highway. They would likely be located in front of the future Kaua'i Kookie Factory just west of 'Ōpū Road westbound and in front of the Kalāheo Neighborhood Center eastbound. Some of the on-street parking fronting the neighborhood center would be lost if a bus stop and pullout were located there. Initial discussions with the Kawakami family were also held regarding the potential relocation of the bus stop and possible pullout as they may encroach upon their property where the future Kaua'i Kookie Factory will be located.





Figure 4-15: Conceptual Streetscape Improvements for Kaumuali'i Highway and Papalina Road (Kalāheo Key Map 5)

***Kaumuali'i Highway, Typical Section through Kalāheo (6).*** For more typical sections of the highway through Kalāheo Town fronting the commercial uses, the existing 60-foot ROW roadway can accommodate 6 foot sidewalks, 11-foot travel lanes, 6-foot bike lanes, and on-street parking on both sides of the highway (Figure 4-16 and Figure 4-18). Tree wells are located in bulbouts between parallel parking stalls so they do not encroach into the sidewalk and can be designed as landscaped bioswales to collect and filter rainwater runoff (Figure 4-19). Currently there are paved drainage swales on both sides of the ROW and few inlets which causes puddles and the pavement to degrade creating potholes and uneven surfaces.

The on-street parking and trees will provide a buffer for the establishments along the highway, creating a sheltered pedestrian space in front of the storefronts (Figure 4-19). East of Papalina Road, sidewalks should be continued all the way to Hokua Road on the makai side of the highway to provide a continuous pedestrian path to Kalāheo Elementary School, but can be terminated at Brick Oven Pizza on the mauka side of the highway. There is currently a safety barrier east of Kalāheo Café on the makai side of the highway and the sidewalk should be located on the makai side of it. On-street parking should be eliminated on both sides of the highway at Brick Oven Pizza on the mauka side and Kalāheo Café on the makai side.

Figure 4-16: Conceptual Streetscape Improvements for Kaumuali'i Highway Fronting Commercial Uses (Kalāheo Key Map 6) and Hokua Road

At the approach to Hokua Road from Līhu'e, there is a striped median that could be converted into a landscaped entry feature to signal to drivers that they are entering Kalāheo Town and to slow down and look for pedestrians. Accent plantings but no trees should be installed. It could also be designed as a bioswale but with curbs with cutouts to allow for rainwater inflow. Rumble strips could also be installed to signal to drivers to slow down (Figure 4-16).

West of Papalina, sidewalks are recommended to be extended to the crosswalk near Holy Cross Catholic Church on the multimodal map. Further west of that, there are a few homes and churches that may also benefit from a sidewalk connection to Kalāheo Town. However, there is some grade along the shoulders which could make this difficult and the lower density of uses may not warrant such an expense. Surveys of the users could be performed to determine the need or desire for sidewalks beyond Holy Cross. Bike lanes, however, could easily be striped on the shoulders of the highway, transitioning to bikes on shoulder lanes at some point further west.

Figure 4-17: Kaumuali'i Highway with Left Turn Lane and Bike Lanes (Kalāheo Key Map 5)

Figure 4-18: Typical Kaumuali'i Highway with Bike Lanes and On-Street Parking (Kalāheo Key Map 6)

Figure 4-19: Perspective of Kaumuali'i Highway with Bike Lanes and On-Street Parking (Kalāheo Key Map 6)

***Papalina Road (7).*** The section of Papalina Road immediately south of the highway has a relatively wide ROW that allows for on-street parking and already has sidewalks on both sides. Minor improvements such as building bulbouts at the crosswalks and widening the sidewalk as needed for ADA compliance could be made. However, further south before it crosses Pu'u Road and just as it enters the residential areas, the sidewalks end and the ROW narrows to 30 feet. Members from the community including the principal at Kalāheo Elementary School suggested adding sidewalks further south on Papalina Road to provide safer pedestrian access to and from the residential neighborhoods. One potential solution is shown in Figure 4-20. The 30 foot ROW includes two 10 foot travel lanes, a 6-foot sidewalk on the eastern side of Papalina Road and a narrowed landscape bioswale on the western side.

***Pu'uwai Road (8).*** Pu'uwai Road on the mauka side of the highway provides the only access to Kalawai Park, a popular place for sports activities and families. Currently, there are no sidewalks leading to the park from the main town core and road shoulders are narrow so most people drive to the park. A potential roadway section for the 30-foot ROW is provided in Figure 4-21. It includes a 5-foot sidewalk on the upslope side of the street with a 1 foot wide French drain and an 18-foot wide two-way travelway. The outside edges of the travelway should be painted with a wide 6-inch stripe. The downslope side of the roadway remains much as it is with a swale on the shoulder.





Figure 4-20: Papalina Road (Kalāheo Key Map 7)

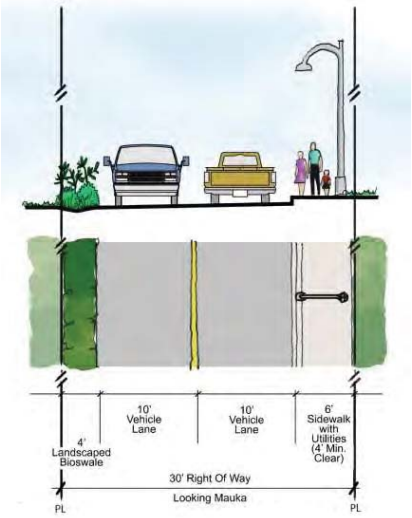
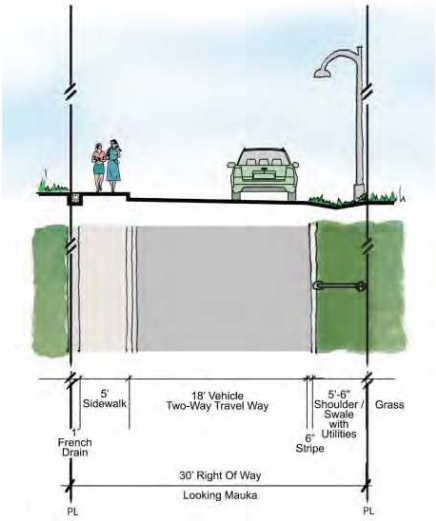



Figure 4-21: Pu'uwai Road (Kalāheo Key Map 8)



#### *4.3.4.3 Po'ipū*

Street sections were not drawn for Po'ipū Road as improvements to Po'ipū Road from Kōloa Road to the Grand Hyatt are already on the STIP and the designs will be based on those developed during the County's Po'ipū Road Charrette. Examples of the proposed street sections developed during the Po'ipū Road Charrette are shown in Figures 4-23 to 4-25 with an illustrative rendering provided in Figure 4-26.

The only additional design feature to consider adding are landscaped bioswales within the 120 foot-wide Po'ipū Road ROW that runs between the roundabout and the Grand Hyatt to help mitigate the surface runoff that currently floods the makai areas such as the Po'ipū Beach Park parking lot and Kāneiolouma. Private properties mauka remain responsible for mitigating the drainage flows from their individual properties but a preliminary drainage study should be done to determine whether some of the existing flows can be mitigated with bioswales along Po'ipū Road. The bioswales could be landscaped with native and appropriate Polynesian-introduced plants that support interpretive features planned for this major roadway.

Figure 4-22: Po'ipū Key Map

Figure 4-23: Po'ipū Road, Section located in Kōloa Town near Kōloa Road (Po'ipū Key Map P1)

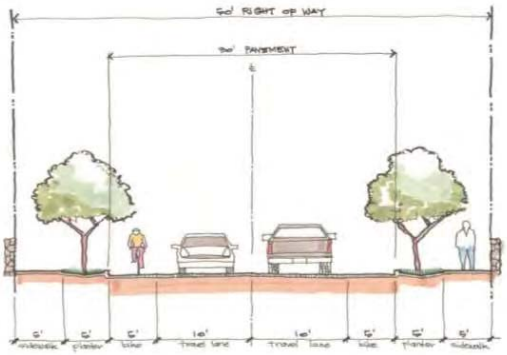



Figure 4-24: Po'ipū Road, Section located near Blakes Lane (Po'ipū Key Map P2)

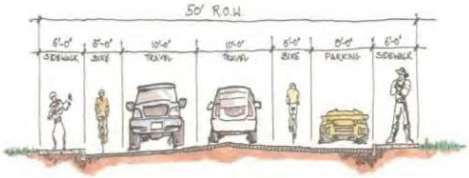



Figure 4-25: Po'ipū Road, Resort Section (Po'ipū Key Map P3)

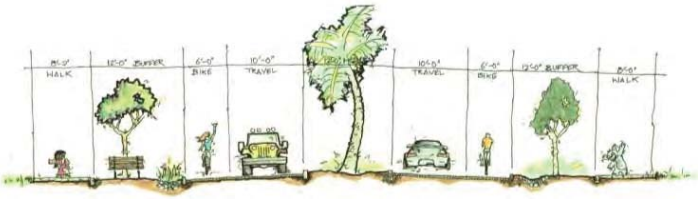


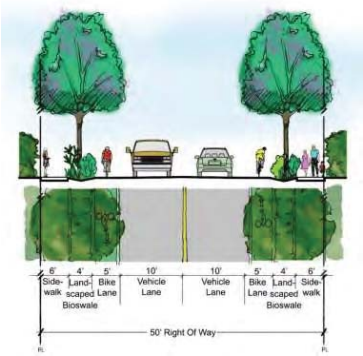





Figure 4-26: Po'ipū Road, Resort Section Rendering (Po'ipū Key Map P3)

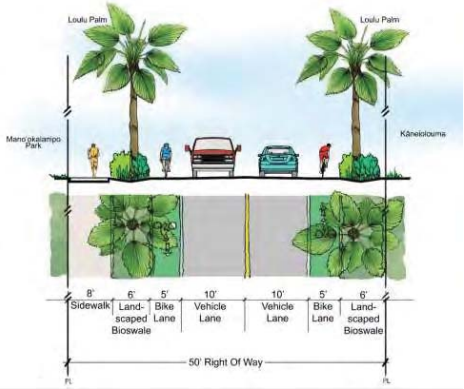
***Kapili Road (9).*** Kapili Road is one of the mauka-makai connector roads between Po'ipū Road and Ho'onani Road which serves several large visitor properties such as the Sheraton Kaua'i Resort and the Po'ipū Kapili as well as Kōloa Landing which is under construction and the Sheraton expansion project. The existing ROW is 50 feet and there are existing 4 foot sidewalks on portions of the road. The conceptual section proposes to build upon the existing facilities, extending the sidewalks by 2 feet to 6 feet wide for the entire length on both sides and adding bike lanes and tree-lined bioswales (Figure 4-27).

Figure 4-27: Kapili Road (Po'ipū Key Map 9)




***Ho'owili Road (10).*** Ho'owili Road runs between Mano'okalanipo Park and Kāneiolouma, two major cultural sites. It also provides the main access to Po'ipū Beach Park and the parking lot serving the park. The proposed section includes an 8 foot wide sidewalk on the side of the park, bike lanes, and landscaped bioswales (Figure 4-28). Currently the beach parking lot floods during heavy rainfall events, rendering much of the parking lot inaccessible. The bioswales as shown would run continuously down the length of Ho'owili Road, providing large landscaped areas to help with collecting, filtering, and infiltrating rainwater runoff. Loulu palms and native plants, particularly those native to Po'ipū, should be installed to highlight the cultural importance of the area.

Figure 4-28: Ho'owili Road (Po'ipū Key Map 10)




***Ho'ohu Road (11).*** Ho'ohu Road is a narrow residential street that winds around the pu'u Pihakekua above Makahū'ena Point and connects Pe'e Road to Po'ipū Road. The street should be redesigned as a yield street to slow traffic, provide on-street parking, and allow for pedestrian and bicycle use. If road shoulders are provided, they should be striped with a wide 6-inch stripe to improve their visibility.

#### *4.3.4.4 Lopaka Paipa Boulevard*

Community concern has been raised regarding increased traffic speeds and reduced safety along Lopaka Paipa Boulevard once the connection between Ala Kalanikaumaka and Po'ipū Road is made. However, other community members have called for the much needed east-west connection to alleviate traffic along Po'ipū Road. To address these concerns, the multimodal plan recommends traffic calming measures and intersection improvements to help reduce traffic speeds such as tighter turning radii and crosswalks with safety improvements to make crossing safer. There was also discussion to investigate whether a second east-west connector road could be built further south in the area of the new regional park to further improve connectivity. The cane haul road alignment was considered. However, it runs through a federal critical

habitat so it was a poor candidate. Further studies for an additional east-west connector should be continued in conjunction with area roadway improvements.

### 4.3.5 Streetscape Design

Wherever pedestrian activity is emphasized and encouraged, elements that make the pedestrian environment safer and enliven the streetscape such as benches, signage, and other amenities should be provided. Bulbouts at crosswalks should be included to shorten the distance pedestrians must traverse across vehicle lanes. These can be incorporated into on-street parking layouts and designed as landscaped bioswales to collect and filter rainwater runoff, provide shade, and beautify the area. Native and Polynesian-introduced plants could be installed and interpreted to add an educational component.

Figure 4-29: Inviting Streetscape with Angled Parking and Bulbouts at the Corners

Figure 4-30: Landscaped Bulbouts with Bioswales and Street Furniture

#### *4.3.5.1 Wayfinding*

To highlight the rich history and culture of the Planning District, the design of wayfinding elements such as signage (address, directional, scenic byways/heritage trails), sidewalk paving, crosswalks, and public artwork should incorporate historical and cultural elements to celebrate and commemorate the heritage of this area. Interpretive plaques and signage should be installed on or at historic structures and places where they will not be intrusive but are accessible by the public. Other cultural signage may include moku and/or ahupua'a markers along roadways that indicate the boundaries of the traditional land districts. An educational piece may accompany these signs where appropriate.

### 4.3.6 Maintenance

Maintenance of the proposed streetscapes as well as the designs being built in the Līhu'e Town Core and the Ke Ala Hele Makalae will require the County to develop a plan for ongoing maintenance of these specialized environments. Options include a County-based urban forestry maintenance team that could reside within the Department of Parks and Recreation or training Division of Park Maintenance staff to care for the street trees, urban landscaping and bioswales. These services could also be contracted out with landscape contractors. Funding for ongoing maintenance could be paid through several mechanisms such as collecting parking fees for public parking, public-private partnerships with business and resort associations, or the creation of improvement districts or community facilities districts as described in Section 6.3.2.

In addition, many from the community voiced the need to properly maintain the existing road shoulders throughout the Planning District as they are used for bicycling and pedestrians. Overgrown vegetation and debris can cause hazardous conditions. There was also concern voiced over adjacent property owners who landscape or encroach upon the public right-of-way especially when those encroachments block safe passage along the roadways. Enforcement to clear those encroachments is recommended.

### 4.3.7 Street Trees

The use of natives and the continuation of existing trees are recommended for a consistent streetscape and wayfinding.

Table 4-3: Recommended Street Trees

| Roadway | Street Tree |
|---|---|
| **Kōloa and Maluhia Roads within Kōloa Town SPA** | Monkey Pod (*Samanea saman*), Royal Poinciana (*Delonix regia*), or Mānele (*Sapindus saponaria*) |
| **Weliweli Road** | Giant Crepe Myrtle (*Lagerstroemia speciosa*) or Māmane (*Sophora chrysophylla*) |
| **Ala Kinoiki** | True Kamani (*Calophyllum inophyllum*), Mānele (*Sapindus saponaria*), or other large native canopy tree |
| **Po'ipū Road (between the roundabout and Grand Hyatt)** | Monkey Pod (*Samanea saman*) or True Kou (*Cordia subcordata*) |
| **Kaumuali'i Highway in Kalāheo** | Lama (*Diospyros sandwicensis*) or Lonomea (*Sapindus oahuensis*) |
| **Ho'owili Road** | Loulu (*Pritchardia aylmer-robinsonii, P remota*) |
| **Kapili Road** | True Kou (*Cordia subcordata*) or Milo (*Thespesia populnea*) |

## 4.4 KAUA'I NATIVE PLANTS & EXCEPTIONAL TREES

### 4.4.1 Kaua'i Native Plants

Native plants and particularly those native to South Kaua'i should be used in the planting areas of the public streets as shown in the conceptual street sections and integrated into interpretive and educational materials. Table 4-5 in the full report provides a list of Kaua'i native plants to consider for landscaping with in the Planning District.

### 4.4.2 Exceptional Trees

The Exceptional Trees listed in Table 2-1 are also shown on the Land Use Map in Figure 4-1 to emphasize the importance of protecting them in future land use and improvement projects including streetscape improvements. The monkey pod trees along Kōloa Road between Po'ipū and Waikomo Roads and Po'ipū Road between Kōloa and Waikomo Roads should also be protected and adopted as Exceptional Trees.

Recently, the County contracted with an arborist to perform a preliminary study on the health of the trees along the famed tree tunnel on Maluhia Road. He found that 85 of the approximately 650 total *eucalyptus robusta* (swamp mahogany) trees and stumps may need further care and that further assessment should be performed (Borgatti 2014). The Mayor has convened a Task Force to further investigate the issue of tree tunnel preservation.

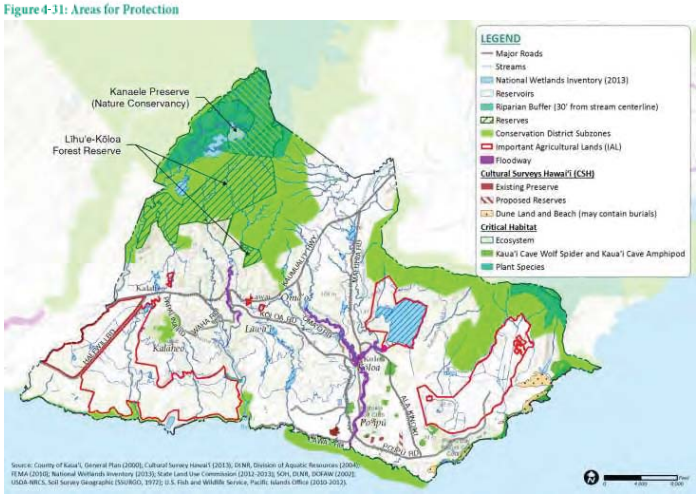




## 4.5 NATURAL & CULTURAL HERITAGE RESOURCES

The Natural and Cultural Heritage section identifies policies to guide the management and protection of South Kaua'i's environmentally and culturally sensitive areas (Figure 4-31). The vast majority of the natural and cultural heritage resources in the region are located within the Natural, Agricultural, Water Bodies & Wetlands, and Park & Recreation land use designations on the South Kaua'i Community Plan Land Use Map.

Figure 4-31: Areas for Protection




Of the estimated 31,300 acres of land within the Planning Area, approximately 79.0 percent is in natural and open space uses, including 28.0 percent designated as Natural, 42.2 percent as Agriculture, 5.6 percent as Water Bodies & Wetlands, and 3.2 percent as Park & Recreation. Areas designated as Natural include lands with significant environmental resources, including watersheds; sites with scenic, historic, cultural, archaeological or ecological significance; and areas with natural ecosystems of endemic plants, fish and wildlife. They also include lands that may be impacted by natural hazards such as floodways.

### 4.5.1 Watershed Management

The wet upland watershed areas are the water source for year-round flowing perennial streams as well as the recharge area for groundwater drinking sources. The guiding principal involves managing the watershed mauka to makai in recognition of the ecosystem services and interrelatedness of nature. The policies and guidelines are organized into four areas of watershed management: watershed planning and management, runoff and erosion prevention, habitat protection, and water quality and resource management.

#### *4.5.1.1 Watershed Planning and Management*

a. Collaborate with State agencies (Office of Planning, DLNR, DOH, Soil and Water Conservation Districts), federal agencies (U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service), and local organizations (e.g., Kaua'i Watershed Alliance) in order to plan and manage watersheds.
b. Prepare a watershed management plan.
c. Expand watershed alliance by encouraging other landowners and organizations to participate. The presence of the Kaua'i Watershed Alliance is promising for more active collaborative management. Ideally, it would be willing to expand its membership and jurisdiction to cover more of the Planning District.
d. Form or encourage a community nonprofit organization to prepare a watershed management plan. Kaua'i Watershed Alliance priorities rightfully focus island-wide and priorities do not include the Planning District. To focus on Planning District needs, form a community nonprofit or seek an existing relevant nonprofit organization to prepare a Watershed Plan to qualify for EPA Clean Water Act Section 319 Nonpoint Source Grant implementation funds.

#### *4.5.1.2 Runoff and Erosion Prevention*

a. Manage land use and earth-moving activities from the standpoint of the entire watershed, considering important characteristics such as scenic landscape features, historic sites, native endangered or threatened species of plants and animals, and other special resources.
b. Filter and manage stormwater and rainwater runoff prior to entering streams and the ocean during construction as well as ongoing maintenance. Integrate green infrastructure with landscaping.
c. Establish ungulate and feral animal management along streams and drainageways. A significant proportion of the highly erodible soils in the Conservation District are along drainageways, implying a need for watershed management practices such as undergrowth maintenance with feral animal management and riparian buffers.
d. Establish and implement soil conservation management practices for IAL. The Māhā'ulepū IAL has soils that are potentially highly erodible, implying a need for soil conservation practices that could be managed through NRCS conservation plans.

#### *4.5.1.3 Habitat Protection*

a. Provide protection for critical habitats. There are critical habitats unprotected by a Conservation District or other means in the vicinity of Kōloa and Po'ipū. Establish critical habitat protection areas.
b. Support funding applications for parcels with existing conservation priorities or subject to riparian buffer permit conditions (e.g., USDA Conservation Reserve Enhancement Program and other funding).

#### *4.5.1.4 Water Quality and Resource Management*

a. Balance the restoration of stream flow, public safety, and water required for agricultural uses.
b. Facilitate County approvals of dam decommissioning applications in watersheds where there is a watershed plan.
c. Expedite review of dam decommissioning applications based on documentation requirements.
d. Establish Total Maximum Daily Loads (TMDL) for impaired streams. The State Department of Health has designated all three perennial streams in the Planning District—Waikomo, Lāwa'i, and Wahiawa—as impaired streams that do not meet state water quality standards.

e. Conduct marine water quality monitoring in context with the larger watershed area. Although the water quality of the popular beaches in Po'ipū is monitored by the Department of Health, the monitoring program is primarily for recreational public health, not for watershed or nearshore environmental quality.
f. Test for cesspool contaminants during marine water quality monitoring. The disposition and effect of cesspool seepage on the groundwater and nearshore water quality is unknown.

## 4.5.2 Cultural Stewardship & Interpretation

Kaua'i is known for its beauty and the variety of its landscape. The native Hawaiian culture is intimately linked to physical places, many of which have special cultural significance. Within the Planning District, these features define the place, and the precious opportunity to preserve and restore what remains, and educate visitors and residents alike about the history and heritage of South Kaua'i, still exits.

The natural landscape (Mount Kahili, Hā'upu Ridge, Māhā'ulepū, coastal pali and dunes, gulches, and shoreline areas) and cultural landscape (Kōloa Field System, Kāneiolouma, Nōmilu Fishpond, Lāwa'i Kai, Kukuiolono, Hapa Trail, and old plantation landmarks) are intimately entwined and define the South Kaua'i communities (see Figure 2-1). Preservation of these resources is essential in maintaining the rich heritage of South Kaua'i.

### 4.5.2.1 Stewardship

a. In conformance with the General Plan, development projects should be designed to preserve, protect and enhance heritage resources and South Kaua'i's unique "sense of place."
b. Restore significant historic sites.
c. As noted in the General Plan, "Preserve public views that exhibit a high degree of intactness or vividness. "Intactness" refers both to the integrity of visual patterns and the extent to which the landscape is free from structures or other visually encroaching features. "Vividness" relates to the memorability of a view, caused by contrasting landforms which create striking and distinctive patterns." An example is the silhouette of Mt. Hā'upu.
d. Assist private owners to secure grant funding, tax incentives and other financial benefits for restoration, preservation and interpretation.
e. Preserve Māhā'ulepū's significant natural and cultural features and protect the dune systems along the coastline where burials remain interred as well as the Makauwahi Cave and Waiopili Heiau. Involve the community in planning for the future of Māhā'ulepū. Planning should take into consideration various interests and factors, including but not limited to: the long-term need for managing Māhā'ulepū lands to preserve their significant natural and cultural features; the owner's desire to develop revenue-producing uses in a way that is sensitive to the area's unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park (GP 2000).
f. Continue to support the stewardship and restoration of Kāneiolouma.
g. Restore or reuse the Kōloa Mill structures if economically feasible.
h. Protect and restore the Nōmilu Fishpond and the salt pans surrounding it for food production and/or ecotourism at the discretion of the private owners. Besides being a unique fishpond, Nōmilu also was known to have the finest salt.
i. Protect Kukuiolono's geological, cultural, and recreational asset. It is the largest cinder cone in the Planning District, was once used to set beacons for fishermen, was the site for the Kukuiolono Heiau (destroyed), and is now a park and golf course.

### 4.5.2.2 Interpretation and Education

a. Develop an interpretive story for the Planning District using the Heritage Resources Map in Figure 3-1, highlighting the significant natural and cultural resources of the area and connecting these resources through a system of wayfinding techniques.
b. Develop interpretive story of ahupua'a and historic resources. Wahiawa Valley seems to have been a rich settlement area that may have been less historically disturbed than other ahupua'a in the Planning District. It could offer examples of kula agricultural terraces, ocean uses, historic plantation infrastructure, and plantation camps. There is also a petroglyph site on the Hawai'i Register of Historic Places.
c. Develop interpretive story of Kōloa Field System. The 1978 Kōloa-Po'ipū-Kalāheo Development Plan proposed leveraging Waikomo Stream for streamside enhancement through Kōloa Town. This revitalization could be further reinforced with interpretation of the Kōloa Field System, an excellent example of an elaborate pre-contact irrigation system fed by Waikomo Stream.
d. Develop interpretive story of Māhā'ulepū. The Makauwahi Sinkhole, extensive taro lo'i, and first sugar mills in the State of Hawai'i by Ladd and Company provide significant findings of interest to scientists, historians, and ecotourists. The historic sugar mill is on the State and National Register of Historic Places.
e. Develop interpretive story for sugar plantation era. The system of ditches and reservoirs, together with the Kōloa Sugar Mill, still remain that could provide the backbone to interpret the sugar plantation history in the Planning District. The location of plantation camps could also be commemorated.
f. Create a network of South Kaua'i scenic byways building from those identified in the Holo Holo Kōloa Scenic Byways. Promote it as the South Kaua'i Heritage Corridor.
g. Complement scenic vistas by providing facilities such as roadside pull-offs and stops so travelers have greater enjoyment, especially along Scenic Byways.

### 4.5.2.3 References

a. Supplement the GP Heritage Resources Map for Kōloa-Po'ipū-Kalāheo with the SKCP Points of Interest Map.
b. Work with The Nature Conservancy and the Office of Hawaiian Affairs to improve the "Hawaiian Footprint" predictive maps identifying areas that have potential archaeological resources or burials to prevent damage to archaeological sites. These maps are available in geographic information system (GIS) format.
c. Verify the Hawaiian Footprint map includes Wahiawa Valley (near the stream), steep gulch areas in Kalāheo and Lāwa'i, Kōloa ahupua'a, areas with high concentrations of known surface archaeological features, and lava tubes with surface openings.
d. Identify probable burial areas on the Hawaiian Footprint map. Probable areas could include the dunes fringing Keoneloa Bay (particularly west side), Kāmala Point near Kawailoa Bay, the dunes fronting Hā'ula Bay, the slopes and shoreline of Wahiawa Stream, and the lava tubes and dunes of the region. Some sites (besides Keoneloa dunes and Māhā'ulepū dunes) that have documented burials include Kukui'ula and Kukuiolono.

## 4.5.3 Natural Hazards & Climate Change

Kaua'i is susceptible to a variety of natural hazards such as flooding, hurricanes, tsunamis, coastal erosion, landslides and rockfalls. While it is difficult to predict such occurrences, it is reasonable to assume that future incidents are likely, given historical events. To prepare for potential impacts due to natural hazards, potential evacuation routes and shelter locations are shown in Figure 4-32. However, a comprehensive emergency preparedness plan should be developed.





Figure 4-32: Emergency Evacuation Routes & Shelters

The effects of climate change and other human-made hazards can be minimized but may not be completely avoided. Sea level rise, beach loss, dam breaches, drought, and wildfires all pose a threat to human life and is therefore an important public health and safety issue that needs to be considered when developing policies for the location and pattern of future development in accordance with Hawai'i State Planning Act Priority Guidelines.

Policies and guidelines in this section provide guidance for further study and actions to help minimize loss of life and damage to property caused by natural or human-made hazards. Some overarching guiding principles outlined by the KC3HA study to help in moving forward include:

1. Use credible climate and hazard science to inform and guide decisions.
2. Minimize coastal hazard risks through planning and development standards.
3. Avoid or minimize coastal resource impacts when addressing risks to new or existing development.

### 4.5.3.1 Risk Assessment and Adaptation

a. Develop a community-scale risk and vulnerability assessment for coastal hazards due to climate change and sea level rise (SLR) in South Kaua'i with particular focus on critical infrastructure facilities (roads, water, wastewater, power, and public facilities such as hospitals, fire, police, schools) and the vulnerability of beach resources and resort facilities. Explore the full range of options to manage the impacts from climate change and SLR including accommodation, protection, retreat/restoration, prevention, and procedural solutions. Examples include:
   - Coastal hardening, which can lead to exacerbating erosion and beach loss
   - Asset protection, such as building higher levies (which may still fail in extreme events)
   - Shoreline/hazard retreat, which may involve loss of property use and value and high construction costs
   - Beach nourishment, which may have high recurring costs if systems are not internally stabilized
b. Develop an adaptation plan for areas with high SLR-related hazards, including coastal areas facing increased erosion and wave inundation. Alternative roadway alignments mauka should be explored for areas projected to be impacted by SLR and inland flooding.
c. Prepare a comprehensive drainage study for existing and projected runoff from changing weather patterns and SLR, and appropriate drainage facilities designed and constructed in conjunction with roadway and other infrastructure improvements.
d. The NOAA SLR flooding hazard layers show little flooding or coastal change at the shoreline. Historical shoreline change studies indicate a long-term trend of shoreline erosion for most of this area, which is sure to increase with increasing SLR. Detailed modeling and mapping of shoreline change and wave inundation hazards is needed to determine the severity hazards to coastal properties and beach resources, which is not shown in the NOAA data.
e. Develop a regional coastal and beach management plan (County, DLNR, UH Sea Grant) to conserve the beach resources critical to the local visitor industry and community, promoting alternatives to increased coastal armoring such as beach restoration.

### 4.5.3.2 Emergency Preparedness

a. Prepare a comprehensive emergency preparedness plan for potential impacts due to natural hazards and climate change. Develop strategies to protect infrastructure and critical facilities. Include public education to increase risk awareness.
b. Work with community groups to hold periodic evacuation training exercises.
c. Develop a preparedness certification program for communities as a systematic guide.
d. Require resorts to develop a self-sheltering plan for tsunami and hurricane events. There are approximately 7,300 visitors at any one time requiring shelter during a hurricane event within the Planning District. Resorts need to be ready to self-shelter visitors and to build and rebuild in accordance with flood-proofing standards while minimizing recurrent damage claims.

### 4.5.3.3 Design and Construction

a. Update design standards and incentives to change building practices and encourage hazard mitigation.
b. Design improvements within the VE Flood Zone to reduce and/or minimize the risk of damage and injury due to shoreline inundation. Avoid high-value development in VE and other high risk areas if possible.
c. New shoreline protection/hardening structures such as seawalls and revetments should be prohibited. Discourage hardening on or of intact dunes. Implement offshore solutions that take advantage of natural processes to build back the beach such as groins, breakwaters, or artificial reefs.
d. Mitigate hazards during infrastructure planning.
e. Retrofit buildings to withstand various hazard conditions or adapt to accommodate SLR and natural hazards.
f. Establish a local reserve fund for public mitigation measures, and incorporate hazard mitigation into all publically funded projects.

g. Clarify with FEMA whether the updates to the VE zone will account for the latest tsunami run-up modeling, and sea level rise. Clarify with FEMA whether the resorts built in the VE zone trigger any policies relating to repetitive losses that would affect their claims or future ability to rebuild.
h. Minimize wildfire risk by using fire-resistant building materials in new residential development, ensuring multiple ingress/egress from residential subdivisions, and creating and maintaining fuel breaks around all residential subdivisions.
i. Develop post-disaster reconstruction guidelines and permit review processes to help prioritize projects and aid recovery. Maui County is partnering with Sea Grant to develop such guidelines and protocols for the conservation of coastal resources and protection of coastal communities. They are expected to be completed in early 2015.

#### 4.5.3.4 Shelters and Evacuation

a. Provide adequate emergency shelter capacity for residents and visitors. Verify if existing shelter capacity can accommodate the projected residential and visitor populations and whether any additional hardening of shelter structures is necessary. Continue to accommodate special needs and pets.
b. Prioritize Kōloa and Kalāheo Schools for hazard mitigation funding to meet hurricane shelter standards.
c. Designate emergency shelters to serve the west (Kukui'ula 20-ac park), central (Kōloa School and Knudsen Park), and east (Gateway project) to have adequate parking, restroom, and resting facilities.
d. Coordinate resort self-sheltering plan for hurricanes that accounts for hurricane surge flooding.
e. Identify specific evacuation routes and meeting locations.
f. Identify emergency bypass routes during rockfall events, flooding, and other major roadway blockages.

#### 4.5.3.5 Mitigation

a. Continue to update as required the Kaua'i Hazard Mitigation Plan and consider developing a specific plan for South Kaua'i in line with the FEMA Whole Community Approach. Include consideration of community resiliency and compliance with federal rules to ensure that Kaua'i and South Kaua'i will be eligible for federal disaster recovery and mitigation funding including non-emergency disaster assistance for preparedness grants, hazard mitigation grants, pre-disaster mitigation grants, public assistance grants, fire management assistance grants, and flood mitigation assistance in order to protect life and property in the event of a natural disaster (https://www.fema.gov/hazard-mitigation-planning-resources#2).
b. Develop sustainable budget for beach nourishment. Consider an alternative funding package for beach nourishment, including a combination of sustained funding sources such as CFD, TAT (Transient Accommodation Tax, and TIF (Tax Increment Financing).
c. Develop one-time programmatic approval for beach nourishment with subsequent expedited checklist review (DLNR/ACOE/DOH/EPA).
d. Identify and mitigate rockfall hazards especially along Kaumuali'i Highway in the vicinity of Kalāheo and Lāwa'i.
e. Ensure periodic inspection and management of all reservoirs and dams to avoid breach.
f. Maintain undeveloped areas to minimize risk and loss to wildfire.
g. Promote and provide for beach re-nourishment for coastal areas suffering erosion.
h. Utilize reservoirs and dams to extinguish wildfires. Nearly half of the county's inventory of reservoirs (created by earthen dams) is located within the Planning District. Provided they are inspected and managed according to DLNR requirements, these reservoirs are potential assets for wildfire fighting water source, irrigation, and ecotourism fishing.

## 4.6 PARKS & RECREATION

There is a mix of public and private facilities shown in the Parks & Recreation land use designation in Figure 4-1. The Parks & Recreation section identifies policies to guide the management of South Kaua'i's varied park resources and recreational opportunities. They should be considered in conjunction with the recommendations from the County's recently completed *Kaua'i Parks and Recreation Master Plan* (2013). Recommendations from this plan are marked with an asterisk (*).

*Kukui'ula Boat Harbor.*

### 4.6.1 Park and Recreational Facilities

a. *Prioritize resources at Po'ipū Beach Park including expanding the beach park areas and ocean recreation opportunities, as this is the premier beach park for South Kaua'i and a major economic driver for the Po'ipū resort area. Restore and maintain tombolo and beaches. Conduct engineering study of drainage requirements for periodic flooding in parking lot.
b. *Improve neighborhood parks including: pavilion and playground equipment at Waikomo Park; gateball field and shade trees at Weliweli Park; and pavilion, small comfort station, and park furniture at 'Ele'ele Nani Park.
c. Expand the mix of recreational facilities to include:
   - Community gardens
   - Tot lot/playground
   - Skate park/motocross
   - Expanded farmers markets
   - Bike tracks
   - Outdoor amphitheater
   - Gymnasium
   - Swimming pool
   - Public bathrooms and drinking fountains at smaller neighborhood parks such as 'Ōma'o
   - Similarly, the top 10 preferences for new facilities for the Kōloa District from the park user survey summarized in the County DPR's *Parks & Recreation Master Plan* (2013) are:
     1. Walking and bicycling paths
     2. Picnic facilities and pavilions
     3. Recreation beaches
     4. Childrer's playground
     5. Camping facilities
     6. Indoor gyms and fitness facilities
     7. Dog parks (off-leash)
     8. Skate parks
     9. Passive (leisure) parks
     10. Tennis courts
d. *Install playground equipment at Kalāheo Neighborhood Center.
e. *Expand Kōloa Neighborhood Center by enclosing the space between the two existing structures.
f. *Expand and improve the parking area at Spouting Horn Park.
g. Support the National Tropical Botanical Garden in its efforts to preserve and manage the Lāwa'i Kai Special Subzone primarily for resource protection and maintaining recreational uses at 2009 levels and the expansion of the McBryde Garden.
h. Provide additional community meeting space, especially within the Po'ipū Gateway Mixed-Use Village.





i. For the future 20-acre Kōloa-Po'ipū District Park, include the community in the planning of the park. Include sports facilities and playgrounds to support the housing projects in the area. The design and layout of the park should facilitate an east-west pedestrian/bicycle/vehicle access between Po'ipū Road and Ala Kalanikaumaka.
j. In concert with the landowner, community and potential partners, such as the National Park Service, public land trusts, and/or others, explore fair-market valuation tools for establishment of a park, conservation easement, and/or managed protected area along the Māhā'ulepū coastline.
k. Work with landowners along coastal areas to maintain public access where sensitive natural and cultural resources are not threatened and where public safety can be protected.
l. Develop new parks to meet the needs of both residents and visitors alike. Explore management of new parks by public-private partnerships.
m. Explore options for potential conservation easements or future acquisition at fair market value via non-profit organizations such as the Hawaiian Islands Land Trust and Trust for Public Lands to preserve the coastal lands.

### 4.6.2 Maintenance

a. Improve the maintenance and upkeep of park grounds and facilities.
b. *Undertake appropriate repairs at Kalāheo Neighborhood Center including repairs to the center and gym roofs.
c. *Continue to support the cultural caretaker group at Kāneiolouma.
d. Fund beach replenishment as necessary at Po'ipū Beach Park.
e. Schedule and budget regularly planned improvements to facilities.
f. Promote an adopt-a-park or adopt-a-trail program. Involve local business and community groups.
g. Seek grants and alternative funding sources for park improvements. Seek visitor-industry funding assistance for visitor-related trails, beaches, and facilities (e.g., HRS 198D TAT revenues).

### 4.6.3 Public Access

a. Maintain public access to beaches and inland recreation areas.
b. Create a regional network of public trails. Partner with private landowners for missing connections via managed access and coordinated time periods.
c. Facilitate the possibility for the old alignment of Hapa Road to be converted for new usage as an off-road multi-use trail. In addition to promoting education about various stages of Hawaiian history, from pre-contact to plantation days, it would offer an appealing non-vehicular connection option for visitors between Po'ipū and Kōloa.
d. Inventory hunting access to Forest Reserves and government trails.
e. Apply for potential funding for trail acquisition, development, and maintenance through Nā Ala Hele and the Hawai'i Tourism Authority.
f. Work with the landowner, community groups, and the Public Access, Open Space, Natural Resources Preservation Fund Commission to explore options for permanent public access to the Māhā'ulepū coastline.
g. Work with the landowner to maintain interim public access to the Māhā'ulepū coastline as the priority.
h. Manage access where necessary to preserve Māhā'ulepū's natural and cultural resources and to ensure public safety.
i. Follow up on the recommendations from the Annual Report to the Kaua'i County Council and Mayor Carvalho from the Public Access, Open Space, Natural Resources Preservation Fund Commission.

## 4.7 AGRICULTURE

The Agriculture section identifies policies to guide the management of South Kaua'i's agricultural resources for economic development and for preservation.

Agriculture occurs at varying scales throughout the Planning District from the large tracts of commercial farms to small rural residential farm lots. For the most part, South Kaua'i's agricultural resources are located in the Agricultural and Homestead land use designations. During the public meetings, concerns were raised about large-scale agriculture and the need for additional regulation at the County level. While such operations are permitted under existing County Agricultural zoning, there are federal and state regulations in place to oversee the day-to-day operations of such businesses. The General Plan Update (commencing 2015) should examine agricultural policies, ordinances, and best practices to manage these concerns and should recommend an island-wide approach to mitigate these potential conflicts. The State Department of Agriculture currently regulates agricultural operations under the authority of HRS Title 11 and through HAR Title 4.

The community also raised concerns about further refining the types of agriculture compatible with the Māhā'ulepū area, particularly given the sensitive cultural and scenic resources surrounding those agriculturally zoned areas.

The County will also be revising the draft IAL report and the recommendations to the LUC.

### 4.7.1 Agricultural Lands as Open Space

a. Preserve agricultural lands for agricultural use to maintain open space and rural character of the area.

### 4.7.2 Local Food Production

a. Support local food production.
b. Encourage a diversity of production.
c. Support farm-to-table initiatives and education.
d. Encourage organic and sustainable farm practices.

### 4.7.3 Economic Sustainability

a. Provide access to technical support for agricultural startups, agricultural tourism, agricultural processing, co-op formation, agricultural financing, small business startup, renewable energy.
b. Continue to investigate opportunities for farmers and local producers to share facilities (e.g., washing, distribution, packing, processing, storage, etc.) and to access a variety of markets. Support organic farming and processing. See also Section 4.9 Industrial.
c. Encourage local restaurants, resorts, and eateries to use locally grown produce and other agricultural products and work towards self-sustaining food production within South Kaua'i. Market farm-to-table efforts.
d. Facilitate access to Enterprise Zone incentives for eligible businesses (e.g., agricultural processing).
e. Support agricultural tourism by streamlining agricultural tourism regulations. However, transient vacation rentals (TVRs) are not supported on agriculturally zoned lands outside of the VDA.

### 4.7.4 Important Agricultural Lands

a. Follow through on the remaining five of eleven IAL incentive and protection programs identified in HRS 205-46(c) that fall on county-level policies:
   (1) Grant assistance

(2) Real property tax systems that support the needs of agriculture, including property tax assessments based on agricultural use valuation

(5) Agricultural business planning, marketing, and implementation grants

(7) Other programs and mechanisms that promote investment in agricultural businesses or agricultural land protection, such as the purchase of development rights

(11) Agricultural education and training for new farmers; upgrading the skills of existing farmers and other agriculture-related employees through the use of mentoring, business incubators, and public or private scholarships; and increasing the returns of farming by adding value to food processing and other tools and methods.

b. In addition, follow through on the five major categories of recommendations and their proposed actions:
   (1) Develop County-level incentives program for IAL designation, specifically to encourage food production to increase self-reliance
   (2) Establish a minimum goal for County-led designations
   (3) Support landowner/farmer-initiated designations of agricultural lands that at least meet criterion #5 of Act 183 (SLH 2005), "land with sufficient quantities of water to support viable agricultural production."
   (4) Use IAL maps and tools when reviewing landowner/farmer-initiated petitions or for evaluating priority lands for designation by State or County
   (5) Evaluate and integrate findings and recommendations of IAL Study into the upcoming General Plan Update for the County of Kaua'i

c. Two other concepts introduced in the IAL Study include agricultural urbanism and agricultural clustering, both of which relate to focusing appropriate urban form and built structures in agricultural areas that appropriately support these farm communities. The IAL Study explains that agricultural urbanism "creates a walkable urban form surrounded by large-scale food production. This is different from … 'Urban Agriculture' which cuts out various spots throughout an urban center (like empty parking lots) for community gardens and temporary farmers markets. [Andres] Duany explains that 'in a rural setting, ag urbanism means clustering buildings together' allowing farmers to be able to work large tracts of land and still pool resources and interact with other farmers and members of the community." The IAL Study suggests that "IAL and Open zones could serve as the larger, contiguous agricultural (and natural) zones which buffers and connects [the rural agricultural] communities…."

*Aerial view of Kaua'i Coffee fields.*

## 4.8 SUSTAINABLE RESORTS & TOURISM

The Sustainable Resorts & Tourism section identifies policies to help focus economic growth in the visitor industry and develop a sustainable visitor destination in Po'ipû. Hotel and visitor accommodations are located in the Resort land use designation. However, tourism activities occur throughout the Planning District on various land designations.

The main goal is to develop the Po'ipû Resort area as a sustainable visitor destination—one that provides eco-friendly and educational experiences, products and services, leverages and supports local businesses and agriculture, relies less on cars, and embodies the rich historic and cultural foundation upon which these communities were built.

### 4.8.1 Sustainable Resorts

a. Establish Po'ipû as a world-class and world-leading sustainable visitor destination. Work together through PBRA to distinguish and market Po'ipû as a sustainable resort destination.
b. Enhance visitor experiences with eco-friendly products and services that also benefit the host communities and environment such as car and bike share programs, increased recycling and solid waste reduction, increased water and energy efficiency improvements, and eco-friendly soaps, cleaning products, and detergents.
c. Reduce the need for personal vehicles and parking lots by improving pedestrian and bicycle access and transit service.
d. Maintain parking at absolute minimum to encourage alternative modes of transportation to/from and within the Planning District.
e. Use renewable energy to power resorts.
f. Encourage use of electric vehicles recharged by renewable energy.
g. Support local food production by sourcing locally.
h. Include bus pass as part of resort fee.
i. Provide shuttles to/from airport.
j. Provide car rentals/car share programs at hotels.
k. Reestablish a minimum pedestrian and bicycle path from Po'ipû Beach Road to Ho'one Road to improve community connectivity.
l. Review demand for new visitor units compared with permitted units constructed every five years.

*Kukui'ula Farmers Market.*

### 4.8.2 Eco-Friendly Experiences

a. Provide a rich visitor experience which incorporates education and proper etiquette and protocol to help protect the island's natural and cultural heritage resources.
b. Promote sustainable tourism activities such as ecotourism, cultural tourism (Kāneiolouma), natural science tourism (Makauwahi Cave and Sinkhole), voluntourism (volunteer tourism), ag-tourism (agriculture-based tourism), health and wellness tourism, and other appropriate tourism-related businesses.





c. Minimize impacts from visitor activities and accommodations on residential communities, public infrastructure, and community facilities.
d. Increase farm-to-table dining experiences and farmers markets.
e. Promote health and wellness retreats.
f. Maximize residents' benefits from the visitor industry by providing kama'āina discounts year round.
g. For visitors to Po'ipû, a new Hapa Road trail could offer an appealing option to travel to Kōloa Town without a vehicle. It would also offer the opportunity to experience some of Kaua'i's pre-contact and plantation history.
h. With such unique natural assets as Kāneiolouma, the National Tropical Botanical Garden and Spouting Horn Park, Kukui'ula is an ideal area to promote ecotourism. A bicycle route between important sites could further encourage visitors interested in sustainable tourism.
i. The numerous reservoirs in the Planning District are sources for irrigation and may have potential for ecotourism fishing/boating.
j. Maintain managed access to Māhā'ulepû but consider providing a comfort station and visitor education resources on the rich natural and cultural heritage of the area.

## 4.9 INDUSTRIAL

As noted in the 2000 General Plan "Develop vacant lands with existing commercial and industrial zoning, to the extent feasible, before approving new commercial and industrial zoning." However, there is currently no industrially-zoned lands within the Planning District to support its vast agricultural lands. Historically, however, this was the birthplace of industrially-scaled sugar production at the first sugar mill in Kōloa. Therefore, the following policies and guidelines support reestablishing industrial uses centered on the historic Kōloa mill site.

a. Designate industrial land use to support rezoning around the Kōloa mill site. Support industrial designation for energy, wastewater processing and reuse, agricultural processing, and other job-creation uses.
b. Support private development of a regional wastewater treatment plant for the Planning District at the industrial center near the mill site. Preliminary engineering and planning studies including a HRS Chapter 343 Environmental Impact Statement (EIS) in 2009 have been completed for the regional plant and it involved closing the smaller package plants throughout the area and consolidating wastewater treatment. It should also consider servicing areas not currently served by centralized treatment.
c. Consider innovative wastewater treatment technologies and effluent reuse. Incorporate educational facilities and small commercial uses to create a themed educational and ecotourism experience.
d. Anticipate and coordinate workforce opportunities in renewable energy technology and mechanics, ecotourism, health and wellness, green streets, and Low Impact Development (LID) landscape maintenance.

*Kōloa Mill Site.*

e. Locate industries and utilities that discharge air or water pollutants, even when treated, in areas where they would impose the least potential harm to the environment and residential communities.
f. Adaptive reuse of the Kōloa Mill is encouraged if economically feasible and no health issues arise from hazardous materials that may exist in the historic structures.

## 4.10 INFRASTRUCTURE & PUBLIC FACILITIES

The Infrastructure & Public Facilities section identifies policies that guide the management of existing infrastructure and the development of new facilities. Capital improvement projects (CIP) should be prioritized to meet basic needs, provide ongoing maintenance and upgrades as necessary to maintain public infrastructure and to avoid or minimize interruption in service, and support the vision for South Kaua'i.

The County has also contracted with R.M. Towill Corporation to prepare an infrastructure assessment as one of the technical studies supporting the General Plan update. It will include transportation, water, wastewater, drainage, and solid waste needs based on the 2035 projections and will focus on high-growth districts such as the South Kaua'i Planning District. It will also provide low-impact, non-traditional strategies such as natural storm water drainage.

As referenced in Section 4.1.5, a comprehensive water planning strategy for the entire Planning District is supported, and should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currently falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.

*Water reservoir off Kōloa Road.*

### 4.10.1 Potable Water Systems

a. Update the County DOW's long-range Water Plan for the Kalāheo, Lāwa'i-Ōma'o, and Kōloa-Po'ipû County Water Systems to determine adequacy of existing source, storage, and transmission to support 2035 growth projections, especially within the SPAs.
b. Plan upgrades and improvement projects accordingly to avoid and/or minimize interruptions in existing service.
c. Coordinate with developers of new projects to provide adequate service.
d. Protect potable water wells and other drinking water

### 4.10.2 Non-Potable Water Systems

a. Integrate and encourage non-potable water sources for appropriate uses within the Planning District.
b. Develop standards for design of systems and policies for applications in concert with State Department of Health (DOH) regulations.

### 4.10.3 Wastewater

a. Assist and support regional wastewater solutions including the potential centralized treatment plant.

b. Support innovative treatment systems that produce effluent at appropriate water quality levels to encourage reuse such as irrigation, industrial uses, and other non-potable uses.
c. Coordinate with commercial establishments and multi-family complexes in Kōloa and Kalāheo to comply with EPA ban of large-capacity cesspools.
d. The future industrial area should be served by an innovative wastewater treatment system or the regional plant.
e. Monitor the disposition and potential effect of cesspool seepage and injection wells on the groundwater and nearshore water quality.

#### 4.10.4 Drainage

a. Prepare a drainage study for the Po'ipū Beach/Kāneiolouma area and propose alternative to mitigate flooding.
b. Install bioswales and rain gardens along streets, in parks, and in parking lots to collect and filter rainwater runoff and increase infiltration via landscaped areas that also beautify the place.
c. Continue to require new development to mitigate site-generated flows.
d. Require installation of catchment systems for non-potable water use onsite such as irrigation and toilet flushing.
e. Support a comprehensive water planning strategy for the entire Planning District, which should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currently falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.

#### 4.10.5 Solid Waste

a. Establish a recycling program to minimize solid wastes generated by residents, businesses, and the visitor industry.
b. Require the construction industry to minimize construction wastes and encourage use of reclaimed and recycled materials.
c. Consider coordinating green waste processing and distribution of mulch within the Planning District to reduce transportation costs. Coordinate with resort and agricultural users.
d. Support composting of food wastes for reuse as soil amendments.
e. Support a clearinghouse of collecting leftover food from area restaurants and resorts to feed the hungry.
f. Continue to seek appropriate recycling of electronic waste for Kaua'i.

#### 4.10.6 Power

a. Continue to support renewable energy generation.
b. Encourage increased energy efficiency for residents and businesses. Develop a rebate program for those who upgrade or install highly energy efficient equipment and appliances.
c. Encourage installation of solar hot water heating systems.

#### 4.10.7 Innovative Technologies with Multiple Benefits

a. Encourage innovative solutions that combine multiple benefits. Examples include:
   - Electric car charging stations for car-share system powered by photovoltaic shade structures. Similarly, the transit system could use electric shuttle buses for the area circulators that are charged by photovoltaic energy.
   - An anaerobic digester system that uses green waste, including invasive plant species, to produce energy that could in turn power a wastewater treatment system, supplemented as necessary with photovoltaics.

## 4.11 ECONOMIC DEVELOPMENT

The resort area of Po'ipū-Kukui'ula is a major employment center capitalizing on its competitive advantage for tourism including sandy beaches, sunny climate, and diverse ocean conditions. The Planning District also has other potential resources such as Important Agricultural Lands to diversify the economic base. Recognizing that the strength of the Planning District's economy relies on the private sector, the role of this Plan in terms of economic development is to be a catalyst to facilitate ongoing trends, coordinate and encourage diversification, and strategically stimulate through infrastructure or other projects that benefit the community as a whole.

#### 4.11.1 Town Core Revitalization

a. Encourage town core revitalization of Kōloa and Kalāheo.
   - Streamline regulations through form-based codes to facilitate higher density mixed uses within the town core.
   - Guide redevelopment in a manner that maintains the historic character.
b. Consider innovative financial methods (e.g., business improvement districts, community facilities districts) to implement street and wastewater system projects.
c. Provide affordable housing for existing employees and to attract new businesses (see Section 4.2.3).
d. Support more affordable market housing by ensuring infill development provides a range of low-to-medium scale housing types, including smaller-footprint single-family units, cottage courts, duplexes, mansion apartments, townhomes, apartment houses, and courtyard buildings.
e. Maintain a healthy commercial balance to support locals and visitors alike.

#### 4.11.2 Diversification

a. Support, facilitate, and incentivize economic diversification focusing on town core revitalization, diversified agriculture, and sustainable tourism.
b. Facilitate and support agricultural networking and economies of scale that would enable sharing of washing, processing, distribution, and/or storage facilities so that farmers with smaller operations can have the collective advantage of larger operations, such as a cooperative.
c. Rezone to industrial an area in proximity to the farmlands that would allow other light industry, including alternative energy, to co-locate.
d. Network with U.S. Department of Agriculture to access funding and technical support for cooperatives, agricultural facilities, and infrastructure.
e. Enable agricultural tourism as a means for farmers to supplement their income and educational opportunity for residents and visitors to learn about local food production.
f. Coordinate compatibility and marketing of agricultural tourism as a key component of the sustainable tourism theme for this resort area.
   - Encourage diverse marketing opportunities by coordinating food safety protocols, farm-to-table partnerships with resort restaurants, farmers markets;
g. Assist with nonpoint source monitoring and compliance through NRCS conservation plans and regionally-supported water quality monitoring.
h. Distinguish the Planning District as a place known for sustainable tourism (see Section 4.8).





i. Promote and expand the Heritage Corridor system, as described in Section 4.5.2, as an economic catalyst for the visitor and health/wellness industries.
j. Encourage business development in industries that would be desirable to attract to the Planning District (e.g., agriculture, green technologies, health and wellness, green infrastructure maintenance) through promotion of the Planning District as an enterprise zone (with associated tax and other incentives) and workforce development programs.

#### 4.11.3 Regional Infrastructure Needs

a. Support and coordinate the needed development of regional multimodal transportation networks, wastewater and drainage infrastructure, and other infrastructure needs.
b. Support a comprehensive water planning strategy for the entire Planning District, which should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currently falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.
c. Promote and expand the Heritage Scenic Byway network system as a fun, healthy, and educational means to access the Planning District's rich collection of natural and cultural points of interests:
   - Expand the Holo Holo Kōloa Scenic Byway to include vehicular and non-vehicular (trails) rights-of-way, owned publicly or privately (with easements granted for public use), interconnecting points of interest throughout the Planning District;
   - Consider forming a nonprofit organization to manage the network system, apply for grants, charge user and/or commercial tour fees, and dedicate the revenues to the promotion, improvement, and maintenance of the network system;
   - Support the growth of a health and wellness industry attracted by the trail system and climate (e.g., equipment suppliers and rentals, health trainers, therapists, senior housing, rehabilitation);
   - Respect the culture by providing education and culturally-appropriate interpretation of the area that ties together the trail alignment, points of interest, and the history; monitor impacts.
d. Coordinate the wastewater and drainage regional infrastructure to enable future growth in a manner that minimizes impacts to the streams, groundwater, and coastal water quality:
   - Allow the private sector to take the lead to the extent they are willing and able;
   - Support as necessary with advance funding for regional studies and/or establishment of innovative financing (see Section 6.3).

#### 4.11.4 Jobs and Housing

a. Anticipate and coordinate workforce training and housing needs to ensure a competent workforce ready to access livable wage opportunities while also able to afford housing in reasonable proximity to jobs.
b. Ensure the workforce has access to a range of housing types, reflective of changing demographics and to help alleviate housing crowding conditions.

# 5 FORM-BASED CODE FRAMEWORK

## 5.1 PURPOSE AND INTENT

Past zoning and subdivision regulations have promoted drivable suburban habitats and development patterns that over time have compromised Kaua'i's unique character. The Form-Based Code (FBC) instead provides a regulatory framework that preserves, enhances, and creates "walkable urbarism"—the concept that places of human habitat on Kaua'i should be of a scale that is primarily pedestrian-oriented in nature—while continuing to preserve Kaua'i's natural resources and rural character, improve the quality of life of its residents and visitors, protect sensitive environmental habitats, and encourage economic growth. The code will:

- Promote, preserve, and enhance community design that reflects the distinct character of Kaua'i and supports a range of vibrant human habitats;
- Promote development patterns that support safe, walkable, pedestrian-oriented mixed-use places;
- Promote development patterns that support safe, effective, and multimodal transportation options, including auto, pedestrian, and bicycle, minimizing vehicle traffic by providing a mix of land uses, walkability, and compact community form;
- Promote the health benefits of pedestrian-oriented places, including safe routes for walking, bicycling, and other exercise;
- Preserve, protect, and enhance the character of established communities;
- Support existing walkable neighborhoods through networks of well-designed streets that are safe and secure for pedestrians and bicycles;
- Encourage appropriately-scaled infill and development that places services within safe, comfortable walking distance of homes;
- Encourage and incubate local business activity through community design;
- Promote neighborhoods with quality housing that encourage a diversity of housing choices;
- Ensure that each building plays a role in creating a better whole, not just a good building;
- Ensure buildings and environments that can adapt to changing economics and demographics;
- Encourage architecture that grows from local climate, history, and building practice; and
- Preserve and protect historic and cultural resources.

## 5.2 PLACE TYPES

Unfortunately, not much of the prehistoric settlement patterns of native Hawaiians survived the plantation era. Certain roads such as Hapa Trail and pockets of sites such as Kāneiolouma survived where sugarcane was not planted or towns did not develop. Instead, South Kaua'i's current settlement patterns relate more to the plantation towns which were centered around sugar cane mills and plantation camps. These places were built to a pedestrian-oriented scale that made it possible to get around on foot. The sugar cane fields that surrounded these places provided a de-facto greenbelt that differentiated places of more intense human habitation from agricultural and natural areas (Kaua'i Smart Growth, 2012). This relationship between built areas and natural or agricultural lands helped to reinforce Kaua'i's primarily-rural identity.

As development has become more auto-oriented and less walkable over the past several decades the distinction between these places has been eroded. Much of the growth that has taken place on Kaua'i is spread out and requires a car to get from place to place. This auto-oriented style of growth consumes rural and agricultural land without contributing to any meaningful sense of place on the island.

In order to distinguish between places built as auto-oriented, drivable places and those built as walkable places eight distinct place types have been identified on Kaua'i. These place types help to determine where certain types and intensities of development are appropriate. Four are considered ***drivable place types*** and the other four are ***walkable place types***.

### 5.2.1 Drivable Place Types

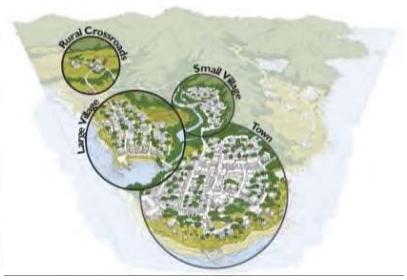
***Drivable place types*** are those in which a person is mostly dependent on the automobile to travel to work, or other destinations, and to accomplish most shopping and recreation needs. These environments may have areas where it is sometimes possible to walk or ride a bike for recreational purposes, but due to the lack of nearby amenities and street connectivity, are not favorable for walking or biking as a primary mode of transportation on a day-to-day basis.

The design and layout of development in these areas is driven by the need to accommodate the automobile. Land uses are segregated and often buffered, leaving large distances between which further require the automobile for day-to-day functions. Drivable place types on Kaua'i include Residential Community, Regional Commercial Center, Port/Airport/Light Industrial, and Resort.

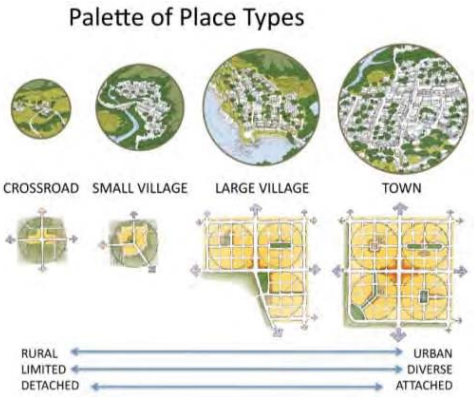
- ***Residential Community:*** Areas that are primarily single-family and are not within walking distance of retail or civic services. Street networks may lack pedestrian facilities and are generally not well connected, sometimes dead-ending in cul-de-sacs. Buildings in a residential community are generally set far back from the street.
- ***Regional Commercial Center:*** Areas that are primarily single-use retail or commercial, such as shopping malls or office parks. Buildings in a regional commercial center are generally separated from the street and sidewalk, if one exists, by large expanses of surface parking. While it is possible to move around within this place type on foot, it is most common to arrive by car.
- ***Port/Airport/Light Industrial:*** Areas that are primarily single-use and have special requirements, such as a large amount of truck traffic or movement of goods. These places often include large-footprint buildings or large areas such as runways, storage lots or staging areas that are not open to the public.
- ***Resort:*** Areas that are set up as visitor accommodations and which are generally self-contained and oriented inwards towards a private central space or outwards towards the ocean. Resorts accommodate car use with large parking facilities and minimal pedestrian connections to surrounding places.

### 5.2.2 Walkable Place Types

***Walkable place types*** are those in which a person can walk, bike or ride transit to work and to fulfill most shopping and recreation needs. These environments allow for the use of automobiles but do not require the use of a vehicle to accommodate most daily needs.




Walkable areas are built with a pattern where a person could live with limited reliance on the automobile, conducive to destination walking and cycling, and with access to transit. Walkable areas are largely supported through a network of interconnected, tree-lined streets, a diversity of housing choices and a mix of appropriate commercial and residential uses in a compact form. These areas also support public transit due to their compact nature.




Four distinct walkable place types, based on traditional settlement patterns and existing places on Kaua'i, provide a framework to establish a more intentional relationship between open spaces and developed areas on the island. These places correspond to traditional settlement patterns on Kaua'i, as well as existing places on the island. Walkable place types include Rural Crossroads, Small Village, Large Village and Town.

- ***Rural Crossroads:*** Located at the intersection of two or more roads, a crossroad provides a small amount of locally-serving retail and other services in a rural or less urban context; crossroads transition quickly into rural or less-urban intensities and activities, and/or into the natural environment. Historic examples of rural crossroads include Kapaia.
- ***Small Village:*** Located in less urbanized areas, small villages exist at the edge of the rural and urban condition. A village has a main street with surrounding residential areas; this transitions quickly into agricultural uses and/or into the natural environment. Historic examples of small villages include 'Ōma'o and Lāwa'i.
- ***Large Village:*** Located in urbanized areas, large villages are made up of clusters of neighborhoods that can support a larger mixed-use environment. The mixed-use environment can be located at the intersection of multiple neighborhoods or along a corridor between multiple neighborhoods. Historic examples of large villages include Kōloa and Kalāheo.
- ***Town:*** Located in urbanized areas, towns are made up of clusters of neighborhoods or villages that support a larger, more complex mixed-use environment. Buildings within towns are often attached and may be up to four stories tall. Large towns are important centers. Līhu'e is an example of a town place type and is the only one on the island.

The fundamental building block of places on Kaua'i is the pedestrian shed, where spaces for living, working, shopping, learning, and recreation are typically located within a five-minute walk of one another. While small places on Kaua'i such as rural crossroads may exist within a single pedestrian shed, larger, more complex places such as towns may incorporate multiple pedestrian sheds.

#### *5.2.2.1 Components of Walkable Place Types*

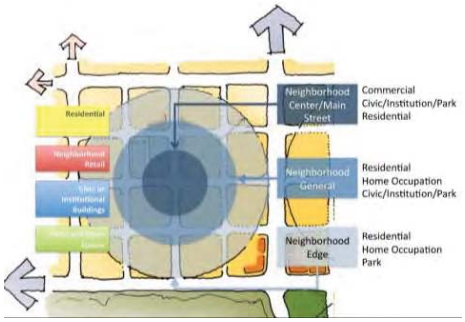
Walkable places on Kaua'i can be differentiated from one another according not only to size, but also according to other qualities such as rural or urban character, limited or diverse land uses, and detached or attached building forms. Generally,





crossroads and small villages tend to be smaller and more rural in character, with a limited range of land uses and buildings that are primarily detached from one another. At the other end of the spectrum, large villages and towns are larger and more urban, with a greater diversity of land uses and buildings that are more commonly attached.

While crossroads and small villages are comprised of only one small neighborhood, large villages and towns are made up of several different neighborhoods. Neighborhoods can be further broken down into three component parts: "neighborhood center" or the main street of town, "neighborhood general," and "neighborhood edge." Differentiating the parts of a neighborhood helps to identify where it is appropriate for certain types of development to take place within a neighborhood.




Neighborhood centers—also called main streets—are appropriate for higher-density buildings and a mix of uses. Blocks designated as neighborhood general are meant to be less dense, with some mix of uses integrated into primarily-residential buildings that may be single- or multi-family. The neighborhood edge is intended for the least amount of density and is primarily single-family residential. All parts of the neighborhood are walkable and provide access to civic spaces.

The distillation of place types, from place type components and designations to more specific neighborhood components, helps to inform the assignment of transect zones as part of a Form-Based Code.

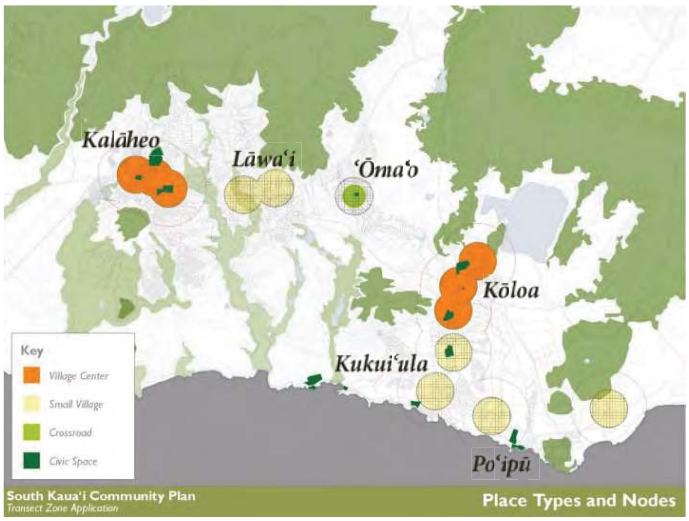
## 5.3 PLACES IN SOUTH KAUA'I

Each of the existing places in South Kaua'i was analyzed by the project team and the CAC and categorized into place types. Figure 5-1 illustrates the initial analysis which was later refined into the following place type descriptions based on the vision statements developed for each community. This analysis was also coordinated with their designation on the Land Use Map (Figure 4-1) and the transect zones for the SPAs. The place type descriptions also recognize the relationships of the different places to one another within the region.

### 5.3.1 Kalāheo

Kalāheo is the largest mauka village in the Planning District, bisected by Kaumuali'i Highway with neighborhoods weaving around hilly terrain to both the north and south. Kalāheo can be categorized as a Small Village due to its size and intensity of retail and civic uses. Over the long-term Kalāheo has the potential to grow into a Large Village since the topography lends itself to multiple-story buildings. However, wastewater service and transportation issues would need to be resolved to support such growth.

Figure 5-1: South Kaua'i Place Types Analysis




### 5.3.2 Kōloa

The site of the State's first sugar plantation, Kōloa is a compact, thriving village resting in the mid-land plains between the mauka villages along Kaumuali'i Highway, and the makai tourism-focused villages and resorts. Its compact commercial main street strikes a balance between serving local residents and tourists. Kōloa can be categorized as a Large Village due to the intensity, size of the commercial core, and the prominence of the area within the region.

### 5.3.3 Kukui'ula

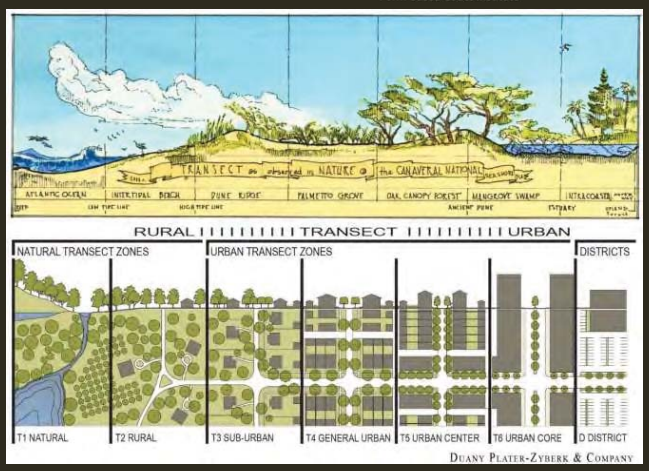
Though Kukui'ula is not a place with much historic development, it is a growing area with many important assets: Spouting Horn, Kukui'ula Small Boat Harbor, and the National Tropical Botanical Garden, in addition to a beautiful coastline. This site is the focus of much new development, with a new high-end shopping center and club, and entitlements for large subdivisions set around golf courses.

## The Rural-to-Urban Transect

The Framework for the Form-Based Code:

The Rural-to-Urban Transect is an organizing principle used in Form-Based Coding (FBC) that establishes a hierarchy of places/contexts from the most rural to the most urban. The designation of each zone along this hierarchy is determined first by the character and form, intensity of development, and type of place and secondly by the mix of uses within the area. This hierarchy of places becomes the framework/organizing principle for the entire FBC, replacing use as the organizing principle as is used in conventional or Euclidean zoning. Transect zones are used to reinforce existing or to create new walkable mixed-use urban environments.

> *The Rural-to-Urban Transect is a means for considering and organizing the human habitat in a continuum of intensity that ranges from the most rural condition to the most urban. It provides a standardized method for differentiating between the intentions for urban form in various areas using gradual transitions rather than harsh distinctions. The zones are primarily classified by the physical intensity of the built form, the relationship between nature and the built environment, and the complexity of uses within the zone.*
>
> *~ Form-Based Codes Institute*




The model transect is divided into six transect zones or T-zones: Natural (T1), Rural (T2), Sub-Urban (T3), General Urban (T4), Urban Center (T5), and Urban Core (T6), together with a District (D), often referred to as a Special District, designation for areas with specialized purposes (e.g., heavy industrial, transportation, entertainment, or university districts, among other possibilities). Each T-zone is given a number: higher numbers designate progressively more urban zones, and lower numbers designate more rural zones.

The traditional Hawaiian ahupua'a has some parallels with the Rural-to-Urban Transect, as land use intensity was historically related to the location of the land within the watershed (i.e., mauka areas were typically forested and sparsely populated, while lowland makai areas were used for cultivation, habitation, and cultural activities). Transect-based zoning can be utilized so that modern communities will also retain a strong relationship to the land, encouraging them to be complete, compact, and connected.



### 5.3.4 Lāwa'i

Lāwa'i is a small mauka neighborhood straddling a winding section of Kaumuali'i Highway, with two distinct "crossroad"-size commercial nodes—along Kōloa Road at Lauoho Road, near the old cannery and on the highway at Aulima Road where the post office and market are located. Though physically encompassing a large area, Lāwa'i's neighborhood pattern is highly defined and limited by its reservoirs and hilly topography. Lāwa'i can be categorized as a rural crossroad due to the limited retail and civic uses found at the core and the surrounding residential areas and hills.

### 5.3.5 'Ōma'o

'Ōma'o is a small series of mauka neighborhoods that reach southward from Kaumuali'i Highway. It has no defined commercial node but is rather a largely residential neighborhood, limited in connectivity, size, and future growth by topography and reservoirs. 'Ōma'o is a small residential community with a small central park.

### 5.3.6 Po'ipū

Po'ipū is a collection of makai developments and historic epicenter for resorts and tourist activity on the southern shore of Kaua'i. It has large expanses of sandy beaches, including the popular Po'ipū Beach Park, and is highly developed with a nearly unbroken maze of resorts and tourist lodgings between Po'ipū Road and the shore. Po'ipū can be classified as a Resort area. While there are portions that have walkways and bike paths, in the longer term, there is potential for Po'ipū to transition to a more walkable environment.

## 5.4 TRANSECTS AND ZONING

### 5.4.1 Using Zoning to Reinforce Place

FBCs provide an alternative approach to Euclidean zoning that emphasizes physical form, rather than separation of uses. They have been utilized to reinforce walkable, sustainable, mixed-use environments that build upon the existing character of places. The nonprofit Form-Based Codes Institute defines FBCs as follows:

> *"Form-Based Codes foster predictable built results and a high-quality public realm by using physical form (rather than separation of use) as the organizing principle for the code. These codes are adopted into city or county law as regulations, not mere guidelines. Form-Based Codes are an alternative to conventional zoning."*

The transect is the organizing principle of FBCs, which regulates the built environment based on its location within the natural to urban spectrum. For the purposes of the SKCP, the transect zones are limited to the rural-to-urban spectrum as there is little need to dictate built form in the natural and agricultural zones (see next page, The Rural-to-Urban Transect sidebar).

Modern Form-Based Codes were initially utilized in the 1980s and 1990s as a means to implement innovative development patterns that would otherwise not have been feasible under conventional zoning. Since then interest and knowledge of form-based coding has increased rapidly, with the advent of the SmartCode, an open-source coding template that was made available by Duany, Plater Zyberk & Company in 2003, growth and development of professional FBC practitioners, the founding of the Form-Based Codes Institute in 2004, and several major publications supporting their development. As of November 2012, there were more than 250 adopted FBCs of different variety and scope across the country (Borys and Talen), including applications in Hawai'i. These include FBCs to implement infill and redevelopment (e.g., Mauka Area Rules for Kaka'ako in Honolulu, Oahu, 2011) as well as FBCs regulating greenfield development (e.g., Honokōhau Village in Kona, Hawai'i, 2008).





It is also important to note that while FBCs primarily regulate an intended physical form, they also regulate use secondarily. FBCs often allow a range of uses that are carefully chosen to maximize compatibility between uses and the intended physical form of the zone. The use tables are simplified and categorized by use type, and clearly defined, to allow a greater degree of administrative decision-making related to particular uses.

### 5.4.2 Implementation

Place type components and the land use designations have a direct relationship to transect zones and the implementation of Form-Based Codes as shown in Figure 5-2. These relationships were determined through the community planning process.

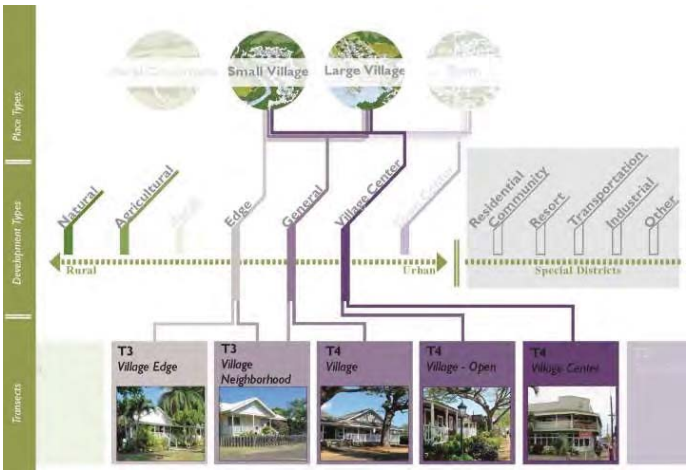



Figure 5-2: Place Types, Land Uses, and Transects

Transect zones can be applied to areas with place type components in order to accommodate growth and change. The exact delineation of transect zones can be "right sized" to the appropriate level of anticipated growth following the guidance that the place types provide.

- ***Neighborhood Center*** designations can generally be implemented with T5 and T4 Transect-zone districts to achieve moderate to high densities and a mix of uses appropriate for walkable centers.
- ***Neighborhood General*** designations can typically be implemented with T4 and T3 zone districts to achieve moderate densities and supporting land uses appropriate for areas in close proximity to walkable centers.
- ***Neighborhood Edge*** designations can typically be implemented in the Form-Based Code as T3 zone districts to achieve low to moderate densities and supporting land uses appropriate for areas further from, but within walking distance of, walkable centers.

Existing places in South Kaua'i help to inform the Form-Based Code content. The range of intensities found in historic centers, for example, can provide direction for how greenfield areas may be required to compose transect zones when forming new places. An analysis of the scale and size of the existing development in South Kaua'i provides a basis for the form standards of respective transect zones, which regulate building types, building heights, setbacks, frontage types, and frontage depths, etc.

The South Kaua'i transects fall within the T3 and T4 zones and include:

- ***T3 Village Edge.*** This zone reinforces established neighborhoods to maintain neighborhood stability and provide a transition between higher intensity walkable neighborhoods and rural and agricultural areas.
- ***T3 Village Neighborhood 1.*** This zone provides a walkable neighborhood that integrates compatible multi-family housing types such as duplexes and cottage courts within walking distance to transit and village center areas.
- ***T4 Village Neighborhood.*** This zone integrates appropriate, medium-density residential building types such as duplexes, cottage courts, small courtyard housing, and mansion apartments with limited retail and service uses in an environment conducive to walking and bicycling.
- ***T4 Village Center.*** This zone integrates main-street commercial and retail environments into neighborhoods, providing access to day-to-day amenities within walking distance, creating potential for a transit stop, and serving as a focal point for the neighborhood.

Since the South Kaua'i transects are meant for application primarily in those areas where mixed-use, walkable environments are desired, both T1 Natural and T2 Rural Transect Zones have not been included. The T5 Town Center is reserved for more intense mixed-use environments than are found in South Kaua'i. Additionally, because very high densities are not currently compatible with the character of Kaua'i, the T6 Urban transect zone has also been omitted.

The transect zones are established in the Regulating Plans for Kōloa, Kalāheo, and the Po'ipū Roundabout Special Planning Areas. (See Appendix C of the SKCP). Future master planning processes will need to be completed to determine the appropriate transects for the remaining three proposed SPAs at Po'ipū Gateway, Lāwa'i Cannery, and Numila. However, they have been categorized as a Large Village (Po'ipū Gateway) and two Small Village (Lāwa'i Cannery and Numila) place types to guide this effort. For all the SPAs within South Kaua'i, the FBC in Appendix C of the SKCP will supersede the regulations from the County's CZO tied to the underlying zoning districts.

The FBC also provides standards for developing larger projects that are otherwise regulated by the County's Subdivision Ordinance such as block size, street standards, and park dedication. These elements are regulated in the Street and Thoroughfares and Civic Space sections of the FBC.

# 6 IMPLEMENTATION & MONITORING

## 6.1 COMMUNITY PLAN ADOPTION

Adoption of the South Kaua'i Community Plan (SKCP) will require repealing and replacing the existing Kōloa-Po'ipū-Kalāheo Development Plan. It will involve review by the Planning Commission and adoption by the County Council, including revisions to Article 6 of KCC Chapter 10, "Special Development Plans" to implement the three proposed Special Planning Areas (SPAs) that will reference Appendix C of the South Kaua'i CP (South Kaua'i FBC) for the FBC regulations. The public review draft has been unveiled at "open house" meetings in Kōloa and Kalāheo and public hearings will be a part of the Planning Commission and County Council review processes.

The County Planning Department will also take a proactive role in supporting zoning amendments and State Land Use District Boundary Amendments (SLUDBA) as required to implement the CP whether it is part of the State's 5-year boundary review process as required by HRS §205-18, or submitted as individual applications and petitions. There may also be another opportunity to implement large-scale redistricting should the task force convened by the State Office of Planning recommend revising the SLUDBA process to include comprehensive boundary redistricting whenever the counties update their long-range plans such as the general plans and community plans. This effort is currently underway and may or may not be completed by the time this CP is adopted. However, it should be monitored as the County continues to update its GP and CPs.

### 6.1.1 General Plan Recommendations

The County Planning Department will be initiating the General Plan update as this CP goes through draft review and plan adoption. The GP was last updated in 2000 and its planning horizon is the same as this SKCP and the Līhu'e CP's, which is 2035. Because the regulatory maps within the GP are expected to change, the primary recommendation is to be consistent with those of this CP. Also the concept and potential application of Transfer of Development Rights is recommended to be explored and possibly adopted as part of the next GP update. Lastly, the three proposed SPAs that do not have regulating plans should initiate their master planning processes to establish their transect zones and have their SPAs and regulating plans adopted through the GP update.

#### *6.1.1.1 Transfer and/or Purchase of Development Rights*

The concept of Transfer of Development Rights (TDR) was introduced during the CAC meetings as a potential tool to help protect certain areas rich in natural and/or cultural resources from development. TDRs allow the landowner to shift the allowable density for land uses that are otherwise permitted based on existing zoning from areas with sensitive natural or cultural resources to other properties they own elsewhere within the Planning District that may be more appropriate for development. This would result in a "density bonus" in the receiving parcels which is intended to incentivize the relocation of the proposed development. The Planning Department determined that TDRs should be addressed on an island-wide basis as part of the General Plan update. However, two specific sites were identified as potential candidates for TDRs: 1) the "historic property" located on the Eric A. Knudsen lands in Po'ipū mauka of Po'ipū Road by CSH, and 2) the coastal area of Māhā'ulepū shown in the "Natural" Land Use Designation on the Land Use Map (Figure 4-1).

The concept of Purchase of Development Rights (PDR) involves the actual purchase of a property's development rights based on the fair market value of those potential developments in order to similarly protect sensitive resources. A conservation easement or some other limitation on development would run with the land once the PDR is completed.

#### *6.1.1.2 CP Land Use Map Updates via the General Plan Update*

As part of the GP update, the three future SPAs that do not have transects identified for them— Lāwa'i Cannery, Po'ipū Gateway Mixed-Use Village, and Numila—should be master planned and appropriate transects should be identified and adopted as regulating plans. If this is accomplished, this should, in turn, amend those areas of the Land Use Map in this CP from Large and Small Villages to the respective Neighborhood Center, Neighborhood General, and Neighborhood Edge designations.

#### *6.1.1.3 Land Use Entitlement and Approval Processes*

Related to the above, consideration for streamlining the entitlement process for zoning amendments and subdivision approvals should be considered for proposed projects which are consistent with the updated community plans. Potential incentives could include shorter review periods or administrative rather than discretional approval processes.

### 6.1.2 County Code Amendments

Chapter 10, Kaua'i County Code 1987, as amended, will be amended to create three Special Planning Areas (SPAs) for the areas where the Form-Based Code will apply. These are the Kōloa, Kalāheo, and Po'ipū Roundabout SPAs. Regulating Plans have been completed with transects identified in the South Kaua'i FBC and their boundaries will be added to the zoning maps. These changes are now adopted with Council approval of the SKCP. The remaining three SPAs as designated on the Land Use Map (Figure 4-1) require additional master planning processes to develop their respective Regulating Plans with transects. Ideally, this can be accomplished in conjunction with the upcoming General Plan process, but may occur as a separate process that could include other future SPA areas from the other planning districts. The three future SPAs are the Lāwa'i Cannery, Po'ipū Gateway Mixed-Use Village, and Numila.

Any development within the SPAs must follow the development standards, allowable land uses, and procedures described in the South Kaua'i FBC rather than those of the underlying zoning district unless the FBC is silent on those matters. Similarly, if there are standards described in the FBC which contradict with those in the Subdivision Ordinance (KCC Chapter 9), then the FBC will supersede those described in the Subdivision Ordinance for the SPAs.

#### *6.1.2.1 Future Zoning District Amendments*

**State land.** There is a State-owned parcel TMK 2-8-022:006 that is recommended for downzoning from R-6 to Open. Discussion with the DLNR Land Agent regarding the first parcel indicated that there are no concerns as there are no projects slated for the land. It is currently under a long-term agricultural lease for ranching till the year 2030.

**Industrial.** The roughly 160-acre area around the historic Kōloa Mill is designated for industrial use and a zoning amendment should be sought for the area indicated on the Land Use Map (Figure 4-1) in conjunction with a State Land Use District Boundary Amendment to Urban.

#### *6.1.2.2 Visitor Destination Areas*

The County's Visitor Destination Area (VDA) boundary shall be amended to include the areas within the Resort Land Use shown on Figure 4-1.

#### *6.1.2.3 Error on Existing Zoning Map*

There is an error on the Kōloa Zoning Map ZM-KO 300 that should also be corrected. There is the letter "A" floating in the area of TMKs 2-8-14:01 and 23 which should be an "O" for the Open District. This should be corrected on the amended Kōloa Zoning Map ZM-KO 300.





### 6.1.3 Special Planning Areas

Chapter 10 of the KCC describes the Special Development Plans for areas that have special development requirements. The new SPAs identified in this SKCP will be mapped on the County zoning maps and described in Chapter 10. The development standards in the South Kaua'i FBC will be adopted by reference and apply to these SPAs.

### 6.1.4 Subdivision Requirements

Similar to the development standards within the CZO, there are requirements within the South Kaua'i FBC which will override the subdivision standards (KCC Chapter 9) within the SPAs. These mainly impact park dedication requirements and street, block, and driveway standards within the SPAs.

## 6.2 CAPITAL IMPROVEMENT PROJECTS

The following section summarizes various capital improvement projects (CIP) described in this plan. Future capital improvements will be driven by the County's financial situation. However, the following provides information on priorities and order-of-magnitude cost estimates as well as potential financing alternatives to support their implementation. CIP projects should be directed to support the proposed growth areas of the plan.

### 6.2.1 General CIP Priorities

During one of the last CAC meetings, attendees were asked to rank their priorities for CIP improvements by County agency and by location. CAC members who were not in attendance were emailed or mailed a copy of the survey and their responses have been incorporated into the following summary of the results. All results are ranked from highest to lowest priorities.

#### *6.2.1.1 Department of Parks and Recreation Priorities*

1. Fix existing parks and facilities (no redesign)
2. Change the mix of recreational facilities (see Section 4.6.1 for a list of proposed facilities)
3. Build more community centers/meeting rooms
4. Acquire land for new parks
5. Replenish sand at beaches

#### *6.2.1.2 Transportation Agency Priorities*

1. Add Po'ipū resort circulator
2. Increase capacity on Kōloa Shuttle route
3. Change Kōloa Shuttle route to include 'Ōma'o Road
4. Add more bus shelters
5. Increase capacity on Kekaha-Līhu'e mainline

#### *6.2.1.3 Public Infrastructure Priorities for Kalāheo*

1. Multimodal roadways
2. Regional wastewater treatment plant
3. Drainage improvements
4. Potable water resources

#### *6.2.1.4 Public Infrastructure Priorities for Kōloa*

1. Multimodal roadways
2. Regional wastewater treatment plant
3. Drainage improvements
4. Potable water resources

#### *6.2.1.5 Public Infrastructure Priorities for Po'ipū*

1. Multimodal roadways
1. Drainage improvements (same average ranking as above)
2. Regional wastewater treatment plant (very close third)
3. Potable water resources

#### *6.2.1.6 Public Infrastructure Priorities for 'Ōma'o*

1. Multimodal roadways
2. Drainage improvements
3. Regional wastewater treatment plant
4. Potable water resources

#### *6.2.1.7 Public Infrastructure Priorities for Lāwa'i*

1. Multimodal roadways
2. Drainage improvements
3. Regional wastewater treatment plant
4. Potable water resources

#### *6.2.1.8 Kalāheo Town Roadway Improvements*

1. Papalina Road/Kaumuali'i Highway intersection improvements
2. Sidewalks and bike lanes on Kaumuali'i Highway
3. Sidewalk on Papalina Road
4. Sidewalk on Pu'uwai Road
5. Wider sidewalk on Pu'u Road

#### *6.2.1.9 Kōloa Town Roadway Improvements*

1. Sidewalks on Kōloa Road
2. Construction of Northerly Leg of Ala Kalanikaumaka
3. Separated bike/pedestrian path on Hapa Road
4. Connect Lopaka Paipa Boulevard through to Ala Kalanikaumaka
5. Separated bike/pedestrian path on cane road
6. Roundabout at Maluhia Road/Ala Kinoiki
7. Sidewalks and bike lanes on Ala Kinoiki

#### *6.2.1.10 Po'ipū Roadway Improvements*

1. Bike/pedestrian path on Lāwa'i Road
2. Coastal pedestrian access easement
3. Bike/pedestrian path on Ho'onani Road
4. Sidewalks on Pe'e to Po'ipū Road
5. Sidewalk and bike lanes on Kapili Road
6. Bike/pedestrian path on Ho'owili & Ho'one Roads

### 6.2.2 Order-of-Magnitude Cost Estimates

This section is a compilation of projects and the order-of-magnitude cost estimates recommended in various sections of this Plan.

#### *6.2.2.1 Multimodal Roadway and Streetscape Improvements*

The multimodal roadway improvements ranked the highest of all CIP-type projects for all of the major communities within the Planning District. The following table includes order-of-magnitude costs for both the improvements proposed in Section 4.3.4 and previously recommended roadway projects that are still relevant to this Plan. It includes a 25 percent contingency to cover any restriping and resurfacing but does not include any planning, design, or operations and maintenance (O&M) fees. Detailed calculations for the SKCP estimates are provided in Appendix F of the SKCP. The only State-owned facility on the list is Kaumuali'i Highway through Kalâheo Town. There are only two projects on the STIP at the time of this report—Po'ipû Road and the Northerly Leg of Ala Kalanikaumaka.

Table 6-1: Multimodal Roadway and Streetscape Order-of-Magnitude Cost Estimates

| Description | Length (LF) | Source* | Order-of-Magnitude Cost Estimate |
|---|---|---|---|
| ***KALÂHEO*** | | | |
| Kaumuali'i Highway ('Ôpû Road to Hokua Road) | 2,050 | SKCP | $750,000 |
| Papalina Road (Kaumuali'i Highway to Waha Road) | 6,380 | SKCP | $1,052,700 |
| Pu'uwai Road (Kaumuali'i Highway to Kalawai Park) | 1,515 | SKCP | $258,500 |
| ***KÔLOA*** | | | |
| Northerly Leg of Ala Kalanikaumaka (STIP) | 2,108 | FAHTP | $20,000,000 |
| Gateway Roundabout at Maluhia Road/Ala Kinoiki | N/A | KPACP+ SKCP | $672,000 |
| Kôloa Road (Maluhia Road to Post Office) | 600 | SKCP | $324,700 |
| Kôloa Road (remainder of Po'ipû Road to Waikomo Road) | 770 | SKCP | $359,900 |
| Weliweli Road (Kôloa Road to Waikomo Road)-Alternative 1 | 1,115 | SKCP | $522,100 |
| Weliweli Road (Kôloa Road to Waikomo Road)-Alternative 2 | 1,115 | SKCP | $423,700 |
| Weliweli Road (Waikomo Road to Hapa Trail) | 1,200 | SKCP | $544,800 |
| Ala Kinoiki-Alternative 1 | 15,375 | SKCP | $4,813,500 |
| Ala Kinoiki-Alternative 2 | 15,375 | SKCP | $4,851,900 |
| Hapa Trail Shared Use Path (Po'ipû Road to Weliweli Road) | 9,237 | KPACP | $1,409,600 |
| Cane Haul Road Shared Use Path (Ala Kinoiki to Po'ipû Road) | 3,751 | KPACP | $571,900 |
| ***PO'IPÛ*** | | | |
| Po'ipû Road (Lâwa'i Road to Ala Kinoiki Road-bike lanes, sidewalks, and intersection improvements) (STIP) | 15,519 | FAHTP | $6,725,000 |
| Lâwa'i Road Shared Use Path (Spouting Horn to Po'ipû Road) | 10,261 | KPACP | $1,562,700 |
| Ho'owili Road | 1,070 | SKCP | $331,900 |
| Kapili Road (Widen existing sidewalks) | 1,085 | SKCP | $189,300 |
| Lopaka Paipa Boulevard Connection | 941 | KPACP | $608,600 |
| ***REGIONAL ROADS*** | | | |
| Maluhia Road Shared Use Path (Kaumuali'i Highway to Ala Kinoiki) | 15,200 | SKCP | $3,325,000 |
| Maluhia Road Shared Use Path (Ala Kinoiki to Kôloa Road) | 2,065 | SKCP | $599,700 |
| Kôloa Road Separated Shared Use Path (Kaumuali'i Highway. to Piko Road) | 3,470 | SKCP | $932,600 |
| Kôloa Road Separated Shared Use Path (Piko Road to Ala Kalanikaumaka) | 12,744 | SKCP | $3,425,000 |
| Kôloa Road Separated Shared Use Path (Ala Kalanikaumaka to Po'ipû Road) | 1,725 | SKCP | $463,600 |

*Source of cost estimates:
- FAHTP = Federal Aid Highways 2035 Transportation Plan for Kaua'i (CH2MHill 2014)
- KPACP = Kôloa-Po'ipû Area Circulation Plan (Charlier 2007)
- SKCP = South Kaua'i Community Plan (Planning Commission draft approved in 2014, as amended by the Kaua'i County Council in 2015, and as may be subsequently amended)

#### *6.2.2.2 Transit Cost Estimates*

Current estimates for increasing capacity for transit either involve larger buses or more frequent service. According to the County Executive on Transportation, the vehicles currently used for County's Kaua'i Bus service are cutaway vehicles which can carry between 29-33 passengers. They cost about $180,000 to purchase and have annual operations and maintenance (O&M) costs of about $60,000 for fuel, repair and maintenance, and labor. Unfortunately, their service life is shorter than typical transit buses. A 40-passenger transit bus is much more expensive at $600,000. However, its service life is 10 years compared with 5 years for the cutaways. Annual O&M is estimated at $75,000 for the 40-passenger transit bus. A 50-passenger transit bus is estimated to cost $950,000 with an estimated $80,000 O&M annual cost and 12-year service life.

## 6.3 POTENTIAL FINANCING AND FUNDING ALTERNATIVES

The Planning District has been a unique testing ground for innovative financing. It is the first in the State to implement a Community Facilities District (CFD). It is also at the forefront of implementing a version of impact fees—an active and progressive community association took the lead to finance an infrastructure study and has taken steps to finance the improvements identified in that study through a "voluntary" impact fee agreement that could be superseded someday by an officially adopted county-wide impact fee program. The CFD and voluntary impact fee program are described in more detail in the SKCP, along with other potential funding sources. They are listed for brevity in this executive summary. However, the general objective is to identify a range of funding alternatives for the County that could be flexibly earmarked and combined to deliver the public facility and program requirements identified in this plan.

### 6.3.1 Financing Guidelines

The following guidelines are intended to help the community and decision makers select the appropriate funding source based on a rational assessment of fairness, reasonableness, and prudence in determining who should pay, when, and how.[1]

1. Fairness: Those who benefit (nexus) should pay their proportionate share.

[1] Adapted from Goodwin Consulting Group, 2011. Financing Plan for Public Facilities and Backbone Infrastructure for the Kona Community Development Plan. Prepared for the County of Hawai'i.





   a. Infrastructure or public facilities that serve a region should be paid by an appropriate broad base such as general taxpayers (e.g., arterial or collector streets, backbone water system, wastewater treatment and collection system). Infrastructure that serves a defined area should be paid by the users who benefit by the local infrastructure or facility (e.g., local roads, water distribution system connecting to properties, sewer collection laterals and local collection system).
   b. General taxpayers rather than new development should pay for *existing deficiencie*. New development should pay their *proportionate share* of regional or subregional infrastructure and facilities.
2. Reasonableness: Developers and property owners must be able to support the assessed burdens. The bottom line should be does it work for all parties—public sector and private sector, residents and businesses already located in the area, and future residents and businesses.
3. Prudence:
   a. Consider debt capacity and risks for longer-term borrowing. No financing should be initiated that may adversely affect the County's credit rating.
   b. Consider cash flow reliability:
      i. **Sporadic.** These funds are received infrequently and without any solid level of predictability. These funds could be accumulated over time and used for acquisition and/or improvements. Examples are: exactions; general obligation bonds; Federal programs/grants.
      ii. **Frequent but Irregular.** These funds are received typically throughout the year and/or on an annual basis, but the amount is more or less difficult to forecast. These funds could also be accumulated over time and used for design and construction or, in some instances where there is near certainty that at least a minimum amount will be collected each year, used to provide a steady stream of revenue for ongoing maintenance. Examples include: user fees; concession revenue.
      iii. **Frequent and Predictable.** These funds are received throughout the year and/or on an annual basis, and the amount can be predicted with reasonable accuracy. This regular stream of revenue can be used to meet annual maintenance requirements or debt service, with any excess channeled into design and construction. Some examples are: property tax; CFD/business improvement districts (BID) special taxes and assessments.
4. Concurrency: Prioritize critical infrastructure and facility projects and regulate development to ensure that adequate infrastructure is provided when needed.
5. Coordination: Address circumstances where there may be multiple landowners and developers with disharmonious development schedules so that the first one is not unfairly burdened to the benefit of subsequent beneficiaries (e.g., oversizing requirements).

### 6.3.2 Funding Sources

This section summarizes the existing funding alternatives as well as potential new sources that require further study and/or enactment. Additional detail is provided in the SKCP.

#### *6.3.2.1 Existing Sources*

##### 6.3.2.1.1 General Obligation Bonds, General Fund (CIP), Bond Fund

General Obligation (GO) bonds are governed by the State Constitution and Hawai'i Revised Statutes (HRS) Chapter 47. The security for these bonds is the full faith and credit of the County, and the principal and interest payments on the bonds are a first charge on the general fund of the County. Total funded debt (outstanding GO bond debt and other debt such as state revolving fund loans) cannot exceed 15% of the total assessed value of real property in the County.

Since the debt service for GO Bonds is paid from the General Fund with taxes paid by residents island-wide, appropriate facilitates to be financed from this source are those that provide some kind of regional or environmental benefit, or assists the County in meeting specific public policy goals related to workforce housing, economic development, or other similar objectves. The debt service is accounted for in the *General Fund*, capital expenses financed by the General Fund are accounted for in the *General Capital Improvement Fund*, and GO Bond proceeds used for capital improvements are accounted for in the *Bond Fund*.[2]

##### 6.3.2.1.2 Development Fund

The Trust Fund for Contributions by Developers (also known as the Development Fund) is a special fund to deposit exactions imposed upon developers.[3] "The annual CIP budget ordinance shall contain a trust fund account to include all contributions made by developers and others for the purpose of relieving impacts created by developments. The Council shall, in making the appropriations in the budget, identify the projects and cost estimates for the project similar to other Capital Improvements Projects. Capital improvement may include plans, land acquisition, structures, roads, sewers, equipment and other public facilities."[4] Appropriations from this fund are limited to capital improvements and excludes operational expenditures. The ordinance exacting the contribution needs to be checked for any limitations on the use or area of the contributed amount.

##### 6.3.2.1.3 Public Access, Open Space and Natural Resources Preservation Fund

The Kaua'i County Charter established a special fund called the Public Access, Open Space and Natural Resources Preservation Fund.[5] "The moneys in this fund shall be utilized for purchasing or otherwise acquiring lands or property entitlements for land conservation purposes in the County of Kaua'i for the following purposes:

1) Public outdoor recreation and education, including access to beaches and mountains;
2) Preservation of historic or culturally important land areas and sites;
3) Protection of significant habitats or ecosystems, including buffer zones;
4) Preserving forests, beaches, coastal areas and agricultural lands;
5) Protecting watershed lands to preserve water quality and water supply;
6) Conserving land in order to reduce erosion, floods, landslides, and runoff;
7) Improving public access to, and enjoyment of, public land and open space;
8) Acquiring public access to public land, and open space.
9) Conserving land for open space and scenic values. "[6]

[2] Id.
[3] Kaua'i County Code Chapter 6 (General Provisions Relating to Finance), Article 8.
[4] Kaua'i County Code §6-8.2.
[5] Kaua'i County Charter 19-15.C.

#### 6.3.2.1.4 Special Trust Fund for Parks & Playgrounds

Every subdivider as a condition precedent to approval of a subdivision shall dedicate land for park purposes and/or pay an in lieu fee. Fees paid are deposited in the park and recreational trust fund. "All monies received shall be used for the acquisition and development of park and recreational facilities, facilities replacement and maintenance equipment to serve the district in which the subdivision is located. Monies received may be expended on neighborhood community facilities in reasonable proximity to the subdivision. Where a public park and playground presently serves a subdivision, such fees may be used for the purpose of providing additional facilities for that park or playground. The County Engineer shall determine the various park areas for funding purposes."[7]

#### 6.3.2.1.5 Bikeway and Highway Funds

The legal source establishing the Bikeway Fund is not clear. If similar to other counties (e.g., City & County of Honolulu), the bicycle license fees are deposited into this fund and used exclusively for bicycle related projects and programs. By ordinance, any resident of the County who rides or propels a bicycle "on any street, highway, alley, roadway, sidewalk, or upon any public path set aside for the exclusive use of bicycles" is required to have the bicycle licensed.[8]

The Highway Fund receives the County's share of the fuel tax pursuant to HRS §243-6. The funds may be used for the acquisition, design, construction, repair, and maintenance of County streets or bikeways, or functions related to transit.

#### 6.3.2.1.6 Sewer Trust Fund

Fees collected pursuant to KCC Chapter 25 (Sewers) are deposited in the Sewer Trust Fund. Fees collected from connection charges and assessments for wastewater treatment capacity are restricted to capital expenditures, including repayment of State Revolving Fund loans.[9]

#### 6.3.2.1.7 Revenue Bonds

The Kaua'i County Charter authorizes the County Council to issue revenue bonds "for the purpose of initiating, constructing, acquiring, extending, replacing or otherwise improving any revenue-producing facility as provided by law."[10] Revenue, or enterprise, bonds are also governed by the State Constitution and HRS Chapter 49. The security for revenue bonds is the County general fund, an enterprise fund (e.g., a fund collecting bi-monthly consumer water charges), or some dedicated revenue stream of the County or an enterprise. The Department of Water Supply is the most likely candidate able to issue revenue bonds secured by their revenue stream of customer charges.

#### 6.3.2.1.8 Land-Secured Financing

***Improvement District*** (ID) financing is governed by HRS §46-80 and Kaua'i County Code (KCC) Chapter 24. The security for these bonds is an assessment levied on property inside the specified boundaries of an ID, which is typically repaid in annual installments. Because the ID assessment must be based on a finding of special benefit, the ID can usually fund only local improvements. Also, every parcel within the ID is subject to the assessment.

***Community Facilities District*** (CFD) financing is governed by HRS §46-80.1 and KCC Chapter 26. The security for these bonds is an annual special tax levied on property inside the specified boundaries of a CFD. Annual special taxes are generally added to the property tax bill and collected at the same time as property taxes. Because the CFD is a special tax rather than an assessment, the CFD has more flexibility to fund special (local) or general (regional) benefit facilities. The CFD may distinguish between developed and undeveloped properties and also create other reasonable tax classifications (e.g., market vs affordable housing).

Ordinance No. 872 created the first CFD in the State. CFD No. 2008-1 encumbers parcels within the boundaries defined in the Ordinance corresponding to the Kukui'ula Development Project. Facilities authorized to be financed by the proceeds of the special tax and/or the proceeds of a CFD bond, as set forth in the Ordinance, include water system improvements, roadways, recreational facilities, civil defense sirens and other community improvements.

#### 6.3.2.1.9 State Revolving Fund

The County may apply for various State Revolving Fund (SRF) loans to fund critical water and sewer projects. Examples of SRF programs include the Water Pollution Control State Revolving Fund, Clean Water State Revolving Fund, and Drinking Water State Revolving Fund. These programs fund projects to, among other things, prevent contamination of groundwater and coastal water resources, and to achieve or maintain compliance with drinking water standards. The source of funds to repay the loan is some kind of dedicated revenue source, such as bi-monthly charges billed to and collected from DWS water customers throughout the County, but may also require a pledge of the full faith and credit of the County. This funding is available for specified purposes and at attractive, low-interest loan terms, and funded projects must meet various eligibility and priority criteria. Loan terms typically involve 0.5% to 3.0% interest rates for 20 years, and loan amounts generally range from $1.5 million to $12.0 million.[11]

#### 6.3.2.1.10 Federal/State Grants

The Hawai'i Statewide Transportation Improvement Program (STIP) is a multiyear budget of State and County projects eligible for Federal funding. The Federal portion is usually 80% with the State or County providing the balance as matching funds. Roadway projects must have a functional classification of an arterial or major collector.

Federal transportation funds allocated through the STIP also include Transportation Enhancement Activities (TAP) activities such "on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities, and environmental mitigation; recreational trail projects; safe routes to school projects; and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former divided highways."[12]

There are numerous other funding programs to which a city, county, or private company applies directly to the federal government. For example, the U.S. Department of Commerce, through the Economic Development Administration, provides grants to fund the construction or rehabilitation of essential public infrastructure and facilities necessary to generate or retain private sector jobs and investments, attract private sector capital, and promote regional competitiveness. The current program provides up to $3 million of matching grants, per project. The U.S. Department of Agriculture Rural Development has loan and grant programs to finance water and wastewater projects.

[6] Kaua'i County Code §6-14.1.
[7] Subdivision Code (Kaua'i County Code §9-2.8).
[8] Kaua'i County Code §16-16.1.
[9] Kaua'i County Code §25-14.1.
[10] Kaua'i County Charter §3.15.

[11] Goodwin Consulting Group, 2011. Financing Plan for Public Facilities and Backbone Infrastructure for the Kona Community Development Plan. Prepared for the County of Hawai'i.
[12] U.S. Department of Transportation, Federal Highway Administration website, TAP overview, http://www.fhwa.dot.gov/environment/transportation_alternatives/overview/brief.cfm (accessed April 2015)





### *6.3.2.2 Potential Sources*

#### 6.3.2.2.1 Voluntary Fair Share Agreements and Impact Fees

In 2007, a report spearheaded by the Kōloa Community Association identified "regional development-driven" transportation projects for the Kōloa-Po'ipū region.[13] This report recommended impact fees as a funding source for these projects:

> Impact fees should be used to fund regional development-driven projects. Because the need for these projects is driven by new development, impact fees, which are paid by property developers, are an appropriate funding source for these transportation investments. To be legally sound, impact fees must have a "rational nexus" between the fee charged and the "benefit" of additional roadway capacity funded by impact fees, and can only be used to fund capital investments, not operations and maintenance.[14]

Impact fees are governed by HRS §46-141 to 46-148, but also requires a county ordinance to authorize impact fees. Because Kaua'i County does not have an impact fee ordinance, the report recommended "the establishment of a voluntary 'Fair Share Contribution' (FSC) system under which the Kōloa-Po'ipū development community would agree to pay into an impact fee system as a way to fund and move the regional development-driven projects forward. However, the Plan strongly recommends that the County over time adopt a formal impact fee ordinance and that the voluntary FSC structure transition to a traditional impact fee system administered by the County."[15] The commitments under the voluntary FSC structure would be secured by a Voluntary Fair Share Agreement executed between contributing developers in the region and the County.

If and when the county-wide impact fee is set in place, the usual collection of impact fees would occur at the time a building permit is issued, but fees may be collected when final subdivision approval occurs or at other times (e.g., when a certificate of occupancy is issued). Impact fees are a pay-as-you-go mechanism because the fee revenue to fund infrastructure trickles in as development occurs, so it is not useful to finance large components of infrastructure that are needed early in the development cycle. Also, existing infrastructure deficiencies cannot be funded with impact fees; the County would need to identify another source to fund any current inadequacies.

#### 6.3.2.2.2 Business Improvement Districts (BID)

A Business Improvement District (BID) is very similar to a CFD or ID, except that the primary purpose of a BID is typically to fund annual operating costs (e.g., security, landscape maintenance, marketing) associated with the needs of local businesses, rather than to fund infrastructure that serves new development.[16] The source of this revenue stream is special assessments levied on property within the boundaries of the BID. Annual assessments are generally added to the property tax bill and collected at the same time as property taxes. Although enabled by HRS 46-80.5, Kaua'i County has not yet authorized BIDs in this County.

#### 6.3.2.2.3 Tax Increment District (TID)

Tax Increment Districts (TIDs) are governed by HRS §46-101 to 46-113. Kaua'i County has not yet authorized TIDs in this County. The source of this revenue stream is an increase in property tax revenue, or tax increment. The increment results not from an increase in property tax rates, but from an increase in taxable property value primarily due to redevelopment or new development. A specific geographic boundary is determined for a TID, which is formed to fund public improvements. Since no new taxes or other annual burdens are being proposed with a TID, protest or election proceedings are not required; instead, TIDs are adopted by ordinance of the County Council.[17] TIDs have not been implemented yet anywhere in the State. Whether bonds could be secured by tax increments is not clear for Hawai'i, but the revenue stream could be used to pay for smaller capital projects or partially pay debt service for a CFD or other land secured financing.

### 6.3.3 Funding Strategy

The prioritization and matching of the Plan's projects to funding sources should be updated annually as part of the County's overall CIP budgeting process. Based on the Financing Guidelines, factors to consider when updating the budget include:

1. Maximize the share of funding available from federal and state grant sources: e.g., STIP for arterial and collector roadway projects, bikeway projects, transit projects; TAP for safe routes to schools, pathways; USDA for water, wastewater, and solid waste projects. Provide local match with Highway Fund, Bikeway Fund, or Development Fund as applicable.
2. Keep track and coordinate the implementation of permit condition requirements. Where the required improvements benefit areas beyond the project, facilitate financing through ID, CFD, or reimbursable programs.
3. Match projects to special funds: e.g., parks (Special Trust Fund for Parks & Playgrounds); open space and public access (Public Access, Open Space, Natural Resources Preservation Fund).
4. Distinguish projects that address existing deficiencies and fund with General Fund CIP or GO Bonds.
5. Projects with long lead time usually have planning, design, and construction phases. Fund the projects through the early phases with smaller funding sources (e.g., Development Fund or Impact Fees) to position these projects to be design-ready or construction-ready. Occasionally, unexpected sources become available and projects that are closer to "shovel (construction)-ready" tend to compete better.
6. Combine funding sources with innovative sources to accelerate projects (e.g., Reimbursable GO Bond with CFD), pay for higher quality (e.g., CFD), retrofit existing development with sewer or water (e.g., USDA with ID), provide maintenance where the County does not have adequate capacity (e.g., BID), capture revenues generated to benefit the Planning District (e.g., TID).

Develop a parking plan which includes an analysis of revenues that could be collected from parking fees that could generate funds for improvements and maintenance of proposed infrastructure and streetscape improvements. Partner with business groups that would benefit from the improvements.

[13] Charlier Associates, Inc., 2007. Kōloa-Po'ipū Area Circulation Plan.
[14] Id., p. 66.
[15] Id., p. 66.
[16] Goodwin Consulting Group, 2011. Financing Plan for Public Facilities and Backbone Infrastructure for the Kona Community Development Plan. Prepared for the County of Hawai'i.

[17] Id.

## 6.4 ACTION PLAN

The following action plan provides a general overview of operational needs as well as steps to implement the CP. It is organized by County agency and provided in table format to show a rough schedule of short-term (0-5 years), mid-term (5-10 years), and long-range (10-20 years) actions.

Table6-2: Action Plan by County Agency

| County Agency | Near-Term Actions (0-5 Years) | Mid-Range Actions (5-10 Years) | Long-Range Actions (10-20 Years) | Policies (from Chapter 4) |
|---|---|---|---|---|
| **Planning Department** | • Adopt the SPAs in Chapter 10.<br>• Update General Plan.<br>• Educate Planning and Public Works staff on FBC.<br>• Improve permit and review processes for implementation of FBC, and explore possible streamlining mechanisms.<br>• Add or identify at least one staff member to be dedicated to FBC implementation, review, education, and outreach.<br>• Hold educational sessions for landowners affected by the new SPAs to inform them of the new development standards and potential opportunities. Include examples from T4 and T3 zones. Train County Planning and Public Works staff on new development standards.<br>• Complete South Shore Shuttle Feasibility Study and move forward with possible solutions.<br>• Work with the Mayor's Office and County Agencies to incorporate the plan's listed capital projects and priorities into the Six-Year Capital Improvements Program Report. | • Evaluate how FBC performing. Determine if integrating FBC into the CZO is desirable and if so, amend CZO to include FBC. | • Perform ongoing monitoring and evaluation every 5 years.<br>• Prepare for next update of SKCP. | • Sections 4.1, 4.2. 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11 |
| **Transportation Agency** | • Work with Planning Dept. and FBRA to determine best option to provide South Shore Shuttle service and initiate it.<br>• Initiate service to 'Ōma'o via the revised Kōloa Shuttle route. Perform ridership survey to determine what will increase ridership.<br>• Coordinate with State DOT and DPW to improve pedestrian access around Lāwa'i bus stops as new shelters are being installed. | • Increase transit service on the Kekaha-Līhu'e mainline as appropriate. In particular, look at increasing capacity during peak hours of highway traffic.<br>• Coordinate installation of bus shelters with DPW as multimodal roadway networks are designed and constructed. | • Increase transit service on the Kekaha-Līhu'e mainline as appropriate. | • Sections 4.3, 4.11.3 |
| **Department of Public Works** | • Coordinate one-year and six-year CIP processes and budgets with proposed projects identified in the CP. Develop a strategic plan that includes County-funded or subsidized infrastructure improvements which support the CP's desired growth areas, streetscapes, policies, and priorities.<br>• As a first step to implementing the Multimodal Roadway Network, restripe roadways to include shoulders and bike lanes as indicated in Figure 4-2. Change signage to direct visitor vehicle traffic to Ala Kalanikaumaka and Ala Kinoiki rather than Po'ipū Road.<br>• Develop detailed phasing plans, budget requests for planning, design, and construction of the Multimodal Roadway Network.<br>• Implement design and construction of Po'ipū Road improvements. Include bioswales within the 120 foot ROW and see if this can alleviate drainage problems | • Continue coordination with the State DOT to implement streetscape improvements in Kalāheo Town.<br>• Continue design and construction of multimodal roadways. Coordinate with Planning Dept. and adjacent landowners.<br>○ Northerly Leg of Ala Kalanikaumaka and roundabout at Maluhia intersection<br>○ Weliweli Road<br>○ Hapa Trail Shared Use Path<br>○ Lāwa'i Road Shared Use Path<br>○ Sidewalks on Papalina and Pu'uwai Roads in | • Create a new Urban Forestry Division under the Department of Public Works to maintain the street trees and landscaping within the public right-of-ways.<br>• Continue design and construction of multimodal roadways.<br>○ Cane Haul Road Shared Use Path<br>○ Ho'owili Road<br>○ Kapili Road<br>○ Ala Kinoiki<br>○ Maluhia Road Shared Use Path (Kaumuali'i Highway to Ala Kinoiki)<br>○ Kōloa Road Separated Shared Use Path | • Sections 4.2.1, 4.3.1, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7, 4.4, 4.5, 4.10, 4.11.3 |





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| | in the area.<br>• Work with State DOT to implement Kaumuali'i Highway improvements in Kalāheo Town.<br>• Initiate design and construction of Kōloa Town sidewalks and crosswalks and Maluhia Road Shared Use Path between Ala Kinoiki to Kōloa Road.<br>• Increase frequency of clearing and maintenance of road shoulders. Train road maintenance crews on proper tree trimming and coordinate with adjacent properties which may have landscape contractors already maintaining public roadway frontages. | Kalāheo<br>○ Follow up on Lopaka Paipa Boulevard connection<br>○ Kōloa Road Separated Shared Use Path (Ala Kalanikaumaka to Po'ipū Road) | (Kaumuali'i Highway. to Ala Kalanikaumaka) | |
| **DPW-Wastewater** | • Develop strategic plan to support and encourage conversion of all cesspools including SF residential within the Planning District to IWS/septic systems by 2035.<br>• Coordinate as necessary with HOH Utilities on implementation of centralized WWTP. | None identified at this time. | None identified at this time. | • Sections 4.5, 4.9.b and c, 4.10.3, 4.10.4, 4.10.7, 4.11.3.c |
| **DPW-Solid Waste** | • Establish guidelines and policies to reduce construction waste. Integrate into building permit requirements.<br>• Establish programs and requirements for residential complexes, resorts and businesses to reduce solid waste and increase diversion and reuse/recycling.<br>• Expand recycling and reuse programs within the Planning District. Encourage processing and reuse within the Planning District whenever possible to minimize transportation costs and impacts.<br>• Roll out automated trash pickup and curb side recycling within the South Kaua'i areas over the next five years as recommended in the Integrated Solid Waste Management Plan (ISWMP 2009).<br>• Continue to follow the action plan from the ISWMP. | • Update Integrated Solid Waste Management Plan. | None identified at this time. | • Sections 4.5 and 4.10.5 |
| **Department of Water** | • Update the long-range Water Plan 2040 based on growth projections and land use patterns developed in the GP technical studies. | • Schedule, budget, and perform ongoing system improvements to maintain service and anticipate projected growth. | • Schedule, budget, and perform ongoing system improvements to maintain service and anticipate projected growth.<br>• Prepare for next update of Water Plan. | • Sections 4.5, 4.10.1 and 4.10.2 |
| **Department of Parks and Recreation** | • Develop detailed phasing plans, budget requests for implementing Kaua'i Parks and Recreation Master Plan. Incorporate proposed mix of recreational facilities listed in Section 4.6.1.<br>• Explore creation of a new Division of Urban Forestry or training existing Division of Park Maintenance staff to care for street trees, urban landscaping, and bioswales. They could also maintain streetscape improvements in Līhu'e and along Ke Ala Hele Makalae. | • Implement design and construction of projects as proposed for the Planning District. | • Prepare for next update of Parks and Recreation Master Plan. | • Sections 4.2.1.c, 4.6 |
| **Finance Department** | • Establish and initiate a charge for public parking in Kōloa and Po'ipū to support maintenance of public ROWs and to encourage people to walk or use alternative means of transportation within these popular destinations.<br>• Investigate CFD/ID concepts for Kalāheo infrastructure improvements, and Kōloa-Po'ipū multimodal roadway improvements. Work with local business groups to explore public-private partnerships.<br>• Enact legislation to enable the county to implement TID/BID strategies as | None identified at this time. | None identified at this time. | • Sections 4.3.3, 4.11 |

| | | | | |
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| | necessary. | | | |
| **Civil Defense, Fire Department, and Police Department** | • Work with resorts and vacation property owners/managers, police/rescue to develop an emergency evacuation plan and shelter in-place plans. Hold annual education sessions for visitor industry managers and security staff.<br>• Establish evacuation routes and educate the public about what to do in an emergency. | • Update visitor industry emergency evacuation and shelter in-place plans at least every 5 years. | None identified at this time. | • Sections 4.5.3 |
| **Housing Agency** | • Work with Planning and Public Works departments to develop appropriate standards for pedestrian/bicycle facilities in workforce and affordable housing projects that keep development costs so projects can remain affordable.<br>• Work with the Planning Department to explore near-term opportunities for County-led affordable housing projects within the existing town cores of Kōloa and Kalāheo. | • The Housing Agency should work closely with Planning, Public Works, and Transportation to develop approx. 120-130 affordable housing units at the Kukui'ula workforce housing site at Po'ipū road that supports multimodal access to Kōloa town and Po'ipū. | • Align infrastructure and policy (Planning & Housing) that support and encourage higher density housing that can feasibly produce 25% of the units built in each town as affordable/workforce units per the Kaua'i County Housing Policy (Ordinance 860). Goal is to have 25% of all units built be affordable as defined in Ordinance 860. Unit goal would result in 550+ affordable units in the Planning District. | • Sections 4.2.3, 4.5, 4.11.1.c, 4.11.4 |
| **Office of Economic Development** | • Provide coordination support for various policies identified in the SKCP including but not limited to those listed in Sections 4.7, 4.8, 4.9, and 4.11 | None identified at this time. | None identified at this time. | • Sections 4.5, 4.7, 4.8, 4.9, 4.11 |

## 6.1 INDICATORS

Various indicators can be used to measure the relative success of the plan recommendations. They range from improvements to the built environment to social indicators to economic indicators.

### 6.1.1 Land Use

- Increase in housing supply
- Reduction in Use Permit and Variance applications
- Reduction in time required to review and process permit applications
- Reduction in the length of public hearings and negative public testimony

### 6.1.2 Multimodal Network and Transit

- Decrease in traffic volumes and level of service
- Increase in pedestrian and bike traffic
- Increase in transit ridership

### 6.1.3 Natural and Cultural Heritage Resources

- Protection and restoration of natural and cultural resources
- Increased educational opportunities
- Improved water quality

### 6.1.4 Public Facilities and Infrastructure

- Reduced or stabilized use of potable water
- Increased use of non-potable water from surface, catchment and recycled water sources
- Reduced incidences of flooding at Po'ipū Beach Park
- Reduced property damage (value and number of incidents) due to flooding
- Increased use and number of reservations at parks and recreational facilities
- Reduction in quantity of solid waste processed at landfill
- Reduction in the number of complaints

### 6.1.5 Economic Indicators

- Increase in the number of jobs/reduction in unemployment
- Increase in diversification of labor force/business establishments
- Increase in home ownership/decrease in homelessness
- Increase in agricultural production
- Increase in the number of visitors/occupancy rates
- Increase in permit applications and their cumulative value
- Increase in property values and tax collections

## 6.2 MONITORING

Once the South Kaua'i Community Plan is adopted, monitoring for the SPAs should occur annually for at least the first five years to determine the effectiveness and ease of implementation for developers and review by Planning Department staff. Annual reports shall be transmitted to the Planning Commission and County Council. Adjustments and fine tuning should occur as needed. Once staff becomes proficient in their reviews, monitoring can shift to once every five years and reports shall be transmitted accordingly.

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# 4 POLICIES & GUIDELINES

This vision for South Kaua'i described in Chapter 2 will be implemented through the application of the land use policies and guidelines presented in Chapter 4 and the Form-Based Code described in Chapter 5 and Appendix C.

The region's character is typified by pockets of low-rise, small-scale rural centers and residential communities surrounded by large expanses of agricultural lands, open space, and scenic view planes. It also includes Kaua'i's world-famous Po'ipū resort destination. To ensure that this regional landscape is maintained, proposed land use policies reflect directed growth areas, resource protection, and community desires to maintain the region's rural setting and unique cultural heritage. These policies focus on the preservation of conservation and agricultural lands while directing limited growth toward Kalāheo, Kōloa and Po'ipū.

The policies within the Kaua'i County General Plan have important bearing on the formulation of policies and guidelines for this community plan. Proposed land use policies are intended to outline future actions and agency decision-making once the Plan is adopted. Policies are broad statements of intent that express the County's overall philosophy toward particular land uses. Guidelines provide more specific guidance to public agencies and private entities in terms of planning, design and implementation of projects and programs in the various land use categories.

It is intended that existing uses and structures that are legal but are not consistent with the South Kaua'i Community Plan policy would be recognized as existing uses and allowed to remain as such in their current purpose, character, and level of use. Future proposed land use changes at those locations, however, would have to conform to the policies enumerated in Chapters 4 and 5.

Chapter 4 is organized under the following headings:

4.1 Land Use
4.2 Context-Sensitive Transportation Networks
4.3 Kaua'i Native Plants
4.4 Natural & Cultural Heritage Resources
4.5 Parks & Recreation
4.6 Agriculture
4.7 Walkable Mixed-Use Communities
4.8 Sustainable Resorts & Tourism
4.9 Industrial
4.10 Infrastructure & Public Facilities
4.11 Economic Development

## 4.1 LAND USE

The County of Kaua'i Comprehensive Zoning Ordinance (CZO), Ordinance No. 935, and accompanying zoning maps prescribe the allowable uses of land for the County of Kaua'i. The CZO identifies the various zoning districts, the uses allowed within each zoning district, and the applicable development standards and procedures within each zoning district.

The South Kaua'i Community Plan Land Use Map illustrates the desired long-range land use pattern for the South Kaua'i Community Plan area through 2035. It supports the community's vision and is intended to be at a level of detail between the County's broad-brush General Plan land use policies and the detailed development of the zoning districts. The CZO is the County's underlying zoning code and shall apply within the Planning District. However, the only exceptions will be within the proposed Special Planning Areas (SPAs) as described below and shown in Figure 4-1, the Land Use Map. Within the SPAs, the development standards of the CZO would be overridden by the Form-Based Code (FBC) located in Appendix C.

In addition, there are some development standards for larger projects that involve roadway construction and block development housed within the County's Subdivision Ordinance (KCC Chapter 9). Within the SPAs, some of these standards will also be superseded by the FBC (Appendix C).

The Land Use Map shown in Figure 4-1 includes land use designations which are described below. Their relationship with the place types analyzed for South Kaua'i and the rural-to-urban transect which forms the basis of the FBC is charted in Figure 5-2.

### 4.1.1 Walkable Mixed-Use Special Planning Areas

In order to accommodate the growth projected for South Kaua'i and to fulfill the community's wishes for safe, pedestrian- and bike-friendly roadways, new Special Planning Areas (SPAs) are recommended for specific areas where compact, walkable communities are desired in both new and existing town cores and nodes. The purpose of these SPAs is to identify where projected residential growth and supporting mixed-use commercial uses will be directed. These areas are either infill areas or areas that are appropriate for future development based on their proximity to employment and/or town centers and transportation networks. These SPAs will be required to follow the design and land use standards detailed in the Form-Based Code (Appendix C) regardless of the underlying zoning. These areas are also tied together by multimodal transportation networks within South Kaua'i to preserve the rural feel of the region and encourage people to walk, bike, and ride transit for a healthier lifestyle.

There are six areas where the proposed Special Planning Areas will be applied within South Kaua'i:

- Kôloa Town
- Kalâheo Town
- Po'ipû Roundabout
- Lâwa'i Cannery
- Po'ipû Gateway Mixed-Use Village
- Numila

They are outlined with a purple dashed line on the Land Use Map and encompass the areas where transect zones are or will be applied as described in the Form-Based Code (Chapter 5 and Appendix C). The transects provide a spectrum of development intensity and building forms within these walkable mixed-use communities, ranging from taller, denser highly-mixed residential and commercial uses at the cores to more rural residential uses and scale at the edges. The intent is to amend the development standards and permitted uses of the underlying zoning so that building forms that encourage pedestrian activity are prioritized rather than the separation of land uses, which is what the County's current CZO is designed to do, based as it is on Euclidean zoning (meaning the traditional type of zoning where land use categories are segregated spatially).

The transect zones will only be located in the SPAs and only three of the six areas have Regulating Plans with transects determined through this community plan process. They are Kôloa Town, Kalâheo Town, and the Po'ipû Roundabout. The other three areas must undergo a special master planning process to develop their Regulating Plans with transects in order for the SPA designation and FBC to apply. This would ideally occur during the upcoming General Plan update process so that other regulatory issues such as the State Land Use District classifications and zoning can be resolved concurrently with the other SPAs.

The areas within the three SPAs with Regulating Plans and transects are further classified into "Neighborhood Center," "Neighborhood General," or "Neighborhood Edge" on the Land Use Map to highlight the cores of these communities and the transition to the surrounding areas. These land use designations are used primarily for those areas within the SPAs.

- **Neighborhood Center.** A small-scale, low-rise, mixed-use center of commerce, residential, and community activity in rural character and setting in which principal establishments are oriented to the street. Land use mixtures may include retail, office, and dining establishments, compatible service businesses and light industry, and residential uses. Commercial activity is concentrated along street frontages in typically "main street" settings.
- **Neighborhood General.** A small cluster of small-scale, low-rise commercial and service businesses which serve primarily the immediate community. Its primary visual appearance is rural residential in character. Buildings are generally compatible in scale and form with adjacent residential areas.
- **Neighborhood Edge.** Primarily single-family homes or small-scale multi-family residential in single-family building form in which rural development standards are employed and provisions for pedestrian circulation, landscaping, and open space are emphasized.

Only those areas within the SPAs and transect designations shown in the Regulating Plans will be required to follow the FBC.

The other three future SPAs which are intended to have Regulating Plans detailed with transects at a future time are labeled either as a **Large Village** or a **Small Village** on the Land Use Map based on the characteristics of their envisioned built form and relationship to the other walkable communities within the South Kaua'i Planning District.

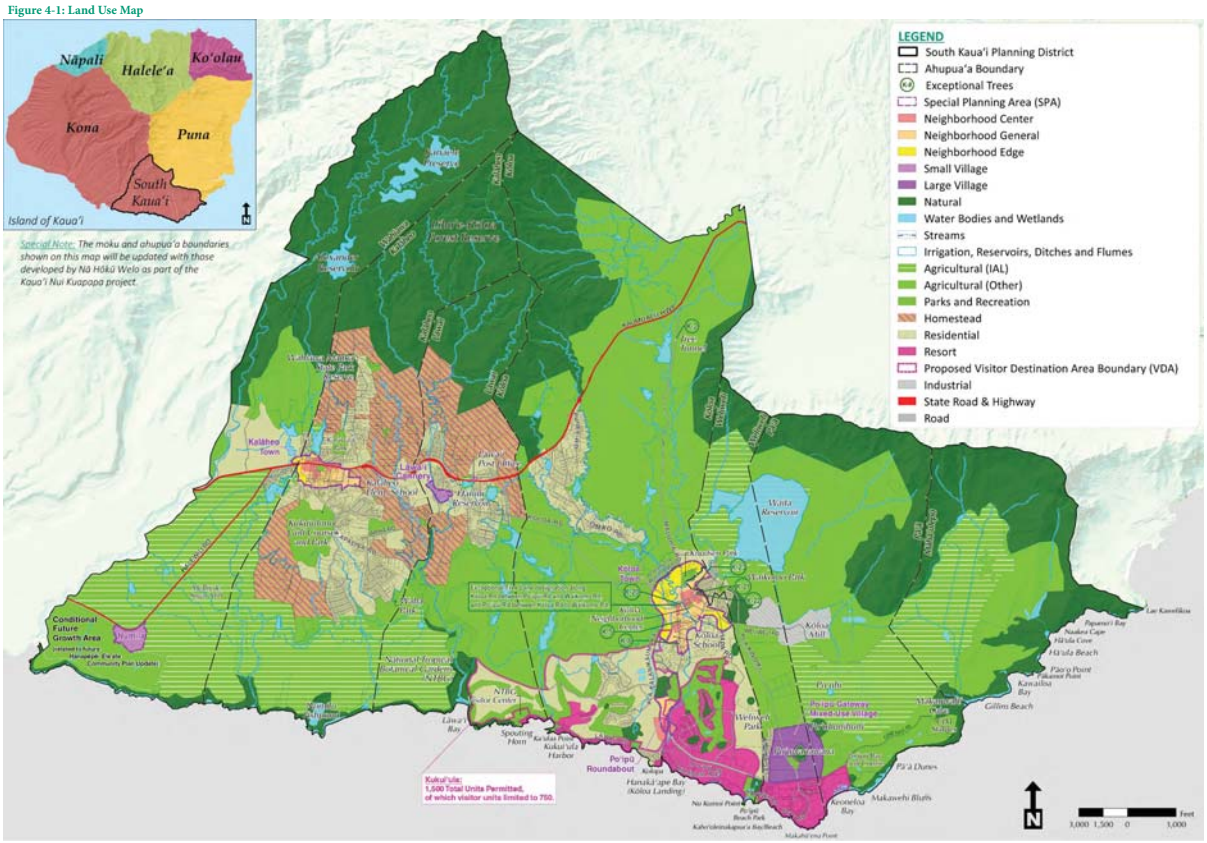
These places types are general placeholders for the future SPAs until their Regulating Plans with transect zones determined. These areas are colored in two shades of purple on the Land Use Map. As noted, additional master planning efforts must be completed to determine what suite of transect zones would be appropriate within its boundaries based on the requirements set forth below. They also will be required to use the transect zones defined in the South Kaua'i FBC (Appendix C). The Po'ipû Gateway Mixed-Use Village is classified as a Large Village and Lâwa'i Cannery and Numila are classified as Small Villages.

Not all of the parcels within these SPAs will necessarily change dramatically in terms of land use or form. In fact, the whole point of the FBC is to be consistent and compatible with the existing building forms and uses. Preservation and reuse of historic buildings are also highly recommended.





Figure 4-1: Land Use Map



#### 4.1.1.1 Kōloa Town

Kōloa's main street is one of the most successful walkable centers of all Kaua'i despite the lack of continuous sidewalks and busy trafficked streets. Kōloa's town core has character, with a canopy of monkeypod trees and covered porch commercial buildings, bisected by Waikomo Stream. The center, primarily along Kōloa Road between Po'ipū Road and Waikomo Road, is arranged compactly and although on-street parking is currently a bit haphazard, it does provide a buffer for pedestrians along the storefronts, enabling Kōloa to support a thriving pedestrian environment.

In order to support and encourage this compact pattern and prevent Kōloa from sprawling outwards, future growth in this area is envisioned as tighter and denser within the town core. Mixed-use commercial is encouraged within the Neighborhood Center and an estimated 450 new residential units are required through 2035. Building heights will remain two stories maximum, respecting the Historic Kōloa Town Core Special Treatment-Cultural/Historic District (KCC §10-6.3(d)).

#### 4.1.1.2 Kalāheo Town

Kalāheo's town core centers mainly on the highway between Papalina and Hokua Roads and makai to Pu'u Road. Kalāheo Elementary School borders this area on the east and the Kalāheo Gulch on the west. Safer pedestrian and bicycle networks is the main focus of this area, connecting the neighborhoods with the school, the Kalāheo Neighborhood Center, Kalawai Park, and commercial uses along the highway. The community has voiced the desire to have a local market or grocery store in Kalāheo and some potential locations include vacant or redeveloping properties along the highway. Due to the limited infrastructure available in the area, primarily the lack of a centralized wastewater treatment facility, only 50 new residential units are projected for this area through 2035.

#### 4.1.1.3 Lāwa'i Cannery

The future Lāwa'i Cannery SPA encompasses approximately 18 acres makai of Kōloa Road and includes existing commercial uses and the former cannery properties currently zoned PD-C. No growth has been allocated for the area but it is designated as a Small Village as there are several businesses that attract activity to this crossroads. The area will require additional master planning to determine which transects would be appropriate. However, improved pedestrian facilities, safer parking areas, and the ability to redevelop the area without undergoing the Project Development process could help the area transform into a walkable core at the crossroads. A multi-use path is also recommended to continue along Kōloa Road to Piko and Oyama Roads, which intersect the highway at the Lāwa'i Post Office bus stop locations.

#### 4.1.1.4 Po'ipū Roundabout

The beautifully landscaped Po'ipū Roundabout on Ala Kalanikaumaka, Lāwa'i, and Po'ipū Roads has quickly become a visual landmark for the community. The Shops at Kukui'ula adjacent to the roundabout on the southwest quadrant has also become a center of activity for the community and is recognized by the CAC as having desirable architectural form. Its internal public space is busy with pedestrians and convenient for activities such as farmers markets. Because of this, the areas immediately surrounding the roundabout and the pedestrian paths have become popular. Encouraging medium-density mixed-use development around this node could make the community even more active and vibrant with pedestrians and cyclists. The Shops at Kukui'ula itself, however, is not included in the SPA due to restrictive covenants that dictate permitted uses and architectural design.

#### 4.1.1.5 Po'ipū Gateway Mixed-Use Village

The Po'ipū Gateway Mixed-Use Village is envisioned to be a new mixed-use community with ample workforce housing located directly mauka of the Po'ipū resort district so people will be able to walk, bicycle, or take a short transit ride to and from work. Over 1,100 new residential units are allocated to the area and a mixed-use commercial center with a range of retail and services should be included to support the new community. Based on an estimate of the area required for park dedication for the 1,100 units, a roughly seven-acre park is shown conceptually along Ala Kinoiki, providing an open view to Pu'u Wanawana. There is also a 30 foot buffer around Pu'u Wanawana and a greenbelt or trail should be provided through the community connecting to Pu'u Hunihuni to keep that view corridor open as well. Potential park facilities could include a playground, active playfields, and a community center.

A separate master planning process will be required in order to determine the mix of transects that will apply. However, the CAC felt that this would be the only area within the planning district in which taller buildings up to 3 stories would be appropriate. The reasons include the proximity to the resort area, which already includes many 4-story buildings, and the need for affordable workforce housing in Po'ipū (Figure 4-2). Along the mauka and eastern edges, the transect zones should transition to T3 zones to blend into the surrounding agricultural areas. The Po'ipū Gateway Mixed-Use Village Floating Zone will be required to provide a minimum of 1,100 new residential units as a condition of plan approval.

Figure 4-2: Aerial of Po'ipū and the Po'ipū Gateway Mixed-Use Village

#### 4.1.1.6 Numila

Numila is an area currently zoned R-6 Residential and located within the State Land Use Urban District. Future master planning efforts will be required to determine the preferred suite of transects to apply in the area. It will also need to be integrated with the adjacent Future Growth Area related to the Hanapēpē-'Ele'ele Community Plan. Therefore, new residential units are limited to roughly 150 units based on existing entitlements.





### 4.1.2 Natural

The intent of the Natural land use designation is to preserve or maintain undeveloped areas such as mountain ridges, coastal bluffs, sand dunes, and beaches as well as protect the State Land Use Conservation Districts, the forest reserves, critical habitats of endangered native plant and wildlife, and archaeological preserves. It also includes the National Tropical Botanical Garden's Lāwa'i Kai Special Subzone of the State Land Use Conservation District, Nōmilu Fishpond, the lower reaches of Kalāheo Gulch, and much of the Māhā'ulepū coastline from Makawehi Bluffs to Kawailoa Point. It also includes the area around Makauwahi Cave and Waiopili Heiau. It otherwise excludes lands in Agriculture, or designated as Important Agricultural Lands (IAL) under Hawai'i Revised Statutes (HRS) Chapter 205 Part III, or lands classified as Park and Recreation which includes both public and private parks and recreational facilities. Where it overlaps existing zoning districts with any development potential or density, the underlying development rights should be allowed to either shift to more appropriate locations or be purchased and valued based on existing entitlements to avoid takings issues.

Lands designated Natural shall remain predominantly free of development involving buildings, non-permeable paving, and other construction. With the exception of kuleana, any construction that is permitted shall be clearly incidental to the use and/or maintenance of the lands and designed to blend in with the natural character of the surrounding area. Protection, restoration, management and maintenance, research, education, and managed public access are the recommended uses within the Natural lands.

Since the land use policy is the most restrictive of all the SKCP land use designations, lands designated as Natural include specifically identifiable features that meet the criteria of the particular types of lands enumerated below.

**Conservation District Areas.** The Natural designation encompasses all lands within the State Land Use Conservation District, over which the State Board of Land and Natural Resources (BLNR) has jurisdiction. The BLNR adopts and administers land use regulations for the Conservation District that are stricter than any County zoning regulations. In South Kaua'i, over 8,600 acres lie within the Conservation District, amounting to about 28 percent of the Planning District's total land area.

**Watershed Areas.** The Kaua'i Watershed Alliance is a public-private partnership that coordinates and manages the long-term protection of Kaua'i's uppermost watershed areas. While the managed watershed area spans across all planning districts, approximately 4,000 acres are located within the mauka portions of the South Kaua'i Community Plan area.

**Forest Reserves and Preserves.** As the well-known 'ōlelo no'eau (Hawaiian proverb) states, Hahai no ka ua i ka ululā'au, the rain always follows the forest. The ancient Hawaiians knew that without the forests, there is no rain. Without the rain, there is no life. For this reason, both public and privately-owned forest reserves and preserves are included within the Natural land use designation. Within the South Kaua'i planning district this includes a portion of the Līhu'e-Kōloa Forest Reserve, the Kanaele Preserve which is on land owned by Alexander & Baldwin but managed by The Nature Conservancy, and the Wahiawa Mauka State Park Reserve.

**Dune Lands and Beaches.** Kaua'i's beaches are known for their beauty and beckon to visitors and residents alike for recreation and visual enjoyment. However, the dunes fringing these beaches and especially those along Māhā'ulepū, Pā'ā, Pāo'o, Kāmala, and Weliweli are well-known as a major interment site for ancient burials. To help protect these sensitive natural and cultural areas, soils classified as "Dune Lands" and "Beaches" by the federal Natural Resource Conservation Service (NRCS, formerly known as the Soil Conservation Service) have also been included in the Natural designation. This includes the beach east of Makaokahai Point near Nōmilu Fishpond, the tombolo at Po'ipū Beach, the Pā'ā Dunes and Makawehi Bluffs, and Aweoweonui above Hā'ula Bay.

**Critical Habitat.** All of the areas designated as critical habitat for endangered and threatened species by the U.S. Fish and Wildlife Service has been included in the Natural designation. This includes the latest designations as of 2014.

**Lāwa'i Kai Special Subzone.** The National Tropical Botanical Garden developed a special subzone within the State Land Use Conservation District to see this area used for conservation, research, education, and managed public recreational uses. The Lāwa'i Kai Special Subzone encompasses Allerton Garden, the lower reaches of Lāwa'i Stream, Lāwa'i Beach, and Lāwa'i Kai Bay including the submerged lands of Lāwa'i Kai Bay. The Lāwa'i Kai Special Subzone was approved by the State Board of Land and Natural Resources on April 26, 2013 and signed into law by Governor Abercrombie on July 5, 2013.

**Archaeological Preserves/Cultural Resources.** Cultural Surveys Hawai'i identified and mapped several archaeological preserves within the planning district. All of these are included in the Natural designation. Other significant cultural resources not located within the above categories were added to the Natural designation to increase the preservation of these resources. Nōmilu Fishpond, the Kāneiolouma Heiau Complex, and Waiopili Heiau are examples of these areas.

### 4.1.3 Agricultural

The designation of Agricultural lands continues Kaua'i's longstanding policy of preserving agricultural lands as a valuable resource base. It also recognizes irrigation water systems as a key resource and the facilities required to support it. The primary intent highlights the importance of open agricultural lands in maintaining Kaua'i's rural character and its economic viability as a visitor destination.

The land use policy and recommended uses for areas designated as Agricultural in the Land Use Map is similar to that described in the State Land Use Agricultural District (HRS §205-4.5) and the County General Plan, which states, Agricultural lands "shall be predominantly used for or held in reserve to be used in the future for agricultural activities" and the facilities to support these activities. "These activities include the breeding, planting, nourishing and caring for, gathering, and processing of any animal or plant organism, including aquatic animals and plants, for the purpose of producing food or material for non-food products; the commercial growing of flowers or other ornamental plants; the commercial growing of forest products; and the commercial breeding and caring for domestic animals and pets." (GP Policy 5.2.1(a))

Lands designated Agriculture shall include: lands in active agricultural use or lands with potential for agriculture, silviculture, or aquaculture. In addition, these uses range in scale from large agricultural fields, to taro lo'i and small papaya farms. Residential development that occurs is on large lots and is a secondary use to the agricultural uses of the land (Opticos) and must qualify as a "farm dwelling" or "employee housing" as defined per HRS §205-4.5(4) and HRS §205-45.5 for those on Important Agricultural Lands (IAL).

There are two types of Agricultural land uses designated on the Land Use Map:

**Agricultural (IAL).** The Land Use Map indicates areas currently classified as Important Agricultural Lands as crosshatched Agricultural lands. It includes all lands designated IAL to date by the State of Hawai'i Land Use Commission (HRS 205 Part III) which includes the lands successfully petitioned by Alexander & Baldwin (A&B) and Grove Farm Company.

The purposes of Important Agricultural Lands are: (1) conserving and protecting agricultural lands; (2) promoting diversified agriculture; (3) increasing agricultural self-sufficiency; and (4) assuring the availability of agriculturally suitable

lands (HRS §205-41). They are defined as lands that (1) are capable of producing sustained high agricultural yields when treated and managed according to accepted farming methods and technology; (2) contribute to the State's economic base and produce agricultural commodities for export or local consumption; or (3) are needed to promote the expansion of agricultural activities and income for the future, even if currently not in production (HRS §205-42(a)). Once identified, these lands cannot be reclassified except under a "super majority" vote of both houses of the state legislature.

**Agricultural (Other).** Other agricultural lands outside of the IAL are also designated on the map. They include the lands classified as State Land Use Agricultural District outside of the Natural, Homestead, and Parks & Recreation land use designations. Large, contiguous agricultural lands adjacent to designated IAL are also prioritized.

### 4.1.4 Parks and Recreation

*Prince Kūhiō Park in Kukui'ula.*

The lands designated as Parks and Recreation include both public and private parks and gardens, and recreational facilities, including beach parks, golf courses, playgrounds, playfields, and district parks. There are approximately 72 acres of public Parks and Recreation land in the Planning District and 35 acres of private Parks and Recreation land. It also includes areas designated as future parks such as the 20-acre community park site at Kukui'ula and the roughly 7-acre future park designated at the Po'ipū Gateway Mixed-Use Village. The National Tropical Botanical Garden in Lāwa'i comprises 202 acres of Parks and Recreation land.

#### *4.1.4.1 Opportunities for Future Parks or Protected Areas*

For several decades, Māhā'ulepū has long-acted as a recreational resource thanks to the landowner's commitment to the community to provide access and maintain the area as a natural, cultural landscape, but also has been an area of concern to the community due to its development potential. The 2000 General Plan acknowledged that the landowner's then proposal for low-scale resort development conflicted with the desire of community and environmental groups to preserve the area's natural quality, but recognized the need for balance. The General Plan's stated policy for Māhā'ulepū is:

> *Involve the community in planning for the future of Māhā'ulepū. Planning should take into consideration various interests and factors, including but not limited to: the long-term need for managing Māhā'ulepū lands to preserve their significant natural and cultural features; the owner's desire to develop revenue-producing uses in a way that is sensitive to the area's unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park. (GP 2000)*

Although admittedly not an exhaustive list, the 2000 General Plan called out two options for the area: allowing some development in exchange for a park and/or preservations areas, and purchase of the land for a State park.

A community group, Mālama Māhā'ulepū, was formed in 2000 for the purpose of working to preserve the natural and cultural resources of Māhā'ulepū, primarily by keeping the area relatively undeveloped but with agricultural, educational and recreations uses. Since then they have played an active role in educating the community about Māhā'ulepū's special resources and have garnered community support for preservation. The County Council passed a resolution in 2001 supporting a collaborative planning effort to explore preservation options for the area. This was followed by a similar resolution in the State House of Representatives and Senate.

During the SKCP planning process, the community voiced a desire to secure permanent public access to the shoreline. Vehicle access is provided down a private dirt road which is secured via gates that are locked at sundown. Pedestrian access is provided on hiking trails that begin at Keoniloa Bay Park. These unmarked trails traverse the perimeter of the golf course and seabird habitat areas. Securing permanent public access via the private road and trail system is desired. However, public access should also be managed to minimize impacts to sensitive environmental and cultural resources, and to ensure public safety.

##### 4.1.4.1.1 Permanent Vehicle Access

The private road is maintained by the landowner and is part of a network of unpaved roads providing access to agricultural lands throughout the valley. It is directly adjacent to existing agricultural activities. If, through fair valuation, the landowner is willing to dedicate the roadway to the County, the road would have to be constructed to County standards. Not only is the cost of constructing a two-mile road very high, but a paved road might conflict with the natural qualities of the area and would likely dramatically increase use of the area.

##### 4.1.4.1.2 Permanent Trail Access

Another goal is to secure permanent public access along the coastal paths, also known as the Māhā'ulepū Heritage Trail. Discussions will have to consider that the trail traverses sensitive natural and cultural resources, including fragile landforms vulnerable to foot traffic. Security for the golf course and Makauwahi Cave should be considered too. If there is a need to obtain legal ownership of public accesses, options for potential conservation easements and/or future acquisition at fair market value via non-profit organizations such as the Hawaiian Islands Land Trust or Trust for Public Land should be explored to preserve the coastal areas.

##### 4.1.4.1.3 Potential Park or Protected Area

In addition to securing permanent public access, protecting the coastal area's natural, cultural and recreational resources in perpetuity is the ultimate goal. This could occur via the establishment of a conservation easement, or acquisition of the property for a park or other managed protected area. Such action could resolve access concerns while providing the framework for improved management of human impacts on the area's environmental and cultural resources. A conservation easement is a voluntary agreement made with a landowner to remove all development rights in a specific area, usually though the purchase of development rights (PDR) or transfer of development rights (TDR). Another option is the fair market acquisition of the coastal area by a government or non-profit entity for a park or protected area. Some cursory steps have been taken to explore this option. In 2003, per charter amendment, the County established a Public Access, Open Space, Natural Resources Preservation Fund to acquire land and easements identified through a public process and guided by an advisory committee (the Public Access, Open Space, Natural Resources Preservation Fund Commission, also known as the Open Space Commission). In the Commission's 2005 and 2007/2008 Reports to Council, the Māhā'ulepū watershed (six parcels comprising 3,774 acres) was listed as a priority site for acquisition, but with the acknowledgment that the fund was unable to match the area's assessed value of over $20 million (in 2005 dollars). Since then, the Commission has prioritized smaller acquisition projects that are within reach of the fund's capacity.

The National Park Service also performed a reconnaissance survey in 2008 to locate a potential national park in the coastal area from Māhā'ulepū to 'Alekoko Fishpond in Lihu'e (Figure 4-3). Based on their preliminary evaluations, the report concluded that, "The National Park Service Pacific West Region recommends that a Special Resource Study be authorized under the stipulations of Public Law 105-391, so long as it focuses on nontraditional management alternatives that a) involve local partners and b) include options for continued farm and ranch operations on private agricultural lands." (NPS 2008)

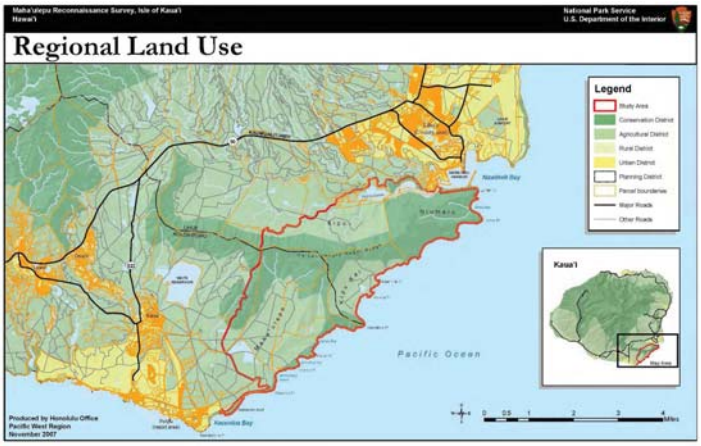




The National Park Service specified that it is the coastal and mountain areas in the Māhā'ulepū Watershed that have qualities of national significance. If acquisition by a government entity is desired, it would require subdivision of large parcels to facilitate such transaction. This would allow the private agricultural activities in the valley and on agriculturally-zoned lands to continue operations.

The opportunity to further explore these options may be forthcoming. U.S. Senator Brian Schatz introduced the Pacific Islands Parks Act of 2013, which calls for the Department of the Interior to conduct a special resource study for the "southeastern coast of Kaua'i, Hawai'i" for the purpose of not only determining the area's suitability as a National Park, but to "consider other alternatives for preservation, protection, and interpretation of the site by Federal, State or local government entities or private and nonprofit organizations."

**Figure 4-3: National Park Service 2008 Reconnaissance Survey Area**




Similarly, further discussions should occur to maintain public access along recreational paths throughout the Planning District and to the coastal areas where sensitive natural and cultural resources are not threatened and where public safety can be ensured.

### 4.1.5 Water Bodies and Wetlands

The Water Bodies and Wetlands designation includes all natural and manmade water bodies and watercourses. It highlights the manmade features or those reservoirs used for irrigation purposes in a darker blue running dashed line. These water features support the natural and agricultural environments as well as sustain South Kaua'i's communities.

The Kaua'i County Council received input from numerous concerned citizens with deep ties to the land in the Planning District, making clear that solutions to various water problems must be of paramount concern to the County, and carefully considered before any development may occur. Accordingly, a comprehensive water planning strategy for the entire Planning District should be supported. Rather than relying on piecemeal, development-specific plans that may be limited in scope to the property at issue without due consideration of related impacts off-site throughout the system as a whole, this strategy should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currently falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.

The following is a summary of the different features included in the mapping of the water bodies and wetlands. It also provides brief policy statements related to each.

**Wetlands.** The wetlands included on the Land Use Map are derived from the U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI), which was last updated for the island of Kaua'i in 2005. The riverine wetlands were drawn by putting a 2.5 meter buffer around the centerline for a total width of 5 meters. The USFWS uses a definition for wetlands which is technically non-regulatory but is used mainly for planning purposes. The definition reads, "Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water." These areas include unvegetated wet areas (e.g., beaches, mudflats, gravel streambeds, shallow ponds) that are not considered wetlands under regulatory definitions used by other agencies such as the U.S. Army Corps of Engineers (Erickson and Puttock 2006). Wetlands are important environmental resources that can provide irreplaceable benefits including flood protection, water quality improvements, habitat for fish and wildlife, and opportunities for recreation, education, and research. The U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency as well as State and County agencies have responsibilities for the protection and management of wetlands. For individual development projects that may impact wetlands, a more detailed wetlands delineation study should be performed as part of the project's planning efforts to determine the actual regulatory boundary of any wetlands.

**Streams.** Streams include both perennial and non-perennial streams and their centerlines are mapped with a 3-dotted dashed line in dark blue. A 30 foot buffer was added to each side of the streams' centerlines for mapping visibility and to indicate potential areas that may affect the streams. Best development practices to reduce non-point source pollution from adjacent land uses should be implemented such as filtering runoff and providing landscaped buffers along the streams preferably with plants native to the area or those that are non-invasive to minimize negative impacts to the streams' ecology.

**Floodways.** The floodways as mapped by the State DLNR from FEMA's digital FIRM GIS layer are also shown in light blue. These maps were last updated on November 26, 2010 for the County of Kaua'i and include those areas of the 100-year storm (1% annual chance flood) which must be kept clear of encroachment. Areas outside of the floodway but within the

100-year flood for which base flood elevations have been determined and are therefore developable are not included on the Land Use Map.

**Irrigation, Reservoirs, Ditches, and Flumes.** These waterways support the vast agricultural fields within the district and are shown with a medium blue dashed line. The water reservoirs vary in size and location and serve as a fresh water resource for agricultural irrigation. These water features also provide habitat for water birds and stream biota and are shown with the same medium blue dashed outline on other water bodies when they serve this dual purpose. The irrigation network should be well-maintained by its respective landowners to support the agricultural uses throughout the Planning District.

### 4.1.6 Residential

The lands included within the Residential designation shall be used predominantly for primary residential housing. While some mixed use is permitted via zoning permits, these areas consist mainly of single-family and lower density rural communities and fall outside of the areas designated for the SPA and FBC.

There are two Residential designations on the Land Use Map:

**Residential.** The Residential land use designation generally follows the County's existing residentially zoned lands and the General Plan Residential Community designation with small modifications as delineated in Chapter 6. Added to these, is the Brydeswood agricultural subdivision west of Kalāheo. Residential lands consist mainly of single-family homes in rural settings.

Over the past few decades, the Hoʻona Road Neighborhood, a small community surrounding Baby Beach and Whaler's Cove with R-4 zoning, has shifted from predominantly residential to a mix of residential and transient vacation rentals today. As such, the character of the neighborhood has changed and at times there is conflict between the two uses, especially in regard to parking and noise. In 2014, 27 of the 58 parcels in the neighborhood had one or more units legally operating as transient vacation rentals under a TVR Non-Conforming Use Certificate. During the planning process, alignment of the area's existing TVRs with the VDA was explored. However, the residents desire no expansion of TVRs or resort uses in the neighborhood. Even though legally operating TVRs will likely continue in the area, the Hoʻona Road Neighborhood is shown as residential on the land use map with the exception of Whaler's Cove.

**Homestead.** The Homestead designation allows for single-family dwellings even if the parcel is in the State Land Use Agricultural District. There are numerous homestead lots within South Kaua'i, mainly in Kalāheo and Lāwa'i, created in the early 1900s under the 1895 Land Act. These homestead subdivisions include: Kalāheo Homesteads 1st Series (1906), Kalāheo Homesteads 2nd Series (1913), Lāwa'i Homesteads (1914), and 'Ōma'o Homesteads (1914). Conveniently, the census designated place boundaries for Kalāheo, Lāwa'i, and 'Ōma'o encompass these homestead lots. The State Land Use Law requires residential dwellings within the State Land Use Agricultural district to be "farm dwellings, " meaning that the occupant needs to earn income from agricultural use of the land (HRS §205-4.5(a)(4)). However, single-family dwellings are permitted on lots existing before June 4, 1976 (HRS §205-4.5(b)). Lands mapped as Homestead are included within this designation although the underlying zoning is agriculture because they are entitled to residential use and many parcels have long been developed with single-family residences.

### 4.1.7 Resort

For the lands within the Resort designation, the primary use shall be for housing and serving visitors to Kaua'i as well as the commercial and public facilities that serve visitors or support the visitor industry. Lands designated Resort may also be used for residential purposes, including resort employee housing.

It includes lands that are zoned Resort (RR) and the Resort areas from the General Plan Land Use Map with the exception of the Natural, Water Bodies, and Parks and Recreation designations. For example, Kāneiolouma and Manoʻokalanipo Park were included in the resort land use in the 2000 GP. They have been taken out in the SKCP land use map and put into Natural and Parks and Recreation, respectively. The Resort areas also include multi-family and condominium projects which have been developed as resort properties and cohesive neighborhoods where many vacation rentals are located on adjacent single-family lots which were not previously mapped as Resort on the General Plan. Examples of these communities include the Lāwa'i Beach Resort, the Poʻipū Beach Estates, Wainani, specific strings of single-family homes along Hoʻona Road and makai of Kaheka and Puʻuholo Roads at Hanakāʻape Bay (Kōloa Landing), and the homes makai of Lāwa'i Road west of Prince Kūhiō Park many of which operate legally as vacation rentals. The 13-acre Makahūʻena Point property has also been added to the Resort designation.

*Poʻipū resorts along the coastline.*

To satisfy the 2035 projected resort growth for the Planning District, a roughly 13-acre area wedged between the Grand Hyatt Kaua'i and the Poʻipū Bay Golf Course but behind the Pāʻā Dunes was selected as it is an already disturbed infill site bounded by the golf course and Grand Hyatt and was formerly used as the nursery for the golf course. The CAC felt this was the most appropriate location for any additional resort growth as they did not feel resort uses should extend west of Kukuiʻula along the coast much of which is in IAL, or be located in the town centers, or mixed with primary residential uses, or in the agricultural and open greenfields. In addition, the vision for the area was seen as a low-scale project with an expanded park area directly east of Shipwreck's Beach and included additional public parking and a comfort station. During the Planning Commission hearings, however, there was concern regarding the expansion of resort uses with the projected number of units needed in the Planning District so close to the number of permitted but not-yet-built resort units. The Planning Commission decided, based on further public hearing testimony, to preserve the area as Open Space





and Agriculture on the Land Use Map (Figure 4-1) and to have periodic reviews to track the number of visitor units being built on entitled land and to compare them with the demand for additional units.

For Kukuiʻula, there is a total of 1,500 total units permitted for the property but only half (750) are allowed to operate as vacation units. Because those 750 visitor units can be located anywhere within the project boundary, only the areas zoned Resort are shown in a solid pink Resort designation on the Land Use Map and the VDA boundary around the project site is shown for reference.

All new Resort designated land is intended to amend the VDA boundary on the zoning maps for increased consistency between long-range land planning, zoning, and actual use. There may be some remaining permitted non-conforming vacation rentals scattered within the Residential land use designation. However, because there was no cohesive group of visitor units, they were not included in the Resort designation. The proposed VDA boundary is shown as a dotted pink line on the Land Use Map (Figure 4-1).

### 4.1.8 Industrial

Roughly 160 acres around the old Kōloa Mill Site is designated as Industrial on the Land Use Map. The Planning District currently does not have any industrially zoned land. However, to support the growing agricultural uses in the district and to encompass the existing solar farm and the potential site for a regional wastewater treatment facility, the Industrial lands shall be predominantly used for or held in reserve to be used in the future for agricultural support facilities and renewable energy. These lands are located away from Residential and Resort uses yet close to Agricultural lands and major roads, Weliweli Road and Ala Kinoiki, for convenience.

The Industrial land use designation allows for facilities for processing, construction, manufacturing, transportation, wholesaling, storage, or similar economic activities, and accessory or supporting facilities which directly enhance their viability. It is recommended that zoning for this area be amended to I-G (General Industrial).

### 4.1.9 Future Growth Area related to the Hanapēpē-ʻEleʻele Community Plan

The Future Growth Area related to the Hanapēpē-ʻEleʻele Community Plan is a general designation for an area envisioned by A&B Properties, Inc. to be a master planned community supporting the growth of ʻEleʻele and Port Allen. Because of the boundary shift between planning districts, it falls within the South Kaua'i planning district. On the Land Use Map, it is shown as a placeholder and will be further defined as part of the future Hanapēpē-ʻEleʻele Community Plan update. No projected residential growth for South Kaua'i has been allocated to the area as a part of this community plan update and the zoning will not be amended as part of this plan. It is therefore left in Agriculture on the Land Use Map. Its rough boundaries are shown as a placeholder and the area will be further defined during the future Hanapēpē-ʻEleʻele Community Plan update.

## 4.2 WALKABLE MIXED-USE COMMUNITIES

The Walkable Mixed-Use Communities section identifies policies to enhance existing communities with pedestrian-friendly development. By locating commercial and retail establishments convenient to residential areas, alternatives to driving, such as transit, walking, and biking, once again become viable. Potential redevelopment is concentrated in the Special Planning Areas identified in Section 4.1.1. More detailed development requirements are provided in the FBC (Appendix C). The main goal is to focus growth to compact, defined settlement areas to enhance sense of community, improve conditions for walkable communities, maintain rural character of the place, and preserve open space.

### 4.2.1 Compact Walkable Neighborhoods

a. Improve Kōloa, Kalāheo, and Po'ipū town core areas as vibrant mixed-use places.
b. Locate commercial areas containing a variety of establishments, personal services, professional offices, restaurants, grocery and retail stores within walking distance of where people live, work and play.
c. Locate community facilities, schools, parks, and recreational facilities within walking distance of primary housing.
d. Create a pedestrian- and bike-friendly environment in Kalāheo by providing continuous sidewalks and bike lanes along Kaumuali'i Highway.
e. Create a secondary main street environment in Kalāheo along Papalina Road fronting the commercial uses.
f. Provide a neighborhood grocery store in Kalāheo.
g. Kalāheo provides the most substantial commercial destination along the entire highway stretch between 'Ele'ele and Lihu'e. Businesses may be able to attract and cater to both local and regional commercial needs, for those regularly traveling through the community, while retaining the scale and character of Kalāheo.
h. Kōloa's main street is one of the most successfully walkable centers of all Kaua'i. Higher density within the town core in the form of tighter or smaller units while maintaining 2-2.5 story height limits will provide affordable housing while maintaining the historic character of Kōloa.
i. Tourism supports a good portion of commercial activity in Kōloa's commercial center; however, ironically, development that is solely tourist-oriented detracts from the charm and authenticity of a place. Safeguarding against this and balancing development that supports local residents and visitors alike is critical for Kōloa to preserve its greatest asset: its uniqueness of place.
j. The small business district around the old cannery in Lāwa'i could become more pedestrian-friendly and provide a mix of housing. The old cannery itself is large and underutilized as a self-storage facility; it could ultimately be a significant opportunity for reuse or redevelopment.

### 4.2.2 Distinct Rural Communities

a. Foster the unique sense of place within each community.
b. Maintain the distinction between each community by keeping the cores intact and making them the focus of any future growth. Future development should maintain the existing character and building form of each community.
c. Protect the rural character of the community from sprawling development. Sprawling development patterns between the different towns and especially between Kōloa and Po'ipū should be avoided to maintain the areas as distinct communities.

### 4.2.3 Housing Location and Options

a. Provide for a diversity of housing to accommodate various household types, incomes and family sizes. The ability to afford a place to live close to work, commercial services, and places to play fosters independence, allows income to be spent in other ways besides transportation costs, and builds community.
b. Focus the residential population to infill on vacant zoned land and strategic areas contiguous to existing settlements. Beyond the absorption within existing urban zoned land, the future population growth as projected by SMS through 2035 shall be directed to the following areas:
    - Existing Town Centers- Kōloa (24 percent) and Kalāheo (3 percent)
    - Po'ipū Gateway (60 percent)
    - Numila (8 percent)
    - Homestead lots (5 percent)
c. Locate a mix of housing including workforce housing close to employment centers. The new Po'ipū Gateway Mixed-Use Village is an opportunity to locate a variety of housing options including higher-density workforce housing within walking and biking distance of the Po'ipū resort community, one of the largest employment centers on the island and the largest in the Planning District (CH2MHill 2014, Exhibit 3.3). The CAC envisioned this area to be the focus of the majority of future growth within the Planning District to preserve the character of existing historic towns. Over 1,000 housing units (60 percent of projected residential growth) has been allocated here. The CAC also envisioned this as the highest level transect in the Planning District.
d. Allow for a variety of accessory dwellings such as 'ohana units and "granny flats" within the SPAs.
e. Provide affordable housing, especially in the Kōloa-Po'ipū area, a major jobs center on the island, through policies and actions that ensure sufficient affordable housing in the region on a long-term basis.
f. Preserve affordable housing stock and provide options that support senior housing and aging in place.

*Sueoka Market, Kōloa Town.*





## 4.3 CONTEXT-SENSITIVE TRANSPORTATION NETWORKS

According to the surveys and feedback received during the project kickoff, one of the most desired wishes for South Kaua'i is safer transportation networks, especially for pedestrians and cyclists and particularly around schools. When asked what their priorities were for improving South Kaua'i, pedestrian/bike paths received the most votes in all surveys. In 2012, Charlier Associates developed the Kaua'i Multimodal Land Transportation Plan. The surveys and public meetings that were a part of this plan found that the transportation-related desires of the residents of Kaua'i can be summarized into five categories: safety, transit, bicycling, pedestrians, and local roads and streets. In the Planning District, residents identified the following as important transportation needs of their district:

- Safe streets for children to walk and bicycle
- Walk/bicycle facilities connecting homes to schools, parks, and beaches
- More frequent bus service
- Shelters at bus stops

### 4.3.1 Multimodal Roadway Network

With the priority for safer, more connected streets for pedestrians and cyclists voiced by the community, a multimodal roadway network was developed to highlight improved pedestrian and bicycle facilities throughout South Kaua'i. See Figure 4-4. A separate map was done for the transit system that the County operates as The Kaua'i Bus and is shown in Figure 4-5. It will also be discussed in more detail in Section 4.3.2.

*Cyclists in Kalāheo.*

The focus of the multimodal roadway network is system preservation and increasing facilities for pedestrians, cyclists, and bicycle and transit riders to encourage alternate means of getting around rather than using single-occupancy vehicles. As noted in the *Federal-Aid Highways 2035 Transportation Plan for the District of Kaua'i*, federal and state funding will have an estimated $2.0 billion dollar shortfall by the year 2035. Recent federal legislation is also emphasizing system preservation rather than high-cost capacity projects such as adding lanes or constructing new roads. It also cites consistency with the federal MAP-21 (Moving Ahead for Progress in the 21st Century) performance goals as codified in 23 USC 135 which states "that long-range plans should consider all modes of transportation, and provide for an integrated, comprehensive transportation system" (CH2MHill 2014).

Similarly, the County of Kaua'i recently completed the *Kaua'i Multimodal Land Transportation Plan* in September 2012 which targets zero growth in vehicle miles traveled through 2035 as its preferred scenario compared to a 19% increase in traffic levels and a 15% increase in average household transportation cost in the baseline scenario (Charlier 2012). In order to achieve this goal, more people will need to walk, bike, or take transit to their destinations and based on the feedback from the South Kaua'i communities, they are very much in support of making the roadways safer for pedestrians and cyclists. Therefore, in order to support and encourage this modal shift and to preserve the unique character of each of South Kaua'i's towns, the multimodal roadway network is designed to improve internal pedestrian and bicycle circulation within key areas of each town and to connect each town with each other along regional connector roads.

*Bustling Kōloa Town.*

#### *4.3.1.1 Map Symbols*

Figure 4-4 highlights the multimodal roadway network proposed for South Kaua'i. The roadways in red are recommended to remain as two-lane roadways. Existing roundabouts are shown as an open red circle and proposed roundabouts are shown as a solid red circle.

Pedestrian facilities are shown in green with dotted green lines indicating sidewalks or pedestrian paths and green squares highlighting the need for safer pedestrian crossings at intersections. The solid green lines are where separated pedestrian/bike paths are recommended.

Bicycle facilities are shown in blue with solid blue lines recommending bike lanes on both sides of the roadway and dotted blue lines indicating bikes on the road shoulders or a signed shared bike route.

The recommendations are conceptual in nature and the detailed design for each of these improvements would follow via the County and State DOT's design and construction processes.

Figure 4-4: Multimodal Roadway Network

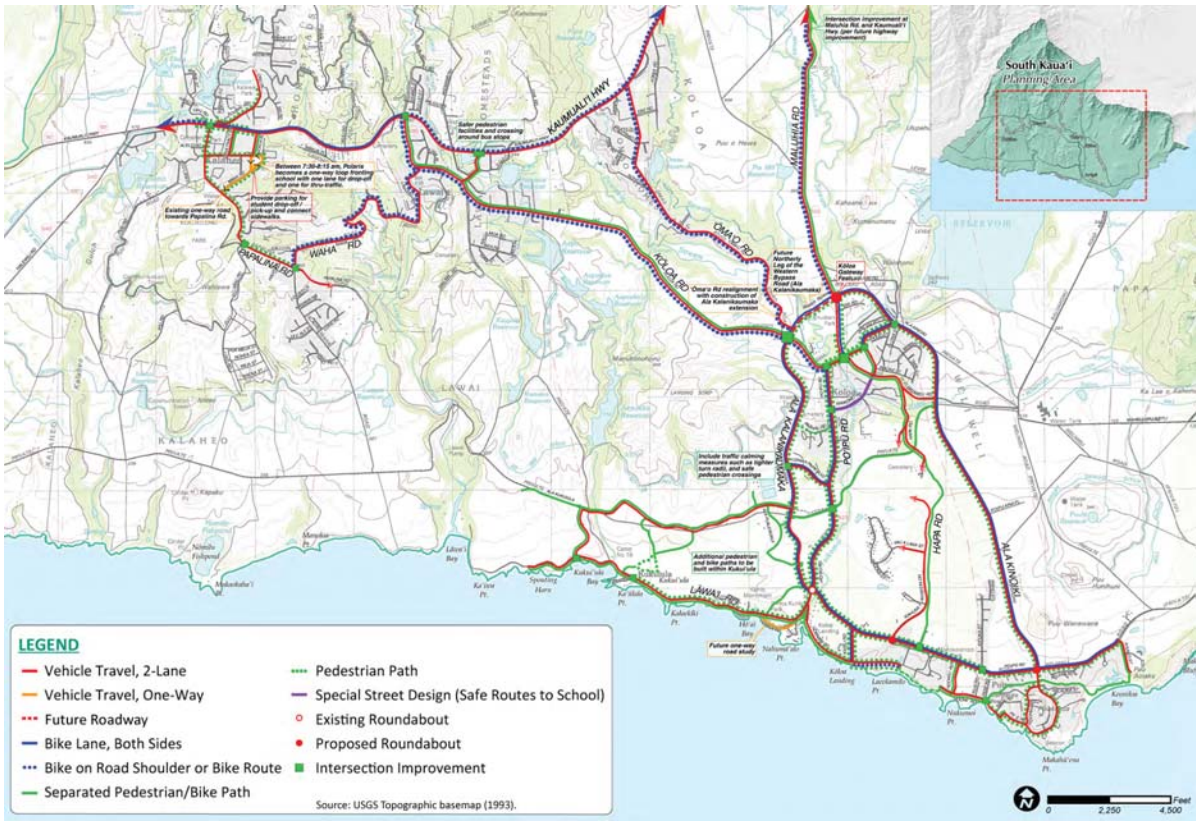







Figure 4-5: Proposed Bus Routes and Priority Shelter Locations

#### *4.3.1.2 Transportation Studies*

##### 4.3.1.2.1 Federal-Aid Highways 2035 Transportation Plan for the District of Kaua'i

According to the *Federal-Aid Highways 2035 Transportation Plan for the District of Kaua'i* report, most of the projected 2035 traffic on South Kaua'i roadways operate at Level of Service (LOS) C with a volume-to-capacity ratio, or V/C ratio < 0.8, or well-below existing roadway capacities. See Figure 4-6. The only exceptions were a few locations where projected daily volumes are at or exceed roadway capacity (LOS F):

- Kaumuali'i Highway between Halewili Road and Upa Road (although there are short sections which have a V/C of 0.8 - 1.0, or LOS D or E)
- Kaumuali'i Highway east of Maluhia Road
- Po'ipū Roundabout
- Intersection of Ala Kinoiki and Po'ipū Road

**Figure 4-6: Projected Traffic, 2035**

In order to solve these projected traffic failures, the plan only included solutions that could be funded via the Federal-Aid Highways program which eliminated transit improvements. It did not include any evaluation of mode shift from vehicles to transit, bicycle, or walking.

The recommended list of projects within the South Kaua'i Planning District includes:

- Widening Kaumuali'i Highway to a divided 4-lane facility between Kōloa Road and Kalāheo Town
- Kaumuali'i Highway Improvements east of Kōloa Road
- Widening Po'ipū Road to include bike lanes, sidewalks, and intersection improvements between Lāwa'i Road and Ala Kinoiki
- Construction of the northern leg of the Western Access Road as a 2-lane, signed shared roadway from Kōloa Road to Maluhia Road

Many of these recommended improvements are in harmony with the goals of improved multimodal roadway networks. However, the potential solution of widening Kaumuali'i Highway through Kalāheo town to a divided 4-lane facility would drastically impact the character of that town and the adjacent property owners. Condemnation of the adjacent properties would likely be required to widen the right-of-way as it is currently only 60 feet wide, and there would be little to no opportunity to include sidewalks or bicycle facilities without the removal of some structures. While the widening is one way to increase the capacity of highway, such widening is not desirable or practical and runs contrary to the goals and vision voiced for the South Kaua'i Community Plan.

##### 4.3.1.2.2 Traffic and Transportation Study for South Kaua'i CP

In developing the multimodal roadway network for this South Kaua'i Community Plan, the traffic engineers, Fehr & Peers, were tasked to:

1. Confirm and update/adjust as needed, the Kaua'i long-range land transportation demand model used in the *Federal-Aid Highways 2035 Transportation Plan for the District of Kaua'i* report.
2. Include SMS's projected residential growth allocated to the Planning District.
3. Determine if maintaining the roadways shown in red on the multimodal roadway network map as two-lane roads would allow projected 2035 traffic with the allocated growth to flow at or below capacity (V/C ratio ≤ 1.0) without adding a new coastal bypass road that is in shown the 2000 General Plan stretching from Port Allen to Po'ipū (potentially undesirable due to cost, negative impacts to Lāwa'i Valley, encouraging unwanted continued private vehicle use, and potential increased development along the coast), and;
4. If not, determine which roadway segments would operate above capacity (V/C ratio ≥ 1.0) and why (e.g., is the majority of the traffic through-traffic or traffic internal to the Planning District?). Calculate how many trips would need to be shifted to other modes of transportation to have them operate at V/C ratio ≤ 1.0.
5. Provide preliminary analysis of alternative intersection designs for:
    a. Papalina Road and Kaumuali'i Highway in Kalāheo, and;
    b. Maluhia Road and Kōloa Road in Kōloa.

For purposes of this analysis, the observed and projected traffic volumes of a roadway segment are compared against its capacity to determine the V/C ratio. Fehr & Peers uses a daily V/C ratio for this study since it is used to evaluate the overall operation of a roadway for long-range planning purposes, similar to the CH2MHill study. Similar to other traffic studies, a LOS grade is given to indicate the relative condition of traffic flow, much like grades at school. Typically, LOS A (V/C ratio < 0.60) indicates free-flowing conditions, LOS C (V/C ratio = 0.71-0.80) is indicative of a moderate level of congestion, and LOS F (V/C > 1.00) indicates significant levels of congestion (Fehr & Peers 2014). A copy of their full report is provided in Appendix D.





However, please note that this type of modeling is generally not suitable for an evaluation of specific intersection designs which require the use of detailed modeling for peak hour operations. Case in point, Fehr & Peers notes that the two intersection failures that were shown in the CH2MHill study – the first at the Po'ipū roundabout and second at the Ala Kinoiki and Po'ipū Road intersection – may be related to the shortcomings of the regional model they used since the regional models tend to do a poor job of analyzing localized intersection conditions. The fact that all the other segments around those intersections are operating at a good level of service (LOS C or better) further reinforces that this may be more of a model coding issue than an actual failure at the intersections. (Fehr & Peers, personal communication 2014)

Fehr & Peers calculated the existing roadway operations to be at or below capacity. See Table 4-1.

**Table 4-1: Existing Traffic**

| Roadway | Location | Volume | Capacity | V/C Ratio |
|---|---|---|---|---|
| **Kaumuali'i Highway** | West of Papalina Road | 16,300 | 19,800 | 0.82 |
| **Kaumuali'i Highway** | Between Papalina Road and Kōloa Road | 19,900 | 19,900 | 1.00 |
| **Kaumuali'i Highway** | Between Kōloa Road and 'Ōma'o Road | 9,600 | 19,800 | 0.48 |
| **Kaumuali'i Highway** | East of 'Ōma'o Road | 14,300 | 24,800 | 0.58 |
| **Maluhia Road** | North of Ala Kinoiki | 6,100 | 24,800 | 0.25 |
| **Ala Kinoiki** | East of Maluhia Road | 8,000 | 16,800 | 0.48 |
| **Ala Kinoiki** | North of Po'ipū Road | 5,500 | 16,200 | 0.34 |
| **Papalina Road** | South of Kaumuali'i Highway | 5,300 | 15,800 | 0.34 |
| **Kōloa Road** | South of Kaumuali'i Highway | 6,000 | 19,000 | 0.32 |
| **Kōloa Road** | North of Po'ipū Road | 6,500 | 22,200 | 0.29 |
| **Po'ipū Road** | South of Kōloa Road | 5,200 | 19,000 | 0.27 |
| **Po'ipū Road** | West of Ala Kinoiki | 5,400 | 15,800 | 0.34 |

***Note: Deficient segments shown in bold***
***Source: Table 3-2 (Fehr & Peers 2014) and Kaua'i 2035 Transportation Demand Forecasting Model (TDFM).***

Additional analysis on existing traffic was done using Inrix data to provide another perspective on roadway operations. Inrix uses crowd-sourcing technology to record travel speeds and congestion levels. Data on travel speeds are obtained from GPS units, commercial vehicles, cell phones, and a variety of other sources. This data is then aggregated and reported through a centralized database. Analysis focused on Kaumuali'i Highway since it had the most reliable data within the Planning District. Based on the Inrix data, there is limited congestion on Kaumuali'i Highway as most vehicles are able to travel between 30 and 50 miles per hour during the peak morning hour (8 AM on a weekday) and peak afternoon traffic (4 PM on a weekday).

To understand what the baseline traffic would be for 2035, Fehr & Peers calculated what the traffic would be without the residential growth projected by SMS. Their analysis shows three segments of Kaumuali'i Highway exceeding capacity between Kalāheo and 'Ōma'o. See Table 4-2.

**Table 4-2: 2035 Traffic Projections without Residential Growth Allocation**

| Roadway | Location | Volume | Capacity | V/C Ratio |
|---|---|---|---|---|
| **Kaumuali'i Highway** | **West of Papalina Road** | **21,600** | **19,800** | **1.09** |
| **Kaumuali'i Highway** | **Between Papalina Road and Kōloa Road** | **22,200** | **19,900** | **1.12** |
| **Kaumuali'i Highway** | **Between Kōloa Road and 'Ōma'o Road** | **21,400** | **19,800** | **1.08** |
| **Kaumuali'i Highway** | East of 'Ōma'o Road | 21,800 | 24,800 | 0.88 |
| **Maluhia Road** | North of Ala Kinoiki | 18,200 | 24,800 | 0.73 |
| **Ala Kinoiki** | East of Maluhia Road | 7,200 | 16,800 | 0.43 |
| **Ala Kinoiki** | North of Po'ipū Road | 11,100 | 16,200 | 0.69 |
| **Papalina Road** | South of Kaumuali'i Highway | 3,100 | 15,800 | 0.20 |
| **Kōloa Road** | South of Kaumuali'i Highway | 13,000 | 19,000 | 0.68 |
| **Kōloa Road** | North of Po'ipū Road | 9,500 | 22,200 | 0.43 |
| **Po'ipū Road** | South of Kōloa Road | 7,000 | 19,000 | 0.37 |
| **Po'ipū Road** | West of Ala Kinoiki | 11,500 | 15,800 | 0.73 |

***Note: Deficient segments shown in bold***
***Source: Table 6-1 (Fehr & Peers 2014) and Kaua'i 2035 Transportation Demand Forecasting Model (TDFM).***

When the projected residential growth is added to the traffic model for 2035, the same three segments of Kaumuali'i are over capacity at slightly higher V/C ratios. The remaining roadway segments are well-below capacities except the remaining segment of the highway which is nearing capacity (V/C ratio = 0.94). See Table 4-3.

**Table 4-3: 2035 Traffic Projections with Residential Growth Allocation**

| Roadway | Location | Volume | Capacity | V/C Ratio |
|---|---|---|---|---|
| **Kaumuali'i Highway** | **West of Papalina Road** | **23,100** | **19,800** | **1.17** |
| **Kaumuali'i Highway** | **Between Papalina Road and Kōloa Road** | **23,500** | **19,900** | **1.18** |
| **Kaumuali'i Highway** | **Between Kōloa Road and 'Ōma'o Road** | **22,900** | **19,800** | **1.16** |
| **Kaumuali'i Highway** | East of 'Ōma'o Road | 23,400 | 24,800 | 0.94 |
| **Maluhia Road** | North of Ala Kinoiki | 21,000 | 24,800 | 0.85 |
| **Ala Kinoiki** | East of Maluhia Road | 7,200 | 16,800 | 0.43 |
| **Ala Kinoiki** | North of Po'ipū Road | 10,900 | 16,200 | 0.67 |
| **Papalina Road** | South of Kaumuali'i Highway | 3,600 | 15,800 | 0.23 |
| **Kōloa Road** | South of Kaumuali'i Highway | 14,200 | 19,000 | 0.75 |
| **Kōloa Road** | North of Po'ipū Road | 10,400 | 22,200 | 0.47 |
| **Po'ipū Road** | South of Kōloa Road | 7,000 | 19,000 | 0.37 |
| **Po'ipū Road** | West of Ala Kinoiki | 12,000 | 15,800 | 0.76 |

***Note: Deficient segments shown in bold***
***Source: Fehr & Peers, 2014***

Similar to the CH2MHill study, Fehr & Peers found that the collector roads internal to South Kaua'i will continue to operate at acceptable levels of service even with the projected growth. However, the traffic on the highway will continue to exceed modeled capacity. While the traditional approach for many traffic engineers and transportation planners would be to recommend the expansion of a roadway which is projected to operate deficiently, Fehr & Peers recognizes many factors which are unique to transportation in Kaua'i and reflect the context environment. These factors include:

- Widening significant sections of Kaumuali'i Highway would likely be extremely costly and have significant negative impacts on the adjacent properties and the environment.
- The study area currently lacks significant facilities for alternative travel modes; thereby forcing people to drive where they might otherwise want to walk, bike, or use transit.
- The widening of the roadway may not be fully compatible with recent long-range transportation planning efforts.
- The assessment of daily capacity often does not fully address the benefits of targeted improvements such as the addition of turn lanes, roundabouts, traffic signal upgrades, and other related strategies to increase capacity at intersections, which are the constraint points of the roadway network (Fehr & Peers 2014).

Fehr & Peers next analyzed the likely effects of targeted improvements and multimodal transportation policies which would moderate travel demand and minimize congestion. In their travel mode shift analysis, they estimated that approximately 1,800 daily vehicle trips would need to be diverted to use alternative travel modes along the highway. When typical auto occupancy factors are applied to this number of vehicle trips, it results in approximately 2,000 daily person trips that would need to change modes. Fehr & Peers also estimates that roughly 70% of the traffic on the highway through Kalāheo is through-traffic, traveling between Westside and areas east of the Planning District. Therefore, the first priority is to continue to support a mode shift of drivers passing through the Planning District to transit and support internal circulation with improved bicycle and pedestrian facilities.

Between 2007 and 2011, transit ridership on the route which uses Kaumuali'i Highway nearly doubled, increasing to almost 750 riders per day. This coincided with the last time gas prices in Hawai'i averaged more than $4.00 a gallon in 2008 and again in 2011 when oil prices were well-above $100 a barrel. According to AAA, Hawai'i hit $4.00 a gallon for the first time on May 23, 2008 and stayed above that until October 12, 2008. During that summer, the 50th state hit its high of $4.50 (CBS News 2011). Today, gas prices on Kaua'i are already reaching between $4.69 to $4.95 a gallon (The Garden Island 2014), which may encourage drivers to switch to transit, especially those commuting long distances to and from work.

During peak hours, the buses often run at capacity and have been known to turn away riders because they are too full. To alleviate the problem, on March 17, 2014 the Transportation Agency added a new route (#150) between Kaumakani and Lihu'e. There are two runs in the morning and two runs in the afternoon, which have eased the crowded condition that was occasionally resulting in denying boarding to some riders at Kalāheo Neighborhood Center in the morning. The afternoon #150 route may be adjusted to begin in Waimea rather than Kaumakani because the peak ridership is usually Waimea High School students boarding at Ishihara Market in Waimea in the afternoon. The Kaua'i Transportation Agency is also planning to purchase slightly larger buses with a 35-40 passenger capacity in the next few years to service the mainline. This is compared to their current 29-33 passenger buses. (Kaua'i Transportation Agency 2014)

Service can also be made more frequent to increase capacity and convenience to riders. Currently the mainline routes 100 and 200 run hourly except for the early morning eastbound and a 4:00 PM westbound service. This may not be frequent enough to make the service convenient for potential riders.

However, while transit is one likely mode of diversion, Fehr & Peers warns it may not provide sufficient capacity for all of the 2,000 daily person trips. There may be a "saturation point" of those willing to give up their car regardless of the cost of gas or the convenience of transit. Any significant reductions in traffic volumes along Kaumuali'i Highway would therefore require some diversion of vehicular traffic to bicycle and pedestrian routes. According to data provided by the American Community Survey (ACS) for 2012, nearly 20 percent of all commute trips on the island of Kaua'i travel by car but have a work trip of 10 minutes or less. Trips of this distance are often able to be easily made by walking or bicycling if the facilities are present. By providing bicycle and pedestrian facilities where they currently do not exist, some level of diversion may be possible. An analysis of travel patterns on Kaumuali'i Highway indicates that as much of 10 percent of the vehicular traffic on these deficient segments of the highway are local as opposed to longer-distance through trips. Diverting a significant portion of these local trips is another way to reduce vehicle demand associated with the plan. (Fehr & Peers 2014)

Therefore, reducing vehicular demand along Kaumuali'i Highway will require implementing the multimodal transportation measures identified in Figure 4-4 along with a meaningful diversion of trips to transit. This diversion of transit trips can only occur if there is sufficient capacity in the transit system, which will require expansion of service along the Kekaha-Lihu'e Mainline route beyond what is provided today (Fehr & Peers 2014) as well as an increase in convenience for transit riders whether it is the scheduling or location of stops. The alternative of building additional roads such as the coastal bypass or widening roads are not ideal solutions for serving regional transportation needs as it will place a





disproportionate burden on Kalāheo Town and Lāwa'i Valley to serve those west and east of these communities. It will also only serve those who are able to drive and who are typically inconvenienced when driving over a certain period of time (peak hour traffic) while the negative impacts (loss of natural and social communities) will be permanent. If an alternative east-west road is required for emergency bypass, the County and DOT should work with adjacent landowners to use existing agricultural roads near the highway. Another less impacting option would be to improve existing east-west roads to connect closer to existing towns and communities to minimize the impact to agricultural and natural areas and to discourage dispersing development along the coast.

#### 4.3.1.2.3 Scenic Roadway Corridors

Scenic Roadway Corridors are primarily designated in areas between towns where the surrounding lands are primarily designated Agriculture and Open. Where a Scenic Roadway Corridor is designated within a town or adjoins an area planned for urban use, the primary intent is to promote setbacks, landscaping, and views of scenic features. Attention must also be given to the number of ingress and egress points along the highway, which, unless limited and carefully planned, will disrupt the free flow of traffic along the highway. Scenic Roadway Corridors are intended to provide design guidance but not to restrict the principal land uses of urban areas.

### 4.3.2 Public Transit

Public opinion regarding public transit was collected at public workshops and with "wishcards," where community constituents shared their observations and visions for the bus system. Of all comments received, the top concerns regarding public transit include service efficiency and expansion (62%) followed by amenity improvements (29%). The proposed transit improvements aim to address these fundamental improvements.

*Bus stop in Kalāheo.*

Service expansion was highly desired by the public. Four of thirteen related discussions revolved around a need for a bus stop along 'Ōma'o Road. These discussions were followed by improved shuttle service to connect Kōloa Town to Po'ipū and its beaches.

Amenity improvements ranked as the next top concern. 83% of these comments desired more bus shelters. As of April 2015, there are two bus shelters—one across the highway from the Lāwa'i Post Office, and one at the Kalāheo Neighborhood Center, which also serves as a park and ride facility (the only designated site in South Kaua'i) and a transfer stop for both the mainline and shuttle routes. The County of Kaua'i Transportation Agency will also install bike racks and trash receptacles at the bus shelter across the highway from the Lāwa'i Post Office and expects to start Phase II of shelter construction in early 2016. Phase II includes the bus stops at the Lāwa'i Post Office, Kōloa School, and at Po'ipū Road/Ho'owili Road. The Transportation Agency is currently finalizing a study on implementing and prioritizing additional bus stop shelters island-wide. Through this process, additional "priority" bus shelter needs were identified for the following stops: "Kukui'ula Store" (which will have two bus stops) and "Kiahuna Drive."

To address these community needs, the following changes are proposed for the Kaua'i Bus service and are illustrated in Figure 4-5.

- **Kekaha-Līhu'e Mainline:** Consider increasing the size of vehicle or increasing the frequency during peak hours to increase capacity and improve convenience to encourage increased ridership. As a rough estimate, to shift 50 percent or 1,000 person trips to transit during the peak morning and afternoon commute, fourteen to fifteen additional 50-passenger buses at crush capacity. Crush capacity describes the condition where there are passengers both seated and standing in a bus. If the buses ran during two 2-hour long peak periods (one in the morning and one in the afternoon), this would require the buses to run roughly every 30 minutes in both directions. To shift 70 percent, or 1,400 person trips, the amount of projected pass-through traffic, this would require twenty additional 50-capacity buses at crush capacity. These additional buses could run over extended periods or the intervals between buses could be shortened to 20 minutes depending on demand.
- **Kōloa Shuttle:** Shift the southbound leg of the route from Kōloa Road to 'Ōma'o Road and stop at Hale Kapuna Heritage Home, an assisted living care facility, in 'Ōma'o. This will provide the community-requested service to 'Ōma'o and a connection to Kōloa, Po'ipū, Kalāheo, and Lāwa'i. Only 0.3 miles will be added to the total distance traveled compared to its existing route. The proposed location also serves as a school bus stop. Construction of a bus pullout and shelter would serve multiple users. Increase frequency to improve convenience for employees. Consider adding a stop at Lāwa'i General Store on Kōloa Road to provide access to these businesses and future SPAs.
- **Po'ipū-Kōloa Shuttle:** Work with PBRA to extend and expand the Intra-Po'ipū Shuttle service to daily operations and provide a stop in Kōloa Town to serve visitors and residents alike. Adjust service hours to maximize ridership and improve cost-efficiency.

### 4.3.3 Parking

While parking is essential to support businesses, particularly in the transition when there is not adequate public transit service or safe pedestrian and bicycle facilities built, providing too much parking can work against the desired multimodal shift away from private vehicle use. Parking will still be required as part of the FBC, however, it will have reduced requirements for vehicle parking and new requirements for bicycle parking. It will also have guidelines on shared parking and opportunities to make adjustments to parking requirements based on different criteria such as the number of adjacent on-street parking spaces and access to transit.

For public parking, the conceptual street designs provided in Section 4.3.4 show on-street parking wherever possible to supplement the existing parking lots and to organize the streetscape, providing a buffer for pedestrians between traffic and the proposed sidewalks. The 2000 GP Update's vision for Kōloa also included pockets of public parking at each end of town, which could also be pursued in partnership with existing landowners and businesses. A parking audit could be performed for Kōloa to take a detailed look at the number of available parking spaces and how many are truly needed to support the existing and projected businesses and residents in town. There may be opportunities to partner with newer developments such as Kōloa Rum and the Knudsen Trust to provide public parking as part of their projects.

Another concept is to charge for parking, both in private lots and at on-street parking stalls to discourage people from driving single occupancy vehicles and encourage them to carpool, walk, or bike. The fees collected from public parking could then be used for the installation and maintenance costs of the proposed streetscapes.

### 4.3.4 Conceptual Intersection Improvements and Street Sections

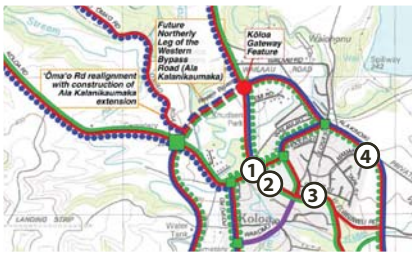
The following conceptual intersection improvements and street sections are organized by community and keyed to the maps for Kōloa, Kalāheo and Po'ipū. As these are meant to be conceptual in nature, there may be multiple options for some street sections, providing different alternatives that can be refined during the design phase. Every attempt was made to stay within the existing rights-of-way to minimize impacts to the adjacent properties. Where additional space is required, this would be sought as easements primarily for pedestrian use or a shared use path.

#### *4.3.4.1 Kōloa*

Conceptual streetscape improvements for Kōloa Town focus on improving the pedestrian environment in this bustling town center and providing appropriate bicycle connections through and to town). Also, recent information from the State of Hawai'i Department of Education (DOE) indicates that over 80 percent of students live within one mile of school and according to a November 2012 parent survey, for those who live within walking distance but do not allow their children to walk or bike to school, the primary reasons are: 1) the lack of safe sidewalks or pathways (65 percent), 2) the amount of traffic along route (62 percent), and the speed of traffic (62 percent) (County of Kaua'i 2013). The sentiment for improved pedestrian and bicycle facilities was echoed in the community surveys collected at the South Kaua'i CP project kick-off.

There are two major streets in Kōloa that are being designed under separate efforts. Waikomo Road is currently being redesigned by the County with a variety of options considered ranging from narrowed vehicle lanes with a striped shoulder for pedestrians and cyclists to a one-way street. Po'ipū Road improvements are already planned from Kōloa Road to the Hyatt and estimated budgets are already on the STIP. The designs will be based on those developed during the County's Po'ipū Road Charrette held in May 2013. Figure 4-7 is the key map for road and intersection improvements in Kōloa.

Figure 4-7: Kōloa Key Map




***Kōloa Road (1).*** The intersection of Kōloa Road and Maluhia Road is the heart of historic Kōloa Town. This is the iconic view recognized for its plantation-style storefronts, covered walkways, and busy streets. Unfortunately, there are currently no continuous sidewalks and only two marked crosswalks—one that leads right into Sueoka's parking lot and the other at the far eastern end by the post office. Pedestrians must weave between parked cars and oncoming traffic to walk to different establishments along Kōloa Road. If it rains, puddles often accumulate forcing pedestrians further into the vehicle lanes. Makeshift bulbouts and paths have been installed via flexible bollards to provide refuge for pedestrians. However, more could be done to improve pedestrian safety and their experience through Kōloa Town.

Figure 4-8 and Figure 4-9 provide an overview of the potential improvements that could be made to the existing right-of-way (ROW) including a wider, continuous sidewalk on the makai side of the road, a shared use path on the mauka side of the road, on-street parking, and landscaped bioswales to help mitigate runoff. The ROW for Kōloa Road to the east of the Maluhia intersection is 65 feet wide which will comfortably accommodate a shared use path, sidewalks and angled and parallel parking. The main difference between the two plans is the inclusion of on-street parking in front of Sueoka's. Alternative 1 does not include parking in order to simplify traffic movements in the area since it is located at the end of Maluhia Road. The curb is extended to provide a larger pedestrian space with benches, landscaping, and signage to welcome people as they enter historic Kōloa Town. The angled parking along Kōloa Road is reverse-in for this alternative. In Alternative 2, the angled parking extends in front of Sueoka's to provide additional public parking and should remain head-in for safety through the T-intersection. There was disagreement between the traffic engineers, who felt Alternative 1 would be safer, and the County DPW, who felt traffic speeds would be slow enough to maintain the stalls in front of Sueoka's. In both alternatives, bicycles will share the roadway on Kōloa Road via sharrow lanes. See Figure 4-10.

Where Kōloa Road narrows to a 50-foot ROW, the shared use path should be maintained on the mauka side of the road, but the makai sidewalk narrowed and on-street parking limited to parallel stalls with tree wells in bioswale bulbouts (Figure 4-11).

An example of where similar pedestrian and bioswale improvements were made can be seen in Figure 4-31 and Figure 4-32 taken on Bainbridge Island off of Seattle, WA. For Kōloa Road, native plants and street furniture that will complement the existing historic buildings should be used.

***Weliweli Road Approaching Kōloa Town (2).*** For Weliweli Road just south of Kōloa Road, there are two alternative street sections—one with a 6 foot sidewalk, a 10 foot shared use path for both pedestrians and cyclists, and a 4 foot landscape strip, and the other with sidewalks, parallel parking on one side of the street, and bicycles would share the vehicle travelway. See Figure 4-12 and Figure 4-13. Alternative 1 provides a transition to the rest of Weliweli Road as it approaches Hapa Trail. However, the tradeoff is there is no on-street parking.

***Weliweli Road Connection to Hapa Trail (3).*** The concept for the next segment of Weliweli Road between Waikomo Road and Hapa Trail is to provide a shared use path and sidewalk as easements on the adjacent undeveloped land (Figure 4-14). This will provide a transition between the pedestrian/bike-only Hapa Trail and Kōloa Town where cyclists will need to slow down and be more aware of vehicle traffic and pedestrians. Street trees, landscaping, and parallel parking provide buffers between vehicles and the bike path and sidewalk fronting the new development.

If the easements on private property are not pursued, either Alternative 1 or 2 of the Weliweli Road section approaching Kōloa Road, whichever is selected, can be continued on this segment.

***Ala Kinoiki (4).*** There are two conceptual alternatives for Ala Kinoiki which has a 60-foot ROW—one that includes bike lanes and a 5 foot sidewalk on both sides of the street. The other has a separated 10 foot shared use path for pedestrians and bicycles with 5 foot shoulders on the roadway which could be used for commuter or higher-speed biking. See Figure 4-15. Landscaped bioswales and broad canopy street trees are included in both alternatives to provide drainage and filtration of runoff and shade along this major connector road. Native trees and plants are preferred as Ala Kinoiki is named in honor of the mother of Prince Jonah Kūhiō Kalaniana'ole, Princess Victoria Kūhiō Kinoiki Kekaulike. She was the daughter of Kaua'i's last king, Kaumuali'i, and sister of Queen Kapi'olani.





Figure 4-8: Conceptual Streetscape Improvements for Kōloa Town, Alternative 1

Figure 4-9: Conceptual Streetscape Improvements for Kōloa Town, Alternative 2

Figure 4-10: Kōloa Road with Angled Parking (Kōloa Key Map 1)

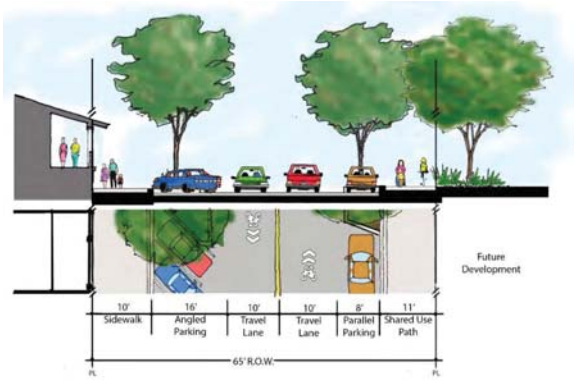



Figure 4-11: Kōloa Road with Parallel Parking (Kōloa Key Map 1)

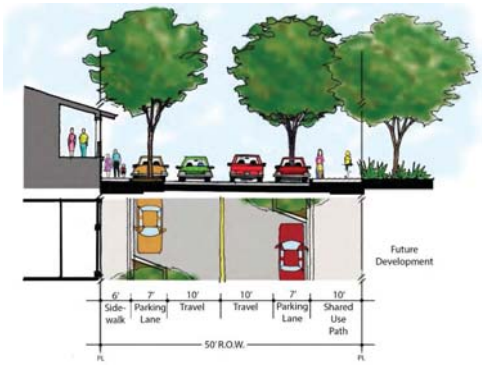



Figure 4-12: Weliweli Road Approaching Kōloa Road (Alternative 1, Kōloa Key Map 2)

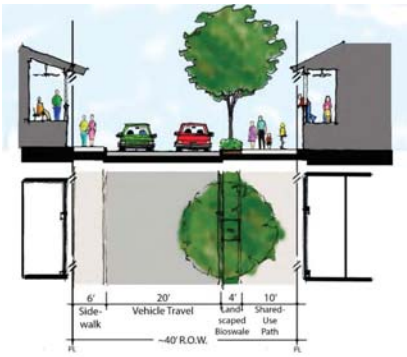



Figure 4-13: Weliweli Road Approaching Kōloa Road (Alternative 2, Kōloa Key Map 2)

Figure 4-14: Weliweli Road Connector to Hapa Trail (Kōloa Key Map 3)

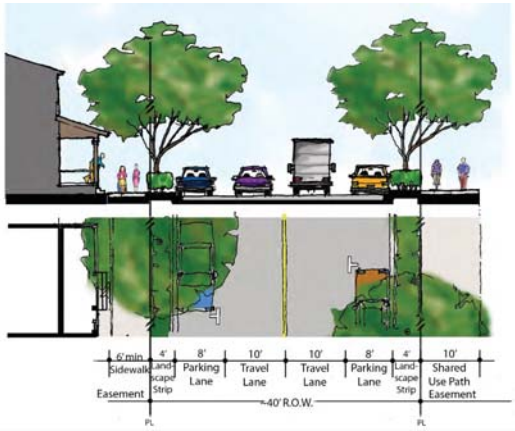
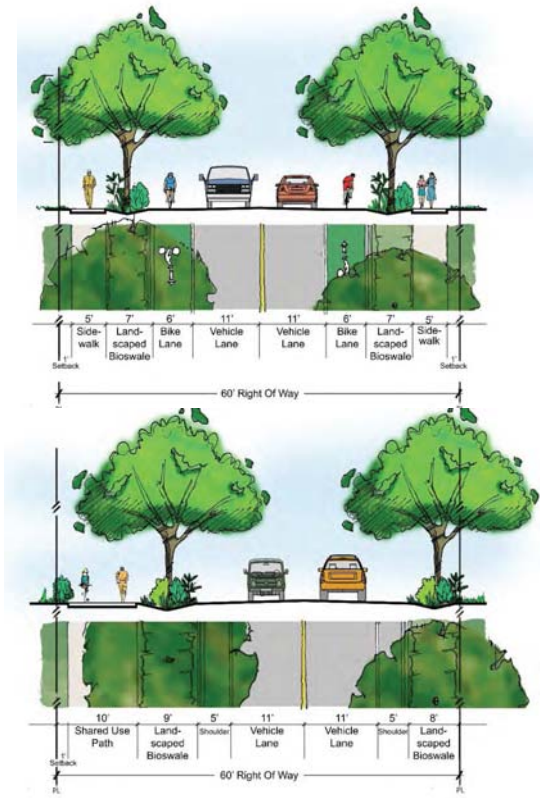



Figure 4-15: Ala Kinoiki Alternatives (Kōloa Key Map 4)



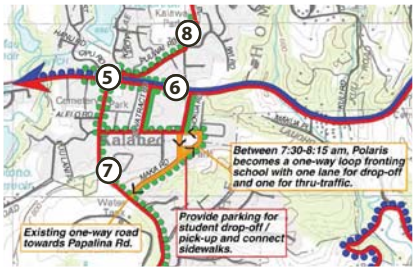





#### *4.3.4.2 Kalāheo*

For Kalāheo, the proposed conceptual streetscape and street section designs strive to improve the pedestrian environment, particularly at the Papalina Road/Kaumuali'i Highway intersection, along the highway fronting the commercial establishments and Kalāheo Neighborhood Center, and on Pu'uwai Road leading to Kalawai Park. There are also different options for bicycle facilities.

Figure 4-16: Kalāheo Key Map




***Papalina Road/Kaumuali'i Highway/'Ōpū Road (5).*** A conceptual plan for the stretch of Kaumuali'i Highway between 'Ōpū and Pu'uwai Roads is shown in Figure 4-17. Several concepts were developed during the September 2013 design studio such as a roundabout, a double roundabout, and a peanut-a-bout. However, after Fehr & Peers reviewed the designs, the simplest design consisting of improved crosswalks and adjusted signal timing made the most sense in terms of cost and limiting impacts to surrounding properties.

The typical ROW width for the highway in this area is 60 feet. However, there is reverse-in angled parking in front of the Kalāheo Neighborhood Center which encroaches on the neighborhood center property. Street trees are provided in 4-foot tree wells on 8-foot sidewalks. If overhead utilities remain above ground, the location of the poles and trees should alternate to allow for clear ADA passage. Bike lanes are painted green for increased visibility and to visually narrow the travel lanes to slow traffic through Kalāheo Town (Figure 4-19).

Another potential modification to the proposed conceptual plan shown in Figure 4-17 includes moving the County bus stops on Papalina Road to Kaumuali'i Highway to reduce travel time lost on the Kekaha-Lihu'e mainline because of the turning movements off the highway. They would likely be located in front of the future Kaua'i Kookie Factory just west of 'Ōpū Road westbound and in front of the Kalāheo Neighborhood Center eastbound. Some of the on-street parking fronting the neighborhood center would be lost if a bus stop and pullout were located there. Initial discussions with the Kawakami family were also held regarding the potential relocation of the bus stop and possible pullout as they may encroach upon their property where the future Kaua'i Kookie Factory will be located.

***Kaumuali'i Highway, Typical Section through Kalāheo (6).*** For more typical sections of the highway through Kalāheo Town fronting the commercial uses, the existing 60-foot ROW roadway can accommodate 6 foot sidewalks, 11-foot travel lanes, 6-foot bike lanes, and on-street parking on both sides of the highway (Figure 4-18 and Figure 4-20). Tree wells are located in bulbouts between parallel parking stalls so they do not encroach into the sidewalk and can be designed as landscaped bioswales to collect and filter rainwater runoff (Figure 4-21). Currently there are paved drainage swales on both sides of the ROW and few inlets which causes puddles and the pavement to degrade creating potholes and uneven surfaces.

The on-street parking and trees will provide a buffer for the establishments along the highway, creating a sheltered pedestrian space in front of the storefronts (Figure 4-21). East of Papalina Road, sidewalks should be continued all the way to Hokua Road on the makai side of the highway to provide a continuous pedestrian path to Kalāheo Elementary School, but can be terminated at Brick Oven Pizza on the mauka side of the highway. There is currently a safety barrier east of Kalāheo Café on the makai side of the highway and the sidewalk should be located on the makai side of it. On-street parking should be eliminated on both sides of the highway at Brick Oven Pizza on the mauka side and Kalāheo Café on the makai side.

At the approach to Hokua Road from Lihu'e, there is a striped median that could be converted into a landscaped entry feature to signal to drivers that they are entering Kalāheo Town and to slow down and look for pedestrians. Accent plantings but no trees should be installed. It could also be designed as a bioswale but with curbs with cutouts to allow for rainwater inflow. Rumble strips could also be installed to signal to drivers to slow down.

West of Papalina, sidewalks are recommended to be extended to the crosswalk near Holy Cross Catholic Church on the multimodal map. Further west of that, there are a few homes and churches that may also benefit from a sidewalk connection to Kalāheo Town. However, there is some grade along the shoulders which could make this difficult and the lower density of uses may not warrant such an expense. Surveys of the users could be performed to determine the need or desire for sidewalks beyond Holy Cross. Bike lanes, however, could easily be striped on the shoulders of the highway, transitioning to bikes on shoulder lanes at some point further west.

***Papalina Road (7).*** The section of Papalina Road immediately south of the highway has a relatively wide ROW that allows for on-street parking and already has sidewalks on both sides. Minor improvements such as building bulbouts at the crosswalks and widening the sidewalk as needed for ADA compliance could be made. However, further south before it crosses Pu'u Road and just as it enters the residential areas, the sidewalks end and the ROW narrows to 30 feet. Members from the community including the principal at Kalāheo Elementary School suggested adding sidewalks further south on Papalina Road to provide safer pedestrian access to and from the residential neighborhoods. One potential solution is shown in Figure 4-22. The 30 foot ROW includes two 10 foot travel lanes, a 6-foot sidewalk on the eastern side of Papalina Road and a narrowed landscape bioswale on the western side.

***Pu'uwai Road (8).*** Pu'uwai Road on the mauka side of the highway provides the only access to Kalawai Park, a popular place for sports activities and families. Currently, there are no sidewalks leading to the park from the main town core and road shoulders are narrow so most people drive to the park. A potential roadway section for the 30-foot ROW is provided in Figure 4-23. It includes a 5-foot sidewalk on the upslope side of the street with a 1 foot wide French drain and an 18-foot wide two-way travelway. The outside edges of the travelway should be painted with a wide 6-inch stripe. The downslope side of the roadway remains much as it is with a swale on the shoulder.

Figure 4-17: Conceptual Streetscape Improvements for Kaumuali'i Highway and Papalina Road (Kalāheo Key Map 5)

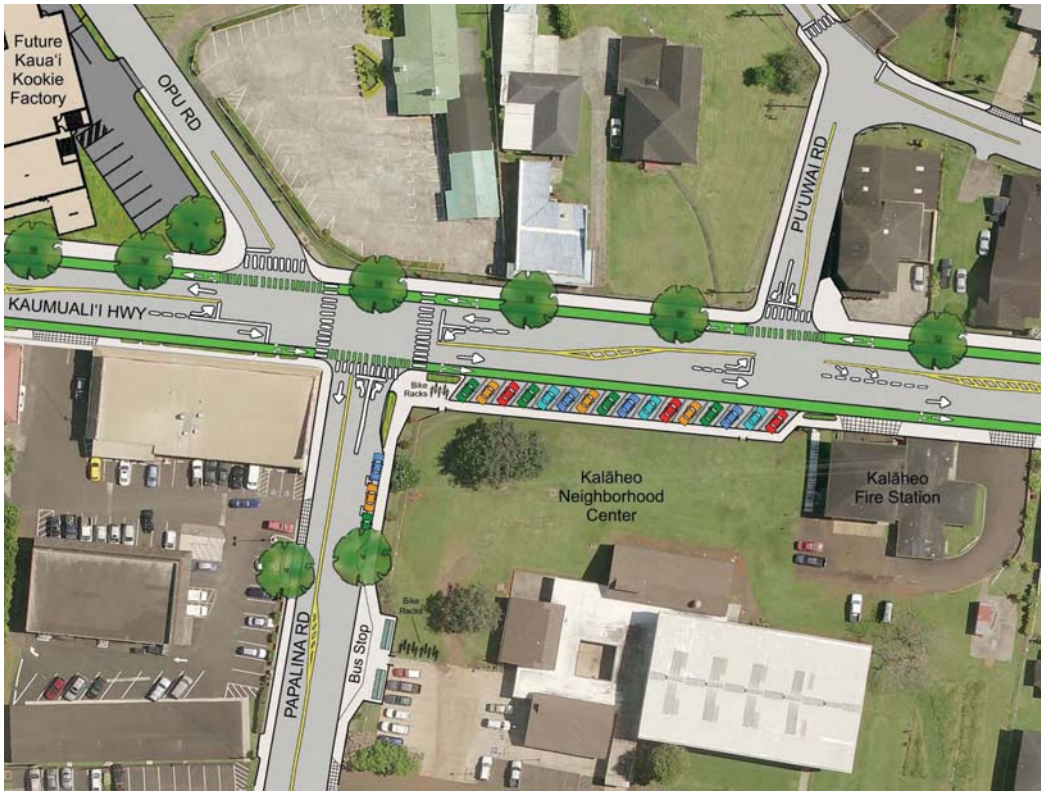







Figure 4-18: Conceptual Streetscape Improvements for Kaumuali'i Highway Fronting Commercial Uses (Kalāheo Key Map 6) and Hokua Road

Figure 4-19: Kaumuali'i Highway with Left Turn Lane and Bike Lanes (Kalāheo Key Map 5)

Figure 4-20: Typical Kaumuali'i Highway with Bike Lanes and On-Street Parking (Kalāheo Key Map 6)

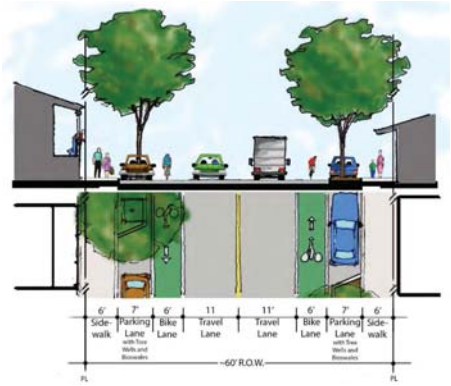



Figure 4-21: Perspective of Kaumuali'i Highway with Bike Lanes and On-Street Parking (Kalāheo Key Map 6)

Figure 4-22: Papalina Road (Kalāheo Key Map 7)

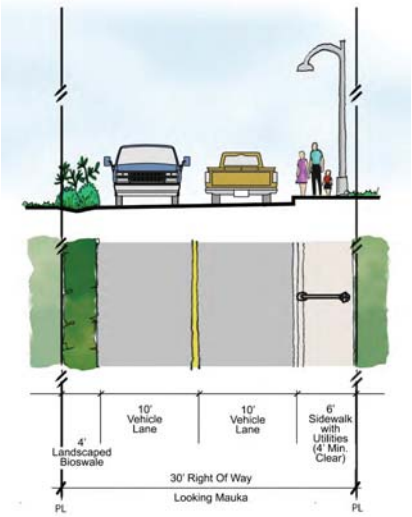
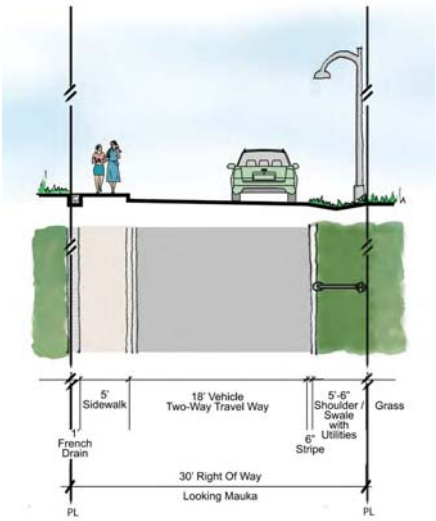



Figure 4-23: Pu'uwai Road (Kalāheo Key Map 8)



#### 4.3.4.3 Po'ipū

As noted earlier, street sections were not drawn for Po'ipū Road as improvements to Po'ipū Road from Kōloa Road to the Grand Hyatt are already on the STIP and the designs will be based on those developed during the County's Po'ipū Road Charrette. Examples of the proposed street sections developed during the Po'ipū Road Charrette are shown in Figures 4-25 to 4-27 with an illustrative rendering provided in Figure 4-28.

The only additional design feature to consider adding are landscaped bioswales within the 120 foot-wide Po'ipū Road ROW that runs between the roundabout and the Grand Hyatt to help mitigate the surface runoff that currently floods the makai areas such as the Po'ipū Beach Park parking lot and Kāneiolouma. Private properties mauka remain responsible for mitigating the drainage flows from their individual properties but a preliminary drainage study should be done to determine whether some of the existing flows can be mitigated with bioswales along Po'ipū Road. The bioswales could be landscaped with native and appropriate Polynesian-introduced plants that support interpretive features planned for this major roadway.

Figure 4-24: Po'ipū Key Map

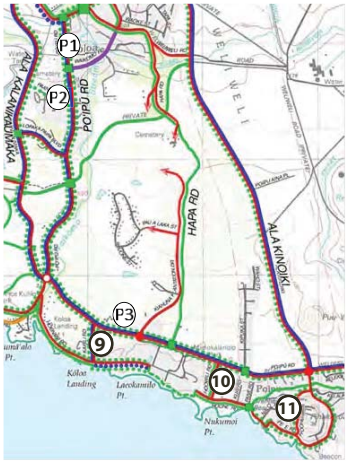



Figure 4-25: Po'ipū Road, Section located in Kōloa Town near Kōloa Road (Po'ipū Key Map P1)

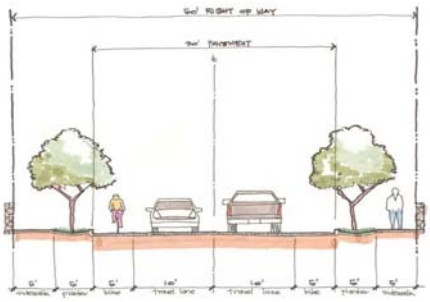


Figure 4-26: Po'ipū Road, Section located near Blakes Lane (Po'ipū Key Map P2)

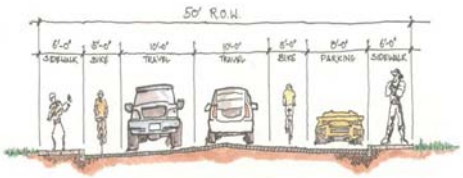



Figure 4-27: Po'ipū Road, Resort Section (Po'ipū Key Map P3)

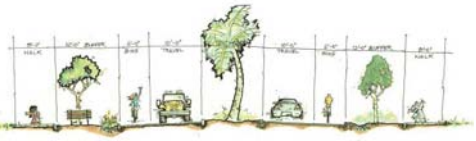


Figure 4-28: Po'ipū Road, Resort Section Rendering (Po'ipū Key Map P3)

***Kapili Road (9).*** Kapili Road is one of the mauka-makai connector roads between Po'ipū Road and Ho'onani Road which serves several large visitor properties such as the Sheraton Kaua'i Resort and the Po'ipū Kapili as well as Kōloa Landing which is under construction and the Sheraton expansion project. The existing ROW is 50 feet and there are existing 4 foot sidewalks on portions of the road. The conceptual section proposes to build upon the existing facilities, extending the sidewalks by 2 feet to 6 feet wide for the entire length on both sides and adding bike lanes and tree-lined bioswales (Figure 4-29).

***Ho'owili Road (10).*** Ho'owili Road runs between Mano'okalanipo Park and Kāneiolouma, two major cultural sites. It also provides the main access to Po'ipū Beach Park and the parking lot serving the park. The proposed section includes an 8 foot wide sidewalk on the side of the park, bike lanes, and landscaped bioswales (Figure 4-30). Currently the beach parking lot floods during heavy rainfall events, rendering much of the parking lot inaccessible. The bioswales as shown would run continuously down the length of Ho'owili Road, providing large landscaped areas to help with collecting, filtering, and infiltrating rainwater runoff. Loulu palms and native plants, particularly those native to Po'ipū, should be installed to highlight the cultural importance of the area.

***Ho'ohu Road (11).*** Ho'ohu Road is a narrow residential street that winds around the pu'u Pihakekua above Makahū'ena Point and connects Pe'e Road to Po'ipū Road. The street should be redesigned as a yield street to slow traffic, provide on-street parking, and allow for pedestrian and bicycle use. If road shoulders are provided, they should be striped with a wide 6-inch stripe to improve their visibility.





Figure 4-29: Kapili Road (Po'ipū Key Map 9)

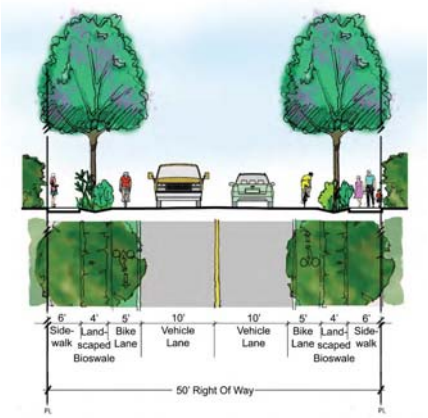
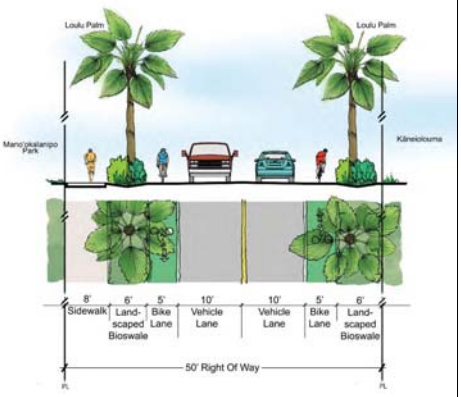
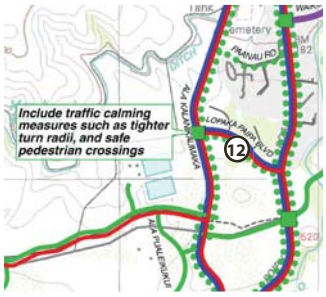



Figure 4-30: Ho'owili Road (Po'ipū Key Map 10)




#### 4.3.4.4 Lopaka Paipa Boulevard

***Lopaka Paipa Boulevard Connection to Ala Kalanikaumaka (12).*** Roughly halfway between Kōloa and Po'ipū, lies Lopaka Paipa Boulevard. Currently, Lopaka Paipa Boulevard stops at a dead-end, roughly 250 feet short of intersecting Ala Kalanikaumaka. The construction of the connection through to Ala Kalanikaumaka is triggered when Phase II of Kōloa Estates starts construction. The 60 foot right-of-way to connect the road through to Ala Kalanikaumaka has already been subdivided (TMK 2-6-14:42), but is still owned by Kukui'ula Development Company, LLC.




Community concern has been raised regarding increased traffic speeds and reduced safety along Lopaka Paipa Boulevard once the connection is made. However, other community members have called for the much needed east-west connection to alleviate traffic along Po'ipū Road. To address these concerns, the multimodal plan recommends traffic calming measures and intersection improvements to help reduce traffic speeds such as tighter turning radii and crosswalks with safety improvements to make crossing safer. There was also discussion to investigate whether a second east-west connector road could be built further south in the area of the new regional park to further improve connectivity. The cane haul road alignment was considered, however, it runs through a federal critical habitat so it was a poor candidate. Further studies for an additional east-west connector should be continued in conjunction with area roadway improvements.

### 4.3.5 Streetscape Design

Wherever pedestrian activity is emphasized and encouraged, elements that make the pedestrian environment safer and enliven the streetscape such as benches, signage, and other amenities should be provided. Bulbouts at crosswalks should be included to shorten the distance pedestrians must traverse across vehicle lanes. These can be incorporated into on-street parking layouts and designed as landscaped bioswales to collect and filter rainwater runoff, provide shade, and beautify the area (Figure 4-31). Native and Polynesian-introduced plants could be installed and interpreted to add an educational component.

#### *4.3.5.1 Wayfinding*

To highlight the rich history and culture of the Planning District, the design of wayfinding elements such as signage (address, directional, scenic byways/heritage trails), sidewalk paving, crosswalks, and public artwork should incorporate historical and cultural elements to celebrate and commemorate the heritage of this area. Interpretive plaques and signage should be installed on or at historic structures and places where they will not be intrusive but are accessible by the public. As an example, the Holo Holo Kôloa Scenic Byway will have 18 signs installed along its route. It has the same logo as the other Hawai'i Scenic Byways recognized by the State and will help educate residents and visitors alike.

Other cultural signage may include moku and/or ahupua'a markers along roadways that indicate the boundaries of the traditional land districts. An educational piece may accompany these signs where appropriate.

Figure 4-31: Inviting Streetscape with Angled Parking and Bulbouts at the Corners

Figure 4-32: Landscaped Bulbouts with Bioswales and Street Furniture

### 4.3.6 Maintenance

Maintenance of the proposed streetscapes as well as the designs being built in the Lihu'e Town Core and the Ke Ala Hele Makalae will require the County to develop a plan for ongoing maintenance of these specialized environments. Options include a County-based urban forestry maintenance team that could reside within the Department of Parks and Recreation or training Division of Park Maintenance staff to care for the street trees, urban landscaping and bioswales. These services could also be contracted out with landscape contractors. Funding for ongoing maintenance could be paid through several mechanisms such as collecting parking fees for public parking, public-private partnerships with business and resort associations, or the creation of improvement districts or community facilities districts as described in Section 6.3.2.

In addition, many from the community voiced the need to properly maintain the existing road shoulders throughout the Planning District as they are used for bicycling and pedestrians. Overgrown vegetation and debris can cause hazardous conditions. There was also concern voiced over adjacent property owners who landscape or encroach upon the public right-of-way especially when those encroachments block safe passage along the roadways. Enforcement to clear those encroachments is recommended.

### 4.3.7 Street Trees

To provide a consistent streetscape and aid in wayfinding, the following is a list of recommended street trees for the major roadways. The use of natives and the continuation of existing trees are the basis for the selections. Different options are provided to assist with selection at the time of installation and provide flexibility should availability of certain trees be limited.

Table 4-4: Recommended Street Trees

| Roadway | Street Tree |
|---|---|
| **Kôloa and Maluhia Roads within Kôloa Town SPA** | Monkey Pod (*Samanea saman*),<br>Royal Poinciana (*Delonix regia*), or<br>Mānele (*Sapindus saponaria*) |
| **Weliweli Road** | Giant Crepe Myrtle (*Lagerstroemia speciosa*) or<br>Māmane (*Sophora chrysophylla*) |
| **Ala Kinoiki** | True Kamani (*Calophyllum inophyllum*),<br>Mānele (*Sapindus saponaria*), or<br>other large native canopy tree |
| **Po'ipū Road (between the roundabout and Grand Hyatt)** | Monkey Pod (*Samanea saman*) or<br>True Kou (*Cordia subcordata*) |
| **Kaumuali'i Highway in Kalāheo** | Lama (*Diospyros sandwicensis*) or<br>Lonomea (*Sapindus oahuensis*) |
| **Ho'owili Road** | Loulu (*Pritchardia aylmer-robinsonii, P remota*) |
| **Kapili Road** | True Kou (*Cordia subcordata*) or<br>Milo (*Thespesia populnea*) |





## 4.4 KAUA'I NATIVE PLANTS & EXCEPTIONAL TREES

### 4.4.1 Kaua'i Native Plants

The following are plants native to Kaua'i that should be considered in any landscape design or installation. Those which have been found as fossils in the Makauwahi Cave Reserve are known to be native or introduced early in human history to the South Shore (Burney et al 2001) and are noted with a double asterisk (**). Natives and particularly those native to South Kaua'i should be used in the planting areas of the public streets as shown in the conceptual street sections and integrated into interpretive and educational materials.

Table 4-5: Kaua'i Native Plants

| COMMON NAME | BOTANICAL NAME |
|---|---|
| ***PALMS*** | |
| **Loulu**** | ***Pritchardia aylmer-robinsonii, **P remota, P. hardyi, P. minor, P. waialealeana* |
| ***TREES*** | |
| **Kukui**** | ***Aleurites moluccana* |
| **Koa** | *Acacia koa* |
| **Koaie (Koai'a)** | *Acacia koaia* |
| **True Kamani** | *Calophyllum inophyllum* |
| **True Kou**** | ***Cordia subcordata* |
| **Lama** | *Diospyros sandwicensis* |
| **'Ōhi'a Lehua** | *Metrosideros polymorpha* |
| **Munroidendron*** | **Munroidendron racemosum* |
| **Hala**** | ***Pandanus tectorius* |
| **Papala Kepau** | *Pisonia spp.* |
| **Ho'awa** | *Pittosporum kauaiensis, P. napaliensis* |
| **Alahe'e** | *Psydrax odorata* |
| **Lonomea**** | ***Sapindus oahuensis* |
| **Mānele** | *Sapindus saponaria* |
| **Māmane** | *Sophora chrysophylla* |
| **Milo** | *Thespesia populnea* |
| ***SHRUBS*** | |
| **Maiapilo**** | ***Capparis sandwichiana* |
| **'Akoko** | *Chamacyse celastroides* |
| **'A'ali'i**** | ***Dodonea viscose* |
| **Na'u*** | **Gardenia brighamii* |
| **Hau Kuahiwi** | *Hibiscadelphus distans* |
| **Native Hibiscus*** | *Hibiscus kokio saintjohnianus (St. John's and Yellow St. John's), H. waimeae, *H.w. spp. Hanerae, *H. immaculatus, *H. clayi, H. kahilii, Kokia kauaiense* |
| **Nehe** | *Lipochaeta succulent, Lipochaeta conata* |
| **COMMON NAME** | **BOTANICAL NAME** |
| **Kulu'i*** | **Nototrichium sandwicensis* |
| **Mokihana (Island Flower)** | *Melicope anisata* |
| **Naio**** | ***Myoporum sandwicense* |
| **'Ulei** | *Osteomeles anthylidifolia* |
| **Alahe'e** | *Psydrax odorata* |
| **Hao**** | ***Rauvolfia sandwicensis* |
| **Naupaka**** | ***Scaevola taccada* |
| **'Akia**** | ***Wikstroemia uva-ursi* |
| **'Iliau** | *Wilkesia gymnoxiphium* |
| ***GROUND COVERS*** | |
| **'Uki'uki** | *Dianella sandwicense* |
| **Pa'u o hi'iaka**** | ***Jacquemontia ovalifolia subsp. sandwicensis, Plumbago zeylanica* |
| **Ilie'e**** | ***Plumbago zeylanica* |
| ***VINES*** | |
| **'Awikiwiki** | *Canavalia kauaiensis, Vigna marina* |
| ***GRASSES*** | |
| **'Ahu'ana** | *Cyperus javanicus* |
| **Makaloa** | *Cyperus laevigatus* |
| **Pili** | *Heteropogon contortus* |
| **Akiaki** | *Sporobolus virginicus* |
| ***FERNS*** | |
| **'Ihi'ihilauakea** | *Marsilea villosa* |
| **Palapalai** | *Microlepia strigosa* |
| **Kupukupu** | *Nephrolepis cordifolia* |
| ***Notes: *endangered species (specifically marked under botanical name)<br>**Found as fossils in the Makauwahi Cave sediments or close relative (Burney et al. 2001)*** | |

### 4.4.2 Exceptional Trees

The Exceptional Trees noted in 3.2.5 are also shown on the Land Use Map in Figure 4-1 to emphasize the importance of protecting them in future land use and improvement projects including streetscape improvements. In addition, the monkey pod trees along Kôloa Road between Po'ipū and Waikomo Roads and Po'ipū Road between Kôloa and Waikomo Roads should be protected and adopted as Exceptional Trees.

Recently, the County contracted with an arborist to perform a preliminary study on the health of the trees along the famed tree tunnel on Maluhia Road. He found that 85 of the approximately 650 total *eucalyptus robusta* (swamp mahogany) trees and stumps may need further care and that further assessment should be performed (Borgatti 2014). The Mayor has convened a Task Force to further investigate the issue of tree tunnel preservation.

## 4.5 NATURAL & CULTURAL HERITAGE RESOURCES

The Natural and Cultural Heritage section identifies policies to guide the management and protection of South Kaua'i's environmentally and culturally sensitive areas (Figure 4-33).

The vast majority of the natural and cultural heritage resources in the region are located within the Natural, Agricultural, Water Bodies & Wetlands, and Park & Recreation land use designations on the South Kaua'i Community Plan Land Use Map.

Of the estimated 31,300 acres of land within the Planning Area, approximately 79.0 percent is in natural and open space uses, including 28.0 percent designated as Natural, 42.2 percent as Agriculture, 5.6 percent as Water Bodies & Wetlands, and 3.2 percent as Park & Recreation (see Figure 4-1). Areas designated as Natural include lands with significant environmental resources, including watersheds; sites with scenic, historic, cultural, archaeological or ecological significance; and areas with natural ecosystems of endemic plants, fish and wildlife. They also include lands that may be impacted by natural hazards such as floodways.

### 4.5.1 Watershed Management

The wet upland watershed areas are the water source for year-round flowing perennial streams as well as the recharge area for groundwater drinking sources. The guiding principal involves managing the watershed mauka to makai in recognition of the ecosystem services and interrelatedness of nature. The policies and guidelines are organized into four areas of watershed management: watershed planning and management, runoff and erosion prevention, habitat protection, and water quality and resource management.

#### *4.5.1.1 Watershed Planning and Management*

a. Collaborate with State agencies (Office of Planning, DLNR, DOH, Soil and Water Conservation Districts), federal agencies (U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service), and local organizations (e.g., Kaua'i Watershed Alliance) in order to plan and manage watersheds.
b. Prepare a watershed management plan.
c. Expand watershed alliance by encouraging other landowners and organizations to participate. The presence of the Kaua'i Watershed Alliance is promising for more active collaborative management. Ideally, it would be willing to expand its membership and jurisdiction to cover more of the Planning District.
d. Form or encourage a community nonprofit organization to prepare a watershed management plan. Kaua'i Watershed Alliance priorities rightfully focus island-wide and priorities do not include the Planning District. To focus on Planning District needs, form a community nonprofit or seek an existing relevant nonprofit organization to prepare a Watershed Plan to qualify for EPA Clean Water Act Section 319 Nonpoint Source Grant implementation funds.

#### *4.5.1.2 Runoff and Erosion Prevention*

a. Manage land use and earth-moving activities from the standpoint of the entire watershed, considering important characteristics such as scenic landscape features, historic sites, native endangered or threatened species of plants and animals, and other special resources.
b. Filter and manage stormwater and rainwater runoff prior to entering streams and the ocean during construction as well as ongoing maintenance. Integrate green infrastructure with landscaping.
c. Establish ungulate and feral animal management along streams and drainageways. A significant proportion of the highly erodible soils in the Conservation District are along drainageways, implying a need for watershed management practices such as undergrowth maintenance with feral animal management and riparian buffers.
d. Establish and implement soil conservation management practices for IAL. The Māhā'ulepū IAL has soils that are potentially highly erodible, implying a need for soil conservation practices that could be managed through NRCS conservation plans.

#### *4.5.1.3 Habitat Protection*

a. Provide protection for critical habitats. There are critical habitats unprotected by a Conservation District or other means in the vicinity of Kōloa and Po'ipū. Establish critical habitat protection areas.
b. Support funding applications for parcels with existing conservation priorities or subject to riparian buffer permit conditions (e.g., USDA Conservation Reserve Enhancement Program and other funding).

#### *4.5.1.4 Water Quality and Resource Management*

a. Balance the restoration of stream flow, public safety, and water required for agricultural uses.
b. Facilitate County approvals of dam decommissioning applications in watersheds where there is a watershed plan.
c. Expedite review of dam decommissioning applications based on documentation requirements.
d. Establish Total Maximum Daily Loads (TMDL) for impaired streams. The State Department of Health has designated all three perennial streams in the Planning District—Waikomo, Lāwa'i, and Wahiawa—as impaired streams that do not meet state water quality standards.
e. Conduct marine water quality monitoring in context with the larger watershed area. Although the water quality of the popular beaches in Po'ipū is monitored by the Department of Health, the monitoring program is primarily for recreational public health, not for watershed or nearshore environmental quality.
f. Test for cesspool contaminants during marine water quality monitoring. The disposition and effect of cesspool seepage on the groundwater and nearshore water quality is unknown.

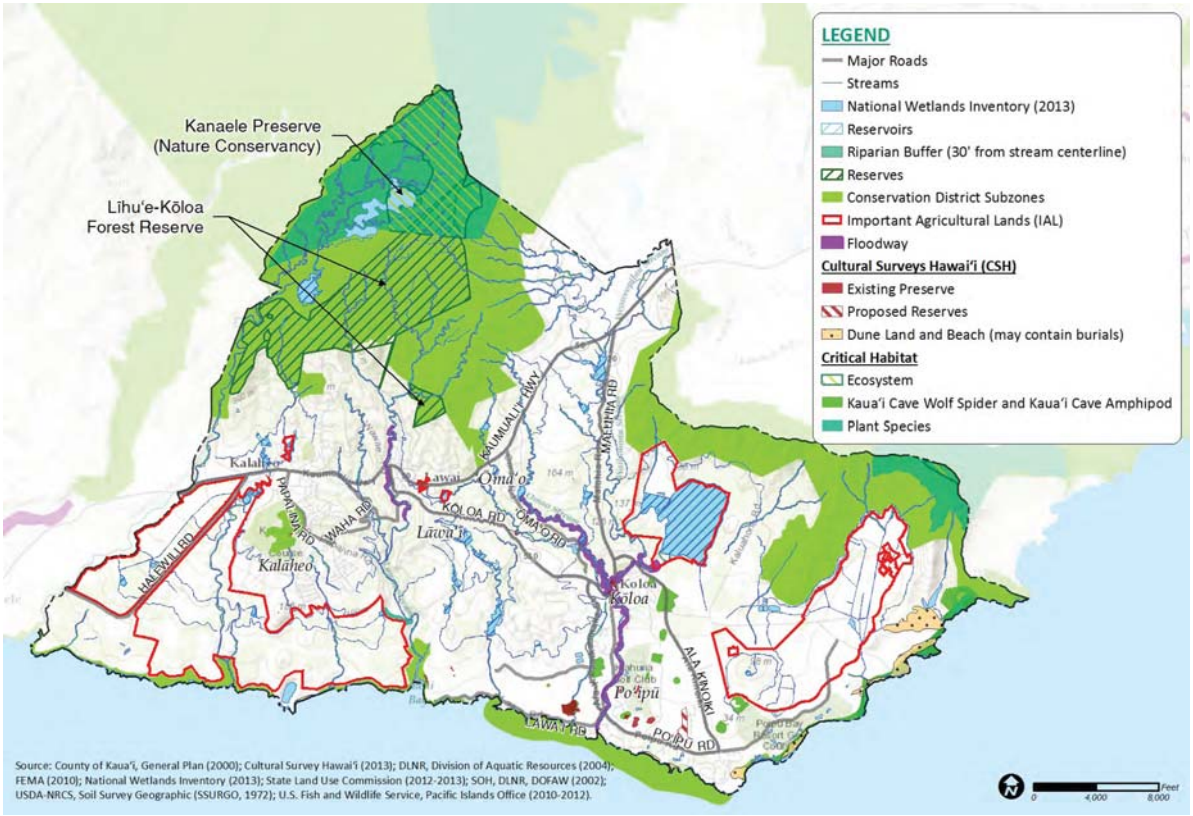
### 4.5.2 Cultural Stewardship & Interpretation

Kaua'i is known for its beauty and the variety of its landscape. The native Hawaiian culture is intimately linked to physical places, many of which have special cultural significance. Within the Planning District, these features define the place, and the precious opportunity to preserve and restore what remains, and educate visitors and residents alike about the history and heritage of South Kaua'i, still exits.





Figure 4-33: Areas for Protection



The natural landscape (Mount Kahili, Hā'upu Ridge, Māhā'ulepū, coastal pali and dunes, gulches, and shoreline areas) and cultural landscape (Kōloa Field System, Kāneiolouma, Nōmilu Fishpond, Lāwa'i Kai, Kukuiolono, Hapa Trail, and old plantation landmarks) are intimately entwined and define the South Kaua'i communities (see Figure 3-1). Preservation of these resources is essential in maintaining the rich heritage of South Kaua'i.

#### *4.5.2.1 Stewardship*

a. In conformance with the General Plan, development projects should be designed to preserve, protect and enhance heritage resources and South Kaua'i's unique "sense of place."
b. Restore significant historic sites.
c. As noted in the General Plan, "Preserve public views that exhibit a high degree of intactness or vividness. "Intactness" refers both to the integrity of visual patterns and the extent to which the landscape is free from structures or other visually encroaching features. "Vividness" relates to the memorability of a view, caused by contrasting landforms which create striking and distinctive patterns." An example is the silhouette of Mt. Hā'upu.
d. Assist private owners to secure grant funding, tax incentives and other financial benefits for restoration, preservation and interpretation.
e. Preserve Māhā'ulepū's significant natural and cultural features and protect the dune systems along the coastline where burials remain interred as well as the Makauwahi Cave and Waiopili Heiau. Involve the community in planning for the future of Māhā'ulepū. Planning should take into consideration various interests and factors, including but not limited to: the long-term need for managing Māhā'ulepū lands to preserve their significant natural and cultural features; the owner's desire to develop revenue-producing uses in a way that is sensitive to the area's unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park (GP 2000).
f. Continue to support the stewardship and restoration of Kāneiolouma.
g. Restore or reuse the Kōloa Mill structures if economically feasible.
h. Protect and restore the Nōmilu Fishpond and the salt pans surrounding it for food production and/or ecotourism at the discretion of the private owners. Besides being a unique fishpond, Nōmilu also was known to have the finest salt.
i. Protect Kukuiolono's geological, cultural, and recreational asset. It is the largest cinder cone in the Planning District, was once used to set beacons for fishermen, was the site for the Kukuiolono Heiau (destroyed), and is now a park and golf course.

#### *4.5.2.2 Interpretation and Education*

a. Develop an interpretive story for the Planning District using the Heritage Resources Map in Figure 3-1, highlighting the significant natural and cultural resources of the area and connecting these resources through a system of wayfinding techniques.
b. Develop interpretive story of ahupua'a and historic resources. Wahiawa Valley seems to have been a rich settlement area that may have been less historically disturbed than other ahupua'a in the Planning District. It could offer examples of kula agricultural terraces, ocean uses, historic plantation infrastructure, and plantation camps. There is also a petroglyph site on the Hawai'i Register of Historic Places.
c. Develop interpretive story of Kōloa Field System. The 1978 Kōloa-Po'ipū-Kalāheo Development Plan proposed leveraging Waikomo Stream for streamside enhancement through Kōloa Town. This revitalization could be further reinforced with interpretation of the Kōloa Field System, an excellent example of an elaborate pre-contact irrigation system fed by Waikomo Stream.
d. Develop interpretive story of Māhā'ulepū. The Makauwahi Sinkhole, extensive taro lo'i, and first sugar mills in the State of Hawai'i by Ladd and Company provide significant findings of interest to scientists, historians, and ecotourists. The historic sugar mill is on the State and National Register of Historic Places.
e. Develop interpretive story for sugar plantation era. The system of ditches and reservoirs, together with the Kōloa Sugar Mill, still remain that could provide the backbone to interpret the sugar plantation history in the Planning District. The location of plantation camps could also be commemorated.
f. Create a network of South Kaua'i scenic byways building from those identified in the Holo Holo Kōloa Scenic Byways. Promote it as the South Kaua'i Heritage Corridor.
g. Complement scenic vistas by providing facilities such as roadside pull-offs and stops so travelers have greater enjoyment, especially along Scenic Byways.

#### *4.5.2.3 References*

a. Supplement the GP Heritage Resources Map for Kōloa-Po'ipū-Kalāheo with the SKCP Points of Interest Map.
b. Work with The Nature Conservancy and the Office of Hawaiian Affairs to improve the "Hawaiian Footprint" predictive maps identifying areas that have potential archaeological resources or burials to prevent damage to archaeological sites. These maps are available in geographic information system (GIS) format.
c. Verify the Hawaiian Footprint map includes Wahiawa Valley (near the stream), steep gulch areas in Kalāheo and Lāwa'i, Kōloa ahupua'a, areas with high concentrations of known surface archaeological features, and lava tubes with surface openings.
d. Identify probable burial areas on the Hawaiian Footprint map. Probable areas could include the dunes fringing Keoneloa Bay (particularly west side), Kāmala Point near Kawailoa Bay, the dunes fronting Hā'ula Bay, the slopes and shoreline of Wahiawa Stream, and the lava tubes and dunes of the region. Some sites (besides Keoneloa dunes and Māhā'ulepū dunes) that have documented burials include Kukui'ula and Kukuiolono.

### 4.5.3 Natural Hazards & Climate Change

Kaua'i is susceptible to a variety of natural hazards such as flooding, hurricanes, tsunamis, coastal erosion, landslides and rockfalls. While it is difficult to predict such occurrences, it is reasonable to assume that future incidents are likely, given historical events. To prepare for potential impacts due to natural hazards, potential evacuation routes and shelter locations are shown in Figure 4-34. However, a comprehensive emergency preparedness plan should be developed.

The effects of climate change and other human-made hazards can be minimized but may not be completely avoided. Sea level rise, beach loss, dam breaches, drought, and wildfires all pose a threat to human life and is therefore an important public health and safety issue that needs to be considered when developing policies for the location and pattern of future development in accordance with Hawai'i State Planning Act Priority Guidelines.

Policies and guidelines in this section provide guidance for further study and actions to help minimize loss of life and damage to property caused by natural or human-made hazards. Some overarching guiding principles outlined by the KC3HA study to help in moving forward include:

1. Use credible climate and hazard science to inform and guide decisions.
2. Minimize coastal hazard risks through planning and development standards.
3. Avoid or minimize coastal resource impacts when addressing risks to new or existing development.





#### *4.5.3.1 Risk Assessment and Adaptation*

a. Develop a community-scale risk and vulnerability assessment for coastal hazards due to climate change and sea level rise (SLR) in South Kaua'i with particular focus on critical infrastructure facilities (roads, water, wastewater, power, and public facilities such as hospitals, fire, police, schools) and the vulnerability of beach resources and resort facilities. Explore the full range of options to manage the impacts from climate change and SLR including accommodation, protection, retreat/restoration, prevention, and procedural solutions. Examples include:
   - Coastal hardening, which can lead to exacerbating erosion and beach loss
   - Asset protection, such as building higher levies (which may still fail in extreme events)
   - Shoreline/hazard retreat, which may involve loss of property use and value and high construction costs
   - Beach nourishment, which may have high recurring costs if systems are not internally stabilized
b. Develop an adaptation plan for areas with high SLR-related hazards, including coastal areas facing increased erosion and wave inundation. Alternative roadway alignments mauka should be explored for areas projected to be impacted by SLR and inland flooding.
c. Prepare a comprehensive drainage study for existing and projected runoff from changing weather patterns and SLR, and appropriate drainage facilities designed and constructed in conjunction with roadway and other infrastructure improvements.
d. The NOAA SLR flooding hazard layers show little flooding or coastal change at the shoreline. Historical shoreline change studies indicate a long-term trend of shoreline erosion for most of this area, which is sure to increase with increasing SLR. Detailed modeling and mapping of shoreline change and wave inundation hazards is needed to determine the severity hazards to coastal properties and beach resources, which is not shown in the NOAA data.
e. Develop a regional coastal and beach management plan (County, DLNR, UH Sea Grant) to conserve the beach resources critical to the local visitor industry and community, promoting alternatives to increased coastal armoring such as beach restoration.

#### *4.5.3.2 Emergency Preparedness*

a. Prepare a comprehensive emergency preparedness plan for potential impacts due to natural hazards and climate change. Develop strategies to protect infrastructure and critical facilities. Include public education to increase risk awareness.
b. Work with community groups to hold periodic evacuation training exercises.
c. Develop a preparedness certification program for communities as a systematic guide.
d. Require resorts to develop a self-sheltering plan for tsunami and hurricane events. There are approximately 7,300 visitors at any one time requiring shelter during a hurricane event within the Planning District. Resorts need to be ready to self-shelter visitors and to build and rebuild in accordance with flood-proofing standards while minimizing recurrent damage claims.

#### *4.5.3.3 Design and Construction*

a. Update design standards and incentives to change building practices and encourage hazard mitigation.
b. Design improvements within the VE Flood Zone to reduce and/or minimize the risk of damage and injury due to shoreline inundation. Avoid high-value development in VE and other high risk areas if possible.
c. New shoreline protection/hardening structures such as seawalls and revetments should be prohibited. Discourage hardening on or of intact dunes. Implement offshore solutions that take advantage of natural processes to build back the beach such as groins, breakwaters, or artificial reefs.
d. Mitigate hazards during infrastructure planning.
e. Retrofit buildings to withstand various hazard conditions or adapt to accommodate SLR and natural hazards.
f. Establish a local reserve fund for public mitigation measures, and incorporate hazard mitigation into all publically funded projects.
g. Clarify with FEMA whether the updates to the VE zone will account for the latest tsunami run-up modeling, and sea level rise. Clarify with FEMA whether the resorts built in the VE zone trigger any policies relating to repetitive losses that would affect their claims or future ability to rebuild.
h. Minimize wildfire risk by using fire-resistant building materials in new residential development, ensuring multiple ingress/egress from residential subdivisions, and creating and maintaining fuel breaks around all residential subdivisions.
i. Develop post-disaster reconstruction guidelines and permit review processes to help prioritize projects and aid recovery. Maui County is partnering with Sea Grant to develop such guidelines and protocols for the conservation of coastal resources and protection of coastal communities. They are expected to be completed in early 2015.

#### *4.5.3.4 Shelters and Evacuation*

a. Provide adequate emergency shelter capacity for residents and visitors. Verify if existing shelter capacity can accommodate the projected residential and visitor populations and whether any additional hardening of shelter structures is necessary. Continue to accommodate special needs and pets.
b. Prioritize Kōloa and Kalāheo Schools for hazard mitigation funding to meet hurricane shelter standards.
c. Designate emergency shelters to serve the west (Kukui'ula 20-ac park), central (Kōloa School and Knudsen Park), and east (Gateway project) to have adequate parking, restroom, and resting facilities.
d. Coordinate resort self-sheltering plan for hurricanes that accounts for hurricane surge flooding.
e. Identify specific evacuation routes and meeting locations.
f. Identify emergency bypass routes during rockfall events, flooding, and other major roadway blockages.

#### *4.5.3.5 Mitigation*

a. Continue to update as required the Kaua'i Hazard Mitigation Plan and consider developing a specific plan for South Kaua'i in line with the FEMA Whole Community Approach. Include consideration of community resiliency and compliance with federal rules to ensure that Kaua'i and South Kaua'i will be eligible for federal disaster recovery and mitigation funding including non-emergency disaster assistance for preparedness grants, hazard mitigation grants, pre-disaster mitigation grants, public assistance grants, fire management assistance grants, and flood mitigation assistance in order to protect life and property in the event of a natural disaster (https://www.fema.gov/hazard-mitigation-planning-resources#3).
b. Develop sustainable budget for beach nourishment. Consider an alternative funding package for beach nourishment, including a combination of sustained funding sources such as CFD, TAT (Transient Accommodation Tax, and TIF (Tax Increment Financing).
c. Develop one-time programmatic approval for beach nourishment with subsequent expedited checklist review (DLNR/ACOE/DOH/EPA).
d. Identify and mitigate rockfall hazards especially along Kaumuali'i Highway in the vicinity of Kalāheo and Lāwa'i.
e. Ensure periodic inspection and management of all reservoirs and dams to avoid breach.
f. Maintain undeveloped areas to minimize risk and loss to wildfire.
g. Promote and provide for beach re-nourishment for coastal areas suffering erosion.
h. Utilize reservoirs and dams to extinguish wildfires. Nearly half of the county's inventory of reservoirs (created by earthen dams) is located within the Planning District. Provided they are inspected and managed according to DLNR requirements, these reservoirs are potential assets for wildfire fighting water source, irrigation, and ecotourism fishing.

Figure 4-34: Emergency Evacuation Routes & Shelters

## 4.6 PARKS & RECREATION

There is a mix of public and private facilities shown in the Parks & Recreation land use designation in Figure 4-1. The Parks & Recreation section identifies policies to guide the management of South Kaua'i's varied park resources and recreational opportunities. They should be considered in conjunction with the recommendations from the County's recently completed *Kaua'i Parks and Recreation Master Plan* (2013). Recommendations from this plan are marked with an asterisk (*).

*Kukui'ula Boat Harbor.*

### 4.6.1 Park and Recreational Facilities

a. *Prioritize resources at Po'ipū Beach Park including expanding the beach park areas and ocean recreation opportunities, as this is the premier beach park for South Kaua'i and a major economic driver for the Po'ipū resort area. Restore and maintain tombolo and beaches. Conduct engineering study of drainage requirements for periodic flooding in parking lot.
b. *Improve neighborhood parks including: pavilion and playground equipment at Waikomo Park; gateball field and shade trees at Weliweli Park; and pavilion, small comfort station, and park furniture at 'Ele'ele Nani Park.
c. Expand the mix of recreational facilities to include:
   - Community gardens
   - Tot lot/playground
   - Skate park/motocross
   - Expanded farmers markets
   - Bike tracks
   - Outdoor amphitheater
   - Gymnasium
   - Swimming pool
   - Public bathrooms and drinking fountains at smaller neighborhood parks such as 'Ōma'o
   - Similarly, the top 10 preferences for new facilities for the Kōloa District from the park user survey summarized in the County DPR's *Parks & Recreation Master Plan* (2013) are:
     1. Walking and bicycling paths
     2. Picnic facilities and pavilions
     3. Recreation beaches
     4. Children's playground
     5. Camping facilities
     6. Indoor gyms and fitness facilities
     7. Dog parks (off-leash)
     8. Skate parks
     9. Passive (leisure) parks
     10. Tennis courts
d. *Install playground equipment at Kalāheo Neighborhood Center.
e. *Expand Kōloa Neighborhood Center by enclosing the space between the two existing structures.
f. *Expand and improve the parking area at Spouting Horn Park.
g. Support the National Tropical Botanical Garden in its efforts to preserve and manage the Lāwa'i Kai Special Subzone primarily for resource protection and maintaining recreational uses at 2009 levels and the expansion of the McBryde Garden.
h. Provide additional community meeting space, especially within the Po'ipū Gateway Mixed-Use Village.
i. For the future 20-acre Kōloa-Po'ipū District Park, include the community in the planning of the park. Include sports facilities and playgrounds to support the housing projects in the area. The design and layout of the park should facilitate an east-west pedestrian/bicycle/vehicle access between Po'ipū Road and Ala Kalanikaumaka.
j. In concert with the landowner, community and potential partners, such as the National Park Service, public land trusts, and/or others, explore fair-market valuation tools for establishment of a park, conservation easement, and/or managed protected area along the Māhā'ulepū coastline.
k. Work with landowners along coastal areas to maintain public access where sensitive natural and cultural resources are not threatened and where public safety can be protected.
l. Develop new parks to meet the needs of both residents and visitors alike. Explore management of new parks by public-private partnerships.
m. Explore options for potential conservation easements or future acquisition at fair market value via non-profit organizations such as the Hawaiian Islands Land Trust and Trust for Public Lands to preserve the coastal lands.

### 4.6.2 Maintenance

a. Improve the maintenance and upkeep of park grounds and facilities.
b. *Undertake appropriate repairs at Kalāheo Neighborhood Center including repairs to the center and gym roofs.
c. *Continue to support the cultural caretaker group at Kāneiolouma.
d. Fund beach replenishment as necessary at Po'ipū Beach Park.
e. Schedule and budget regularly planned improvements to facilities.
f. Promote an adopt-a-park or adopt-a-trail program. Involve local business and community groups.
g. Seek grants and alternative funding sources for park improvements. Seek visitor-industry funding assistance for visitor-related trails, beaches, and facilities (e.g., HRS 198D TAT revenues).

### 4.6.3 Public Access

a. Maintain public access to beaches and inland recreation areas.
b. Create a regional network of public trails. Partner with private landowners for missing connections via managed access and coordinated time periods.
c. Facilitate the possibility for the old alignment of Hapa Road to be converted for new usage as an off-road multi-use trail. In addition to promoting education about various stages of Hawaiian history, from pre-contact to plantation days, it would offer an appealing non-vehicular connection option for visitors between Po'ipū and Kōloa.
d. Inventory hunting access to Forest Reserves and government trails.
e. Apply for potential funding for trail acquisition, development, and maintenance through Nā Ala Hele and the Hawai'i Tourism Authority.
f. Work with the landowner, community groups, and the Public Access, Open Space, Natural Resources Preservation Fund Commission to explore options for permanent public access to the Māhā'ulepū coastline.
g. Work with the landowner to maintain interim public access to the Māhā'ulepū coastline as the priority.
h. Manage access where necessary to preserve Māhā'ulepū's natural and cultural resources and to ensure public safety.
i. Follow up on the recommendations from the Annual Report to the Kaua'i County Council and Mayor Carvalho from the Public Access, Open Space, Natural Resources Preservation Fund Commission.

## 4.7 AGRICULTURE

The Agriculture section identifies policies to guide the management of South Kaua'i's agricultural resources for economic development and for preservation.

Agriculture occurs at varying scales throughout the Planning District from the large tracts of commercial farms to small rural residential farm lots. For the most part, South Kaua'i's agricultural resources are located in the Agricultural and Homestead land use designations. During the public meetings, concerns were raised about large-scale agriculture and the need for additional regulation at the County level. While such operations are permitted under existing County Agricultural zoning, there are federal and state regulations in place to oversee the day-to-day operations of such businesses. The General Plan Update (commencing 2015) should examine agricultural policies, ordinances, and best practices to manage these concerns and should recommend an island-wide approach to mitigate these potential conflicts. The State Department of Agriculture currently regulates agricultural operations under the authority of HRS Title 11 and through HAR Title 4.

The community also raised concerns about further refining the types of agriculture compatible with the Māhā'ulepū area, particularly given the sensitive cultural and scenic resources surrounding those agriculturally zoned areas.

The County will also be revising the draft IAL report and the recommendations to the LUC.

### 4.7.1 Agricultural Lands as Open Space

a. Preserve agricultural lands for agricultural use to maintain open space and rural character of the area.

### 4.7.2 Local Food Production

a. Support local food production.
b. Encourage a diversity of production.
c. Support farm-to-table initiatives and education.
d. Encourage organic and sustainable farm practices.

### 4.7.3 Economic Sustainability

a. Provide access to technical support for agricultural startups, agricultural tourism, agricultural processing, co-op formation, agricultural financing, small business startup, renewable energy.
b. Continue to investigate opportunities for farmers and local producers to share facilities (e.g., washing, distribution, packing, processing, storage, etc.) and to access a variety of markets. Support organic farming and processing. See also Section 4.9 Industrial.
c. Encourage local restaurants, resorts, and eateries to use locally grown produce and other agricultural products and work towards self-sustaining food production within South Kaua'i. Market farm-to-table efforts.
d. Facilitate access to Enterprise Zone incentives for eligible businesses (e.g., agricultural processing).
e. Support agricultural tourism by streamlining agricultural tourism regulations. However, transient vacation rentals (TVRs) are not supported on agriculturally zoned lands outside of the VDA.

### 4.7.4 Important Agricultural Lands

a. Follow through on the remaining five of eleven IAL incentive and protection programs identified in HRS 205-46(c) that fall on county-level policies:
   (1) Grant assistance
   (2) Real property tax systems that support the needs of agriculture, including property tax assessments based on agricultural use valuation
   (5) Agricultural business planning, marketing, and implementation grants
   (7) Other programs and mechanisms that promote investment in agricultural businesses or agricultural land protection, such as the purchase of development rights
   (11) Agricultural education and training for new farmers; upgrading the skills of existing farmers and other agriculture-related employees through the use of mentoring, business incubators, and public or private scholarships; and increasing the returns of farming by adding value to food processing and other tools and methods.

b. In addition, follow through on the five major categories of recommendations and their proposed actions:
   (1) Develop County-level incentives program for IAL designation, specifically to encourage food production to increase self-reliance
   (2) Establish a minimum goal for County-led designations
   (3) Support landowner/farmer-initiated designations of agricultural lands that at least meet criterion #5 of Act 183 (SLH 2005), "land with sufficient quantities of water to support viable agricultural production."
   (4) Use IAL maps and tools when reviewing landowner/farmer-initiated petitions or for evaluating priority lands for designation by State or County
   (5) Evaluate and integrate findings and recommendations of IAL Study into the upcoming General Plan Update for the County of Kaua'i

c. Two other concepts introduced in the IAL Study include agricultural urbanism and agricultural clustering, both of which relate to focusing appropriate urban form and built structures in agricultural areas that appropriately support these farm communities. The IAL Study explains that agricultural urbanism "creates a walkable urban form surrounded by large-scale food production. This is different from … 'Urban Agriculture' which cuts out various spots throughout an urban center (like empty parking lots) for community gardens and temporary farmers markets. [Andres] Duany explains that 'in a rural setting, ag urbanism means clustering buildings together' allowing farmers to be able to work large tracts of land and still pool resources and interact with other farmers and members of the community." The IAL Study suggests that "IAL and Open zones could serve as the larger, contiguous agricultural (and natural) zones which buffers and connects [the rural agricultural] communities…."

*Aerial view of Kaua'i Coffee fields.*





## 4.8 SUSTAINABLE RESORTS & TOURISM

The Sustainable Resorts & Tourism section identifies policies to help focus economic growth in the visitor industry and develop a sustainable visitor destination in Po'ipū. Hotel and visitor accommodations are located in the Resort land use designation. However, tourism activities occur throughout the Planning District on various land designations.

The main goal is to develop the Po'ipū Resort area as a sustainable visitor destination—one that provides eco-friendly and educational experiences, products and services, leverages and supports local businesses and agriculture, relies less on cars, and embodies the rich historic and cultural foundation upon which these communities were built.

### 4.8.1 Sustainable Resorts

a. Establish Po'ipū as a world-class and world-leading sustainable visitor destination. Work together through PBRA to distinguish and market Po'ipū as a sustainable resort destination.
b. Enhance visitor experiences with eco-friendly products and services that also benefit the host communities and environment such as car and bike share programs, increased recycling and solid waste reduction, increased water and energy efficiency improvements, and eco-friendly soaps, cleaning products, and detergents.
c. Reduce the need for personal vehicles and parking lots by improving pedestrian and bicycle access and transit service.
d. Maintain parking at absolute minimum to encourage alternative modes of transportation to/from and within the Planning District.
e. Use renewable energy to power resorts.
f. Encourage use of electric vehicles recharged by renewable energy.
g. Support local food production by sourcing locally.
h. Include bus pass as part of resort fee.
i. Provide shuttles to/from airport.
j. Provide car rentals/car share programs at hotels.
k. Reestablish a minimum pedestrian and bicycle path from Po'ipū Beach Road to Ho'one Road to improve community connectivity.
l. Review demand for new visitor units compared with permitted units constructed every five years.

### 4.8.2 Eco-Friendly Experiences

a. Provide a rich visitor experience which incorporates education and proper etiquette and protocol to help protect the island's natural and cultural heritage resources.
b. Promote sustainable tourism activities such as ecotourism, cultural tourism (Kāneiolouma), natural science tourism (Makauwahi Cave and Sinkhole), voluntourism (volunteer tourism), ag-tourism (agriculture-based tourism), health and wellness tourism, and other appropriate tourism-related businesses.
c. Minimize impacts from visitor activities and accommodations on residential communities, public infrastructure, and community facilities.
d. Increase farm-to-table dining experiences and farmers markets.
e. Promote health and wellness retreats.
f. Maximize residents' benefits from the visitor industry by providing kama'āina discounts year round.
g. For visitors to Po'ipū, a new Hapa Road trail could offer an appealing option to travel to Kōloa Town without a vehicle. It would also offer the opportunity to experience some of Kaua'i's pre-contact and plantation history.
h. With such unique natural assets as Kāneiolouma, the National Tropical Botanical Garden and Spouting Horn Park, Kukui'ula is an ideal area to promote ecotourism. A bicycle route between important sites could further encourage visitors interested in sustainable tourism.
i. The numerous reservoirs in the Planning District are sources for irrigation and may have potential for ecotourism fishing/boating.
j. Maintain managed access to Māhā'ulepū but consider providing a comfort station and visitor education resources on the rich natural and cultural heritage of the area.

*Kukui'ula Farmers Market.*

## 4.9 INDUSTRIAL

As noted in the 2000 General Plan "Develop vacant lands with existing commercial and industrial zoning, to the extent feasible, before approving new commercial and industrial zoning." However, there is currently no industrially-zoned lands within the Planning District to support its vast agricultural lands. Historically, however, this was the birthplace of industrially-scaled sugar production at the first sugar mill in Kōloa. Therefore, the following policies and guidelines support reestablishing industrial uses centered on the historic Kōloa mill site.

a. Designate industrial land use to support rezoning around the Kōloa mill site. Support industrial designation for energy, wastewater processing and reuse, agricultural processing, and other job-creation uses.
b. Support private development of a regional wastewater treatment plant for the Planning District at the industrial center near the mill site. Preliminary engineering and planning studies including a HRS Chapter 343 Environmental Impact Statement (EIS) in 2009 have been completed for the regional plant and it involved closing the smaller package plants throughout the area and consolidating wastewater treatment. It should also consider servicing areas not currently served by centralized treatment.
c. Consider innovative wastewater treatment technologies and effluent reuse. Incorporate educational facilities and small commercial uses to create a themed educational and ecotourism experience.
d. Anticipate and coordinate workforce opportunities in renewable energy technology and mechanics, ecotourism, health and wellness, green streets, and Low Impact Development (LID) landscape maintenance.
e. Locate industries and utilities that discharge air or water pollutants, even when treated, in areas where they would impose the least potential harm to the environment and residential communities.
f. Adaptive reuse of the Kōloa Mill is encouraged if economically feasible and no health issues arise from hazardous materials that may exist in the historic structures.

*Kōloa Mill Site.*





## 4.10 INFRASTRUCTURE & PUBLIC FACILITIES

The Infrastructure & Public Facilities section identifies policies that guide the management of existing infrastructure and the development of new facilities. Capital improvement projects (CIP) should be prioritized to meet basic needs, provide ongoing maintenance and upgrades as necessary to maintain public infrastructure and to avoid or minimize interruption in service, and support the vision for South Kaua'i.

The County has also contracted with R.M. Towill Corporation to prepare an infrastructure assessment as one of the technical studies supporting the General Plan update. It will include transportation, water, wastewater, drainage, and solid waste needs based on the 2035 projections and will focus on high-growth districts such as the South Kaua'i Planning District. It will also provide low-impact, non-traditional strategies such as natural storm water drainage.

As referenced in Section 4.1.5, a comprehensive water planning strategy for the entire Planning District is supported, and should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currently falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.

### 4.10.1 Potable Water Systems

a. Update the County DOW's long-range Water Plan for the Kalāheo, Lāwa'i-'Ōma'o, and Kōloa-Po'ipū County Water Systems to determine adequacy of existing source, storage, and transmission to support 2035 growth projections, especially within the SPAs.
b. Plan upgrades and improvement projects accordingly to avoid and/or minimize interruptions in existing service.
c. Coordinate with developers of new projects to provide adequate service.
d. Protect potable water wells and other drinking water resources from contamination.

### 4.10.2 Non-Potable Water Systems

a. Integrate and encourage non-potable water sources for appropriate uses within the Planning District.
b. Develop standards for design of systems and policies for applications in concert with State Department of Health (DOH) regulations.

### 4.10.3 Wastewater

a. Assist and support regional wastewater solutions including the potential centralized treatment plant.
b. Support innovative treatment systems that produce effluent at appropriate water quality levels to encourage reuse such as irrigation, industrial uses, and other non-potable uses.
c. Coordinate with commercial establishments and multi-family complexes in Kōloa and Kalāheo to comply with EPA ban of large-capacity cesspools.
d. The future industrial area should be served by an innovative wastewater treatment system or the regional plant.
e. Monitor the disposition and potential effect of cesspool seepage and injection wells on the groundwater and nearshore water quality.

### 4.10.4 Drainage

a. Prepare a drainage study for the Po'ipū Beach/Kāneiolouma area and propose alternative to mitigate flooding.
b. Install bioswales and rain gardens along streets, in parks, and in parking lots to collect and filter rainwater runoff and increase infiltration via landscaped areas that also beautify the place.
c. Continue to require new development to mitigate site-generated flows.
d. Require installation of catchment systems for non-potable water use onsite such as irrigation and toilet flushing.
e. Support a comprehensive water planning strategy for the entire Planning District, which should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currerntly falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.

### 4.10.5 Solid Waste

a. Establish a recycling program to minimize solid wastes generated by residents, businesses, and the visitor industry.
b. Require the construction industry to minimize construction wastes and encourage use of reclaimed and recycled materials.
c. Consider coordinating green waste processing and distribution of mulch within the Planning District to reduce transportation costs. Coordinate with resort and agricultural users.
d. Support composting of food wastes for reuse as soil amendments.
e. Support a clearinghouse of collecting leftover food from area restaurants and resorts to feed the hungry.
f. Continue to seek appropriate recycling of electronic waste for Kaua'i.

### 4.10.6 Power

a. Continue to support renewable energy generation.
b. Encourage increased energy efficiency for residents and businesses. Develop a rebate program for those who upgrade or install highly energy efficient equipment and appliances.
c. Encourage installation of solar hot water heating systems.

### 4.10.7 Innovative Technologies with Multiple Benefits

a. Encourage innovative solutions that combine multiple benefits. Examples include:

- Electric car charging stations for car-share system powered by photovoltaic shade structures. Similarly, the transit system could use electric shuttle buses for the area circulators that are charged by photovoltaic energy.
- An anaerobic digester system that uses green waste, including invasive plant species, to produce energy that could in turn power a wastewater treatment system, supplemented as necessary with photovoltaics.

## 4.11 ECONOMIC DEVELOPMENT

The resort area of Po'ipū-Kukui'ula is a major employment center capitalizing on its competitive advantage for tourism including sandy beaches, sunny climate, and diverse ocean conditions. The Planning District also has other potential resources such as Important Agricultural Lands to diversify the economic base. Recognizing that the strength of the Planning District's economy relies on the private sector, the role of this Plan in terms of economic development is to be a catalyst to facilitate ongoing trends, coordinate and encourage diversification, and strategically stimulate through infrastructure or other projects that benefit the community as a whole.

### 4.11.1 Town Core Revitalization

a. Encourage town core revitalization of Kōloa and Kalāheo.
   - Streamline regulations through form-based codes to facilitate higher density mixed uses within the town core.
   - Guide redevelopment in a manner that maintains the historic character.

b. Consider innovative financial methods (e.g., business improvement districts, community facilities districts) to implement street and wastewater system projects.

c. Provide affordable housing for existing employees and to attract new businesses (see Section 4.2.3).

d. Support more affordable market housing by ensuring infill development provides a range of low-to-medium scale housing types, including smaller-footprint single-family units, cottage courts, duplexes, mansion apartments, townhomes, apartment houses, and courtyard buildings.

e. Maintain a healthy commercial balance to support locals and visitors alike.

### 4.11.2 Diversification

a. Support, facilitate, and incentivize economic diversification focusing on town core revitalization, diversified agriculture, and sustainable tourism.

b. Facilitate and support agricultural networking and economies of scale that would enable sharing of washing, processing, distribution, and/or storage facilities so that farmers with smaller operations can have the collective advantage of larger operations, such as a cooperative.

c. Rezone to industrial an area in proximity to the farmlands that would allow other light industry, including alternative energy, to co-locate.

d. Network with U.S. Department of Agriculture to access funding and technical support for cooperatives, agricultural facilities, and infrastructure.

e. Enable agricultural tourism as a means for farmers to supplement their income and educational opportunity for residents and visitors to learn about local food production.

f. Coordinate compatibility and marketing of agricultural tourism as a key component of the sustainable tourism theme for this resort area.
   - Encourage diverse marketing opportunities by coordinating food safety protocols, farm-to-table partnerships with resort restaurants, farmers markets;

g. Assist with nonpoint source monitoring and compliance through NRCS conservation plans and regionally-supported water quality monitoring.

h. Distinguish the Planning District as a place known for sustainable tourism (see Section 4.8).

i. Promote and expand the Heritage Corridor system, as described in Section 4.5.2, as an economic catalyst for the visitor and health/wellness industries.

j. Encourage business development in industries that would be desirable to attract to the Planning District (e.g., agriculture, green technologies, health and wellness, green infrastructure maintenance) through promotion of the Planning District as an enterprise zone (with associated tax and other incentives) and workforce development programs.

### 4.11.3 Regional Infrastructure Needs

a. Support and coordinate the needed development of regional multimodal transportation networks, wastewater and drainage infrastructure, and other infrastructure needs.

b. Support a comprehensive water planning strategy for the entire Planning District, which should include, but not be limited to, consideration of water access, infrastructure, quality, and drainage, and the attendant oversight and maintenance. Water source regulation currently falls under HRS Chapter 174C, and is facilitated through CWRM. Storage and transmission of water for the County domestic water system falls under the jurisdiction of DOW by County Charter, and DOW is responsible for water planning related to the domestic system.

c. Promote and expand the Heritage Scenic Byway network system as a fun, healthy, and educational means to access the Planning District's rich collection of natural and cultural points of interests:
   - Expand the Holo Holo Kōloa Scenic Byway to include vehicular and non-vehicular (trails) rights-of-way, owned publicly or privately (with easements granted for public use), interconnecting points of interest throughout the Planning District;
   - Consider forming a nonprofit organization to manage the network system, apply for grants, charge user and/or commercial tour fees, and dedicate the revenues to the promotion, improvement, and maintenance of the network system;
   - Support the growth of a health and wellness industry attracted by the trail system and climate (e.g., equipment suppliers and rentals, health trainers, therapists, senior housing, rehabilitation);
   - Respect the culture by providing education and culturally-appropriate interpretation of the area that ties together the trail alignment, points of interest, and the history; monitor impacts.

d. Coordinate the wastewater and drainage regional infrastructure to enable future growth in a manner that minimizes impacts to the streams, groundwater, and coastal water quality:
   - Allow the private sector to take the lead to the extent they are willing and able;
   - Support as necessary with advance funding for regional studies and/or establishment of innovative financing (see Section 6.3).

### 4.11.4 Jobs and Housing

a. Anticipate and coordinate workforce training and housing needs to ensure a competent workforce ready to access livable wage opportunities while also able to afford housing in reasonable proximity to jobs.

b. Ensure the workforce has access to a range of housing types, reflective of chaning demographics and to help alleviate housing crowding conditions.

# Appendix 19

ORIGINAL

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

| | | |
|---|---|---|
| In The Matter Of The Petition Of | ) | DOCKET NO. DR11-43 |
| | ) | |
| MĀHĀ'ULEPŪ FARM LLC | ) | FINDINGS OF FACT, |
| | ) | CONCLUSIONS OF LAW, |
| For A Declaratory Order To Designate | ) | AND DECISION AND ORDER |
| Important Agricultural Lands | ) | |
| For Approximately 1,533 Acres At Kōloa, | ) | |
| Kaua'i, Hawai'i | ) | |
| | ) | |

LAND USE COMMISSION
STATE OF HAWAII
2011 MAY 19 P 2:44

**FINDINGS OF FACT, CONCLUSIONS**
**OF LAW, AND DECISION AND ORDER**
**AND**
**CERTIFICATE OF SERVICE**



ORIGINAL

LAND USE COMMISSION
STATE OF HAWAII
2011 MAY 19 P 2:44

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

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|---|---|---|
| In The Matter Of The Petition Of | ) | DOCKET NO. DR11-43 |
| | ) | |
| MĀHĀ'ULEPŪ FARM LLC | ) | FINDINGS OF FACT, |
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| For A Declaratory Order To Designate | ) | AND DECISION AND ORDER |
| Important Agricultural Lands | ) | |
| For Approximately 1,533 Acres At Kōloa, | ) | |
| Kaua'i, Hawai'i | ) | |
| | ) | |

**FINDINGS OF FACT, CONCLUSIONS**
**OF LAW, AND DECISION AND ORDER**

MĀHĀ'ULEPŪ FARM LLC ("Petitioner") filed a Petition for Declaratory Order to Designate Important Agricultural Lands ("Petition") on February 23, 2011, pursuant to Hawai'i Revised Statutes ("HRS") §§ 205-44 and 45 and Hawai'i Administrative Rules ("HAR") chapter 15-15 to designate as Important Agricultural Lands ("IAL") approximately 1,533 acres of land situated at Kōloa, Kaua'i, Hawai'i, and identified as Tax Map Keys ("TMK"): 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6 (collectively "Petition Area").

The State of Hawai`i Land Use Commission ("Commission"), having heard and examined the testimony, evidence, and argument of counsel presented during the hearing, along with the pleadings filed herein, hereby makes the following Findings of Fact, Conclusions of Law, and Decision and Order:

## FINDINGS OF FACT

PROCEDURAL MATTERS

1. On February 23, 2011, Petitioner filed the Petition, Verification, and Exhibits "A" through "C" of the Petition.

2. On April 8, 2011, the State of Hawai`i Office of Planning ("OP") filed comments on the Petition.

3. On April 12, 2011, the County of Kaua`i Planning Department ("Planning Department") filed comments on the Petition.

4. On April 13, 2011, the State of Hawai`i Department of Agriculture ("DOA") filed comments on the Petition.

5. On April 19, 2011, OP filed the comments of the State of Hawai`i Commission on Water Resource Management ("CWRM") on the Petition.

6. On April 21, 2011, Petitioner filed an Errata to the Petition.

7. On April 25, 2011, Petitioner filed a Second Errata to the Petition.

8. On May 3, 2011, Petitioner filed a response to the comments of OP, the County, and DOA on the Petition.



9. On May 11, 2011, the DOA filed additional comments on the Petition.

10. On May 12, 2011, the Commission held a site visit to view the Petition Area.

11. On May 12, 2011, the Commission held an action meeting on the Petition in Līhu`e, Kaua`i, Hawai`i. Benjamin M. Matsubara, Esq., Curtis T. Tabata, Esq., and Michael Tresler appeared on behalf of Petitioner. Also appearing were Bryan Yee, Esq., and Jesse Souki on behalf of OP and Michael Dahilig on behalf of the Planning Department.[1]

12. The Commission entered, without objection, the written comments of OP, the DOA, the Planning Department, and the CWRM, and Petitioner's response thereto as well as the written testimonies of Matilda A. Yoshioka, Steven Kai, and Roy Oyama and Melissa McFerrin into the record in this proceeding. The Commission also heard public testimony from Jerry Ornellas, Karol Haraguchi, Joseph Manini, and Beryl Blaich.

DESCRIPTION OF PETITION AREA

[1] At the meeting, Commission Lezy disclosed that he had provided legal services to Grove Farm Fish & Poi, a subsidiary of Grove Farm Company, Inc. There were no objections by Petitioner, OP, and the Planning Department to Commissioner Lezy's participation in this docket.

13. The Petition Area consists of approximately 1,533 acres of land, situated at Kōloa, Kaua`i, Hawai`i, TMKs: 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6.

14. The Petition Area is owned in fee simple interest by Petitioner.

DESCRIPTION OF REQUEST

15. Petitioner seeks a determination from the Commission that the lands identified by Petitioner in this Petition should be designated as IAL pursuant to HRS §§ 205-44 and 45.

16. Petitioner is not seeking to reclassify any agricultural lands to the State Land Use Urban, Rural or Conservation Districts.

17. Petitioner has represented that it is not claiming and will not claim any credits described in HRS § 205-45(h).

CONFORMANCE WITH THE STANDARDS AND CRITERIA FOR THE IDENTIFICATION OF IAL

18. The Petition Area, consisting of approximately 1,533 acres of land, currently has approximately 1,274 acres in cultivation or ranching and is being leased to eight independent farms and ranchers for the cultivation of taro, seed corn, and forage crops as well as for cattle ranching. Prior agricultural use of the Petition Area includes over 100 years of sugarcane cultivation until 1996 when the Kōloa Mill was closed.

19. The University of Hawai`i, Land Study Bureau ("LSB"), developed the Overall Productivity Rating, which classified soils according to five levels, with "A"



representing the class of highest productivity soils and "E" representing the lowest. Approximately 88.5 percent of the Petition Area is rated B. The balance of the Petition Area is rated C, D, E, or is unclassified and is either essential elements of the active agricultural operations (reservoirs, drainageways, etc.) or is surrounded by B rated lands.

20. Based on the Sunshine Maps prepared in 1985 by the Department of Business, Economic Development and Tourism, formerly known as the State Department of Planning and Economic Development, Energy Division, over 80.7 percent of the Petition Area receives an annual average 450 calories of solar energy per square centimeter per day, while the balance of the lands receive an annual average of 400 calories of solar energy per square centimeter per day.

21. In 1977, the DOA developed a classification system to identify Agricultural Lands of Importance to the State of Hawai`i ("ALISH"). The classification system is based primarily, though not exclusively, upon the soil characteristics of the lands. The three classes of ALISH lands are "Prime," "Unique," and "Other," with all remaining lands termed "Unclassified." When utilized with modern farming methods, Prime agricultural lands have a soil quality, growing season, and moisture supply necessary to produce sustained crop yields economically. Unique agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of a specific crop. Other agricultural lands include those that

have not been rated as Prime or Unique. Approximately 41.5 percent of the Petition Area is classified as Prime and 36.4 percent is classified as Other. The balance of the lands includes essential elements of the active agricultural operations such as reservoirs and drainageways.

22. The main water source for irrigation of the Petition Area is the Waitā Reservoir, which occupies approximately 429 acres of land and has a 2.3 billion gallon capacity. Pu'uhi Reservoir and Māhā'ulepū Reservoir are both located on the Petition Area and have a combined capacity of approximately 2.5 million gallons. Waitā Reservoir serves as a resource for Pu'uhi Reservoir and Māhā'ulepū Reservoir. The gravity flow system is capable of providing approximately 7.9 million gallons per day ("MGD"), and current water demand on the Petition Area is approximately 2.4 MGD. Water demand for potential agricultural uses on the Petition Area is approximately 6 MGD. Water delivery capacity can be increased by adding pumps.

23. The Petition Area's agricultural classification is consistent with the County 2000 General Plan Update and the Kōloa-Po'ipū-Kalāheo Planning District Land Use Map. Almost all of the Petition Area is designated as Agriculture with a few portions designated as Open.

24. The Petition Area is situated within the State Land Use Agricultural District.



25. The Petition Area contributes to maintaining a critical land mass important to agricultural operating productivity.

26. The Petition Area is fully integrated with the irrigation, roadway, and transport infrastructure necessary to support agricultural production, harvesting, processing, and shipping of product.

## CONCLUSIONS OF LAW

1. The Commission has jurisdiction over the Petition pursuant to HRS §§ 91-8, 205-44, and 205-45 and HAR § 15-15-98.

2. Pursuant to HRS § 205-44(a), the Commission has the authority to designate lands as IAL so long as any of the criteria in HRS § 205-44(c) are met.

3. The Petition Area is currently used for agricultural production in accordance with HRS § 205-44(c)(1).

4. The Petition Area has soil qualities and growing conditions that support agricultural production in accordance with HRS § 205-44(c)(2).

5. The Petition Area constitutes lands identified under agricultural productivity rating systems, such as the ALISH system adopted by the Board of Agriculture on January 28, 1977, in accordance with HRS § 205-44(c)(3).

6. The Petition Area includes traditional Native Hawaiian agricultural uses such as taro cultivation in accordance with HRS § 205-44(c)(4).

7. The Petition Area has sufficient quantities of water to support viable agricultural production in accordance with HRS § 205-44(c)(5).

8. The Petition Area's designation as IAL is consistent with the general, development, and community plans of the County in accordance with HRS § 205-44(c)(6).

9. The Petition Area contributes to maintaining a critical land mass that is important to agricultural operating productivity in accordance with HRS § 205-44(c)(7).

10. The Petition Area is near support infrastructure conducive to agricultural productivity, such as transportation to markets, water, or power in accordance with HRS § 205-44(c)(8).

11. The designation of the Petition Area as IAL meets the purposes of Article XI, Section 3, of the Hawai`i State Constitution by conserving and protecting agricultural lands, promoting diversified agriculture, increasing agricultural self-sufficiency, and assuring the availability of agriculturally suitable lands.

12. The designation of the Petition Area as IAL meets the objectives of HRS § 205-42(b) by contributing to the maintenance of a strategic agricultural land resource base that can support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities and increase agricultural self-sufficiency for current and future generations.



13. The designation of the Petition Area as IAL meets the policies of HRS § 205-43(1) by promoting the retention of IAL in blocks of contiguous, intact, and functional land units large enough to allow flexibility in agricultural production and management.

14. The designation of the Petition Area as IAL meets the policies of HRS § 205-43(7) by facilitating the access of farmers to IAL for long-term viable agricultural use.

15. The designation of the Petition Area as IAL meets the policies of HRS § 205-43(8) by promoting the maintenance of essential agricultural infrastructure systems, including irrigation systems.

16. The Petition Area meets the requirements of HRS § 205-45 for designation as IAL.

17. Any conclusion of law herein improperly designated as a finding of fact should be deemed or construed as a conclusion of law; any finding of fact herein improperly designated as a conclusion of law should be deemed or construed as a finding of fact.

## DECISION AND ORDER

This Commission, having duly considered the Petition, the oral and/or written comments of Petitioner, OP, the DOA, the Planning Department, and the CWRM, and a motion having been made at a meeting on May 12, 2011, in Līhu`e,

Kaua`i, Hawai`i, and the motion having received the affirmative votes required by HAR § 15-15-13 and HRS § 205-45(e), and there being good cause for the motion,

HEREBY ORDERS that the Petition Area, consisting of approximately 1,533 acres of land, situated at Kōloa, Kaua`i, Hawai`i, identified as TMKs: 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6, and shown approximately on Exhibit "1," attached hereto and incorporated by reference herein, shall be and is hereby designated as IAL as governed by HRS chapter 205.

IT IS FURTHER ORDERED that the designation of the Petition Area as IAL shall be subject to the following conditions:

1. Petitioner shall comply with representations made to the Commission with respect to not claiming any credits described in HRS § 205-45(h) with respect to the Petition Area.

2. Within seven days of the issuance of the Commission's Decision and Order, Petitioner shall record it with the Bureau of Conveyances.



ADOPTION OF ORDER

This ORDER shall take effect upon the date this ORDER is certified by this Commission.

Done at Honolulu, Hawai'i, this 19th day of May, 2011, per motion on May 12, 2011.

LAND USE COMMISSION
STATE OF HAWAI'I

By _____
VLADIMIR DEVENS
Chairperson and Commissioner

APPROVED AS TO FORM

_____
Deputy Attorney General

Filed and effective on:

5/19/11

Certified by:

_____
ORLANDO DAVIDSON
Executive Officer

**EXHIBIT "1"**

(Consisting of 3 pages)

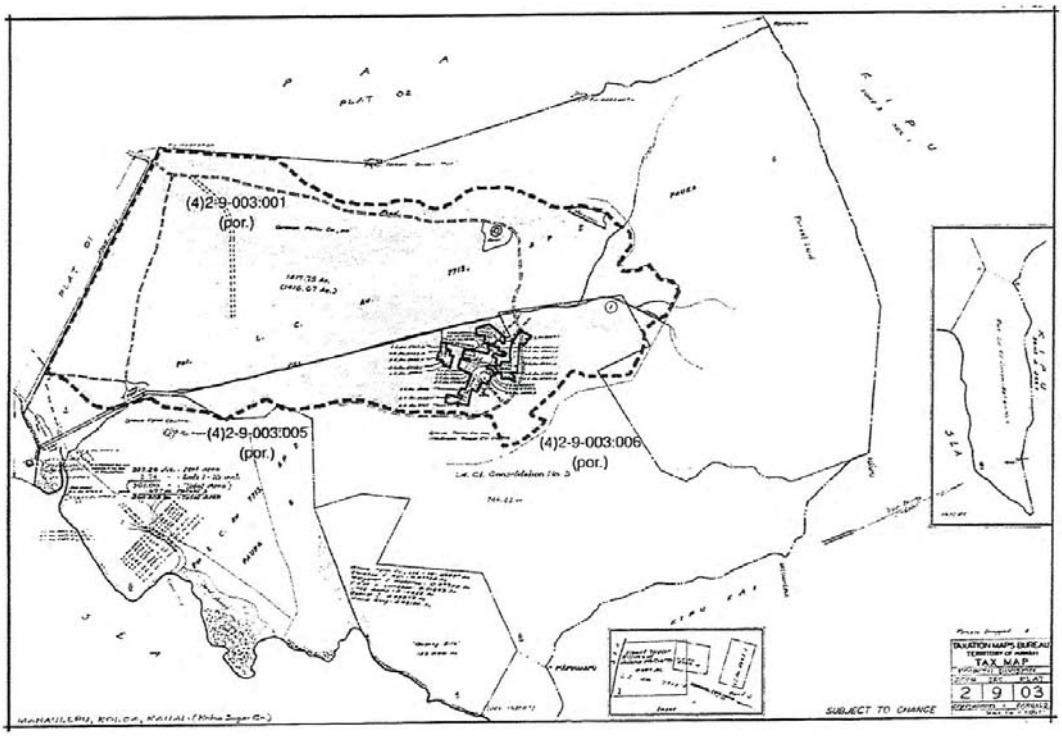
**DR11-43**

Approximately 1,533 acres of land owned by Petitioner are designated as Important Agricultural Land ("IAL"). The parcels are specifically described as Tax Map Keys ("TMK"): 2-9-01: por. 1 and 2-9-03: por. 1, por. 5, and por. 6.

The following table shows a summary of the TMK parcels and approximate acreages for the IAL lands:

| TMK | Approximate Acreage |
|---|---|
| 2-9-01: por. 1 | 710 |
| 2-9-03: por. 1 | 632 |
| 2-9-03: por. 5 | 6 |
| 2-9-03: por. 6 | 185 |
| **Total** | 1,533 |

The tax maps that follow further identify the portions of the individual TMK parcels that are designated IAL.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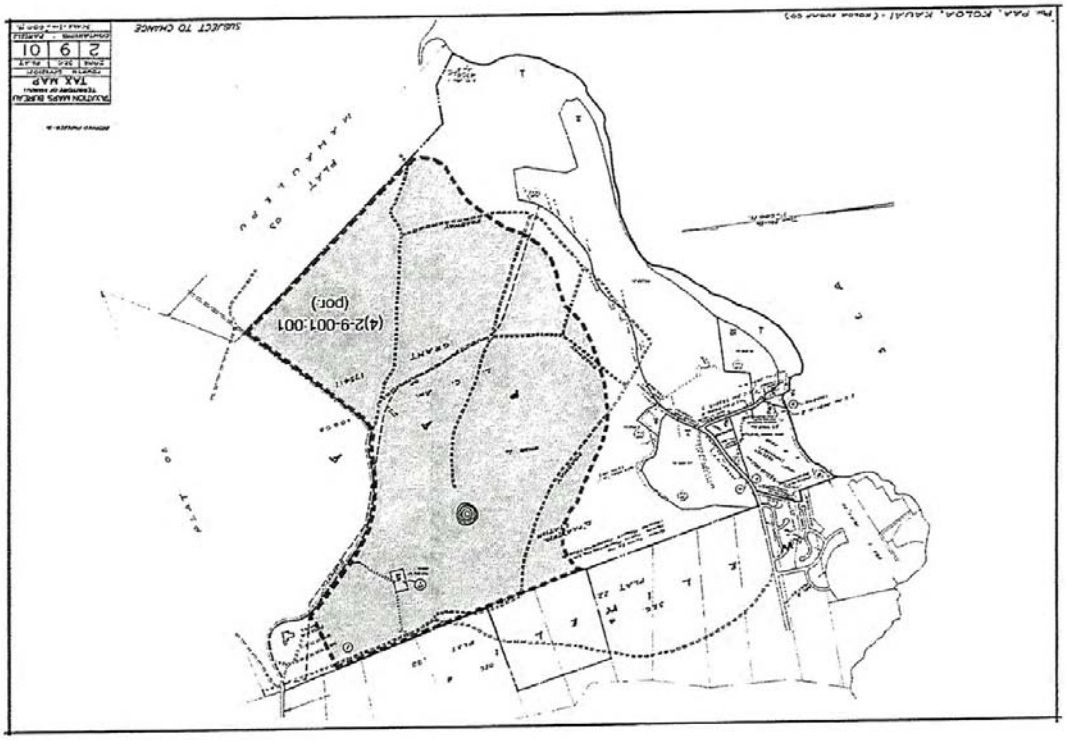
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ORIGINAL

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

| | | |
|---|---|---|
| In The Matter Of The Petition Of | ) | DOCKET NO. DR11-43 |
| | ) | |
| MĀHĀ'ULEPŪ FARM LLC | ) | CERTIFICATE OF SERVICE |
| | ) | |
| For A Declaratory Order To Designate Important Agricultural Lands For Approximately 1,533 Acres At Kōloa, Kaua'i, Hawai'i | ) | |

LAND USE COMMISSION
STATE OF HAWAII
2011 MAY 19 P 2:44

**CERTIFICATE OF SERVICE**

I hereby certify that a copy of the **FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DECISION AND ORDER** was served upon the following by either hand delivery or depositing the same in the U. S. Postal Service by regular or certified mail as noted:

| | HAND DELIVERED | REGULAR MAIL | CERTIFIED MAIL |
|---|---|---|---|
| JESSE SOUKI, DIRECTOR<br>Office of Planning<br>235 S. Beretania Street Rm. 600<br>Honolulu, Hawai'i 96813 | X | | |



| | HAND DELIVERED | REGULAR MAIL | CERTIFIED MAIL |
|---|---|---|---|
| BRYAN YEE, ESQ.<br>Deputy Attorney General<br>Hale Auhau, Third Floor<br>425 Queen Street<br>Honolulu, Hawai'i 96813 | | X | |
| BENJAMIN M. MATSUBARA, ESQ.<br>Matsubara-Kotake<br>888 Mililani Street, 8th Floor<br>Honolulu, Hawaii 96813 | | | X |
| ALFRED CASTILLO, ESQ.<br>Office of the County Attorney,<br>County of Kauai<br>4444 Rice Street, Suite 220<br>Lihue, Hawaii, 96766 | | | X |
| Michael A. Dahilig<br>Director of Planning<br>4444 Rice St. Suite 453<br>Lihue, HI, 96766 | | X | |

Dated: Honolulu, Hawaii, 5/19/11.

ORLANDO DAVIDSON
Executive Officer

State of Hawaii
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359

91 7108 2133 3935 6892 0846

Kauai County Attorney
Office of the County Attorney, County
of Kauai
4444 Rice Street, Suite 220
Lihue, Hawaii, 96766 ATTN: ALFRED CASTILLO

**SENDER: COMPLETE THIS SECTION**

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Kauai County Attorney
Office of the County Attorney, County
of Kauai
4444 Rice Street, Suite 220
Lihue, Hawaii, 96766
ATTN: ALFRED CASTILLO

2. Article Number
(Transfer from service label) 91 7108 2133 3935 6892 0846

**COMPLETE THIS SECTION ON DELIVERY**

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

PS Form 3811, August 2001 Domestic Return Receipt

DA 4-43

State of Hawaii
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359

91 7108 2133 3935 6892 0853

Benjamin M. Matsubara, Esq.
Curtis Tabata, Esq.
Wyeth Matsubara, Esq.
888 Mililani Street, 8th Floor
Honolulu, Hi 96813

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- Print your name and address on the reverse so that we can return the card to you.
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1. Article Addressed to:

Benjamin M. Matsubara, Esq.
Curtis Tabata, Esq.
Wyeth Matsubara, Esq.
888 Mililani Street, 8th Floor
Honolulu, Hi 96813

2. Article Number
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**COMPLETE THIS SECTION ON DELIVERY**

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

# Appendix 20

# Hawai'i Environmental Policy Act
# Citizen's Guide

*October 2014*

**State of Hawai'i**
**Office of Environmental Quality Control**
**235 S. Beretania St., Room 702**
**Honolulu, HI 96813**
**Phone (808) 586-4185**
**Fax (808) 586-4186**
**Oeqchawaii@doh.hawaii.gov**
**www.hawaii.gov/health/environmental/oeqc/index.htm**

***Introduction:***

***This citizen's guide is a summary of the environmental review process and how it works. Please refer to the statute (Chapter 343, Hawai'i Revised Statutes (HRS)), its implementing rules (Hawai'i Administrative Rules (HAR) Chapters 11-200 and 11-201), and the latest version of the Guidebook on the Office of Environmental Quality Control (OEQC) website for more specifics. This document is to be used as general information only.***

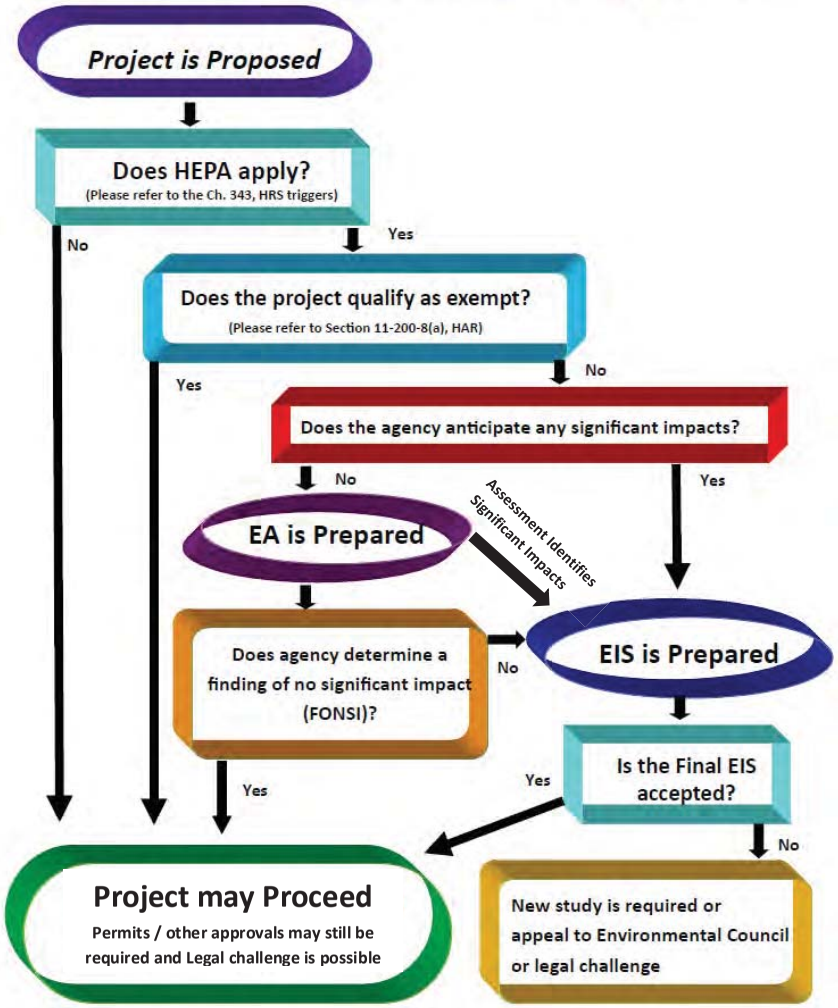
***Changes in the laws, rules and Guidebook can occur, and users are advised to check periodically with OEQC for updates to the review process. For example, the statute was revised in 2012:***

***1) To allow agencies to go directly to an environmental impact statement (EIS); and***

***2) To exempt from review certain actions in public rights of way.***

***Also, the Environmental Council is currently in a rule revision process; the administrative rules were last amended in 1996.***

## Environmental Review Decision-Making Process



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**The following acronyms are frequently used throughout this Citizen's Guide:**

*OEQC – Office of Environmental Quality Control*

*HEPA – Hawai‘i Environmental Policy Act*

*DEA – Draft Environmental Assessment*

*FEA – Final Environmental Assessment*

*FONSI – Finding of No Significant Impacts*

*EISPN – Environmental Impact Statement Preparation Notice*

*DEIS – Draft Environmental Impact Statement*

*FEIS – Final Environmental Impact Statement*



# Hawai‘i Environmental Policy Act (HEPA)

### Chapter 343, Hawai‘i Revised Statutes (HRS)

## 1.0 Overview

Hawai‘i's environmental review process was first enacted in 1974 to ensure that the environmental consequences of actions proposed within our state are appropriately considered.

The Hawai‘i Environmental Policy Act (HEPA or Chapter 343, HRS) is modeled after the National Environmental Policy Act (NEPA) which became federal law in 1970 and is our country's basic charter for reviewing environmental impacts. HEPA requires that government establish a system of environmental review to the environmental, social, cultural and economic impacts of proposed projects or programs prior to implementation. This is done through the preparation of environmental reviews. The law also provides a method for public notification and review in the planning process.

HEPA includes the following statutes and administrative rules:

- Chapter 343, HRS: Environmental Impact Statements
- Sections 11-200, Hawai‘i Administrative Rules (HAR): Environmental Impact Statement Rules
- Sections 11-201, HAR: Environmental Council Rules of Practice and Procedure

As described in Chapter 343, HRS, the environmental review process is designed to:

- Improve decision making by establishing an environmental review structure that ensures environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.
- Increase public participation in environmental decision-making by integrating citizen concerns into the planning process.

The Office of Environmental Quality Control (OEQC) facilitates the HEPA process.

**Chapter 343-1 Findings and Purpose:**

*"[t]he legislature finds that the quality of humanity's environment is critical to humanity's wellbeing, that humanity's activities have broad and profound effects upon the interrelations of all components of the environment, and that an environmental review process will integrate the review of environmental concerns with existing planning processes of the State and Counties and alert decision makers to significant environmental effects which may result from the implementation of certain actions. The legislature further finds that the process of reviewing environmental effects is desirable because environmental consciousness is enhanced, cooperation and coordination are encouraged, and public participation during the review process benefits all parties involved and society as a whole."*

## 1.1 Understanding the HEPA Process

Under the State's environmental review law, all activities fall into one of four activities:

1. Those that do not require a Chapter 343, HRS review;
2. Those that trigger Chapter 343, HRS but are exempt;
3. Those that trigger Chapter 343, HRS and require the preparation of an environmental assessment (EA); and
4. Those that trigger Chapter 343, HRS and require the preparation of an environmental impact statement (EIS).

## 1.2 HEPA Triggers:

The nine specific types of actions that prompt environmental review are termed "triggers."

Projects that propose the use of state or county lands or funds; land in the conservation district, land in the shoreline setback area, any historic site or district, or land in Waikiki are all subject to an environmental review prior to implementation.

Also, any proposed reclassification of conservation land, amendment to a county general plan, new or expanded helicopter facility and the proposal of a wastewater treatment unit, waste-to-energy facility, landfill, oil refinery, or power-generating facility may trigger an environmental review.

***The statutory triggers for HEPA are provided in the following table:***

**Table 1: Statutory "Triggers" Initiating HEPA**

| | Triggers | Agency Usually Responsible for Complying with Trigger |
|---|---|---|
| 1. | Use of State or County lands or funds (except for funds for feasibility or planning studies or the acquisition of unimproved real property). | The proposing or approving agency. |
| 2. | Use of any conservation district land. | Office of Conservation and Coastal Lands of the Department of Land and Natural Resources, State of Hawai'i (DLNR). |
| 3. | Use within a shoreline area. | The respective county planning department. |
| 4. | Use within any historic site. | The respective county planning department. |
| 5. | Use within the Waikiki area | The Department of Planning and Permitting of the City and County of Honolulu. |
| 6. | Amendments to existing county general plans that would result in urban or rural designations, except actions where initiated by a county. | The respective county planning department. |
| 7. | Reclassification of any conservation district land. | The State Land Use Commission |
| 8. | Helicopter facilities that may affect: conservation district land, shoreline area or historic site. | The respective local planning department. |
| 9. | Propose any: Wastewater treatment unit, except for an individual wastewater system or unit serving fewer than fifty single-family dwellings or the equivalent; Waste-to-energy facility; Landfill; Oil refinery; or Power-generating facility exceeding 5 .0 MW. | The agency issuing the discretionary approval. |

## 1.3 Statutory Exclusions

The following actions are also excluded from review by statute:

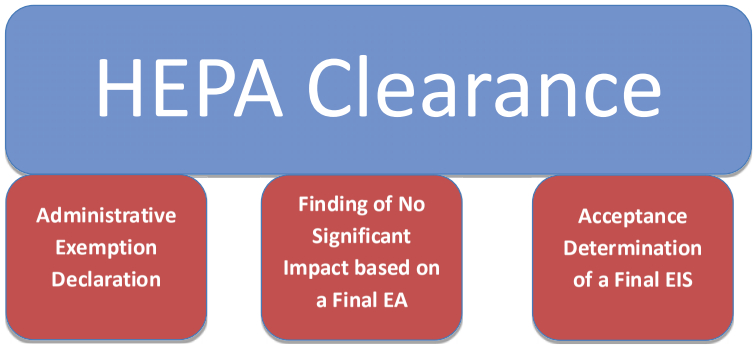
1. Purchase of the assets of the Waiahole water system (Section 343-6.5, HRS)
2. Proposed reconstruction, restoration, repair, or use of any Hawaiian fishpond provided that compliance with certain conditions in Section 183B-2, HRS is met;
3. Affordable housing, provided that compliance with certain conditions in Section 2014H-38, HRS is met;
4. Broadband infrastructure, provided that compliance with certain conditions in Act 151, SLH 2011, is met

Statutory exclusions do not require any action by the agency, while exemption declarations made by an agency are pursuant to the requirements described in Section 3.0

## 1.4 Clearing the Process

If your project "triggers" HEPA (and is not statutorily excluded), in order to fulfill Chapter 343, HRS requirements there are three ways to clear the process:

1. *Administrative exemption declaration* (Section 11-200-8, HAR);
2. *Finding of no significant impact (FONSI) based on a final environmental assessment (FEA)* (Section 11-200-11.2, HAR);
3. *Determination of acceptance* of a final EIS or *if the approving agency fails to make a timely determination on the acceptability of the Final EIS (as described in Section 343-5€, HRS.*






## 2.0 Consultation

***Please refer to Section 11-200-9, HAR***

Consultation is a critical and imperative part of the HEPA process. At the earliest practicable time, an agency is required to consult (or direct an applicant to consult) with agencies, citizen groups and individuals that might have jurisdiction or expertise with respect to the proposed action. Communities and various stakeholders must be included in the decision making process. The cultural and social importance of the environment to the people who live in the area must be considered.

## 2.1 Consultation Process

Consultation is an *iterative process*. Throughout the Chapter 343 process, agencies, individuals, or organizations may be contacted multiple times, depending on the information received and the questions that arise. Conflict is probable, but through transparency and public participation, potential adverse effects on the environment are identified and solutions considered. It is pragmatic to involve communities and various stakeholders in the decision making process because the public is more likely to 'buy in' to a proposal or plan in which they have had some involvement.

## 2.2 Who needs to be consulted?

Which agencies and individuals to consult will depend on both the *regulatory context and* the *environmental context*. To determine the regulatory context, it helps to contact all agencies processing required discretionary approvals. Determining the environmental context of the proposed action is also important. For example, the proponent of a new wind farm should consider both the site for the wind turbines and the surrounding environment.

## 2.3 Pre-Assessment Consultation

Consult with the community as well as agencies regarding your proposed activity before preparing your draft EA or EISPN. Groups, individuals and organizations that have expertise in the field, have an interest or will be affected by the activity you are proposing should be consulted. Immediate neighbors or neighboring landowners must be contacted. Consultation with the local planning department is required. The local planning staff can also direct you to other necessary agency contacts.

## 3.0 HEPA Exemptions

***Please refer to Section 11-200-8, HAR, Exempt classes of action.***

Certain projects or actions that trigger HEPA, but are deemed minor or routine by the overseeing state or county agency, may be declared exempt from the Chapter 343 process.

There are 11 classes of actions that agencies may use to find, after consultation, that an action is exempt.

### 3.1 Eleven Exempt Classes of Action:

1. Operations, repairs, or maintenance of existing structure, facilities, equipment, or topographical features, involving negligible or no expansion or change of use beyond that previously existing.
2. Replacement or reconstruction of existing structures and facilities where the new structure will be located generally on the same site and will have substantially the same purpose, capacity, density, height, and dimensions as the structure replaced.
3. Construction and location of single, new, small facilities or structures and the alteration and modification of the same, including, but not limited to:
   - A. Single-family residences less than 3,500 square feet not in conjunction with the building of two or more units;
   - B. Multi-unit structures designed for not more than four dwelling units if not in conjunction with the building of two or more such structures;
   - C. Stores, offices, and restaurants designed for total occupant load of twenty persons or less per structure, if not in conjunction with the building of two or more such structures; and
   - D. Water, sewage, electrical, gas, telephone, and other essential public utility services extensions to serve such structures or facilities; accessory or appurtenant structures including garages, carports, patios, swimming pools, and fences; and, acquisition of utility easements;
4. Minor alterations in the conditions of land, water, or vegetation;
5. Basic data collection, research, experimental management, and resource evaluation activities that do not result in a serious or major disturbance to an environmental resource;
6. Construction or placement of minor structures accessory to existing facilities;
7. Interior alterations involving things such as partitions, plumbing, and electrical conveyances;
8 Demolition of structures, except those structures located on any historic site as designated in the national register or Hawai'i register as provided for in the National Historic Preservation Act of 1966, Public Law 89-665, 16 U.S.C. §470, as amended, or Chapter 6E, HRS;
9. Zoning variances except shoreline setback variances;
10. Continuing administrative activities including, but not limited to, purchase of supplies and personnel related actions; and
11. Acquisition of land and existing structures, including single or multi-unit dwelling units, for the provision of affordable housing, involving no material change of use beyond that previously existing, and for which the legislature has appropriated or otherwise authorized funding.



### 3.2 Exemption Lists

Each agency is required by rule to develop a list of specific types of actions it may perform that fall within the 11 classes. The lists must be consistent with both the letter and intent expressed in the 11 classes and Chapter 343. The agencies must submit such a list and periodic amendments to the Environmental Council (EC or Council) for review and concurrence. An agency's exemption list helps determine whether to declare routine actions exempt.

### 3.3 Exempted Actions

Each proposed exempted action must be reviewed for potential environmental impacts. An agency may declare an action exempt from the EA/ EIS requirements if after project analysis and consultation, an agency finds that an action will have minimal or no significant environmental effects.

Prior to declaring an action exempt the agency must obtain advice from "other outside agencies or individuals having jurisdiction or expertise as to the propriety of the exemption." Section 11-200-8(a), HAR.

The proposing agency and the approving agency sign the declaration and keep it on file. Each agency must maintain records of actions that it has found to be exempt and shall produce those records for review upon request.

"All exemptions under the classes in this section are inapplicable when the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment."
*Section 11-200-8 (b), HAR*

## 4.0 Environmental Review Process

If a proposed action is subject to the Chapter 343 process (and is not determined to be exempt) the environmental review process typically begins with the development of a draft Environmental Assessment (EA). An EA is an informational document prepared by the proposing agency or the private applicant and used to evaluate the potential environmental impacts of a proposed action and determine if an EIS is required. After the draft EA has been finalized and public comments responded to, the agency proposing or approving the action determines if any "significant" environmental impacts are anticipated.

If the agency determines that the project will not have a significant impact, it issues a finding of no significant impact (FONSI). With the notice of this finding, the 30 day legal challenge period begins and the agency or applicant may proceed to the permitting process.

If the agency determines that the project may have a significant impact, a more detailed environmental impact statement (EIS) must be prepared. The decision to prepare an EIS can be made either at the initial planning stage or after reviewing an EA.

## 4.1 Significance Criteria

In most cases, an agency determines that an action may have a significant impact on the environment if it meets any of the following criteria:

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
2. Curtails the range of beneficial uses of the environment;
3. Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;
4. Substantially affects the economic or social welfare of the community or State;
5. Substantially affects public health;
6. Involves substantial secondary impacts, such as population changes or effects on public facilities;
7. Involves a substantial degradation of environmental quality;
8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;
9. Substantially affects a rare, threatened, or endangered species, or its habitat;
10. Detrimentally affects air or water quality or ambient noise levels;
11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water or coastal waters;
12. Substantially affects scenic vistas and view planes identified in county or state plans or studies; or
13. Requires substantial energy consumption

## 5.0 Environmental Assessments

For actions that trigger Chapter 343, HRS review but are not declared exempt, an EA is required (unless the agency, using its judgment and expertise, determines that an environmental impact statement (EIS) is required at the outset). The analysis within an EA is used to determine whether the impact on the environment will be significant enough to warrant the preparation of a full EIS or will be used to declare a Finding of No Significant Impact (FONSI) thus clearing the HEPA process.

### 5.1 Applicant or Agency Action?

The HEPA process is divided into two separate procedural tracks: Applicant and Agency Actions.

**5.1.1 Applicant Actions** are those initiated by a private party - HRS §343-5 (e).

For ***Applicant Actions*****,** identify the applicant and approving agency. The approving agency oversees the preparation of an EA and determines if the impacts of a proposed action are significant enough to warrant the preparation of an EIS or issue a FONSI.

The "approving agency" is an agency that issues an approval prior to actual implementation of an action and that agrees to process the HEPA review for the applicant's proposed action. For applicant actions, this is the case for both EA and EIS determinations.

**5.1.2 Agency Actions** are those proposed by a government agency - HRS §343-5 (b).

For ***Agency Actions,*** a government agency is proposing the project, submitting the EA, and making the determination. That is, the proposing and submitting agency is the same as the approving agency.

*Please note that in the event that the proposing agency determines that a full EIS is required the entity that determines the acceptability of the subsequent FEIS is termed the "accepting authority." The accepting authority is either the Governor or the County Mayor.*

If more than one agency has an interest or responsibility, then the one with the greatest responsibility for overseeing the proposed activity and/or will issue the major permit or approval should be the lead agency. If there is no agreement on who will lead, OEQC is empowered to select a single lead agency to process an environmental review. This is to ensure that a single document will meet the requirements of all the agencies involved in a project's approval.



### 5.2 Preparing an Environmental Assessment

The EA should be made understandable to the general public using plain language, illustrations, and photographs. The comprehensiveness of the EA should be proportional to the potential effects of the action. It does not need to be exhaustive, but should provide enough information for the agency to evaluate the potential effects. The following sections describe the required minimum content for an EA, as prescribed in Section11-200-10, HAR.

### 5.3 EA Content Requirements:

1. Identification of applicant or proposing agency;
2. Identification of approving agency, if applicable;
3. Identification of agencies, citizen groups, and individuals consulted in making the assessment;
4. General description of the action's technical, economic, social and environmental characteristics;
5. Summary description of the affected environment, including suitable and adequate regional, location, and site maps such as Flood Insurance Rate Maps, Floodway Boundary Maps, or United States Geological Survey topographic maps;
6. Identification and summary of impacts and alternatives considered;
7. Proposed mitigation measures;
8. Anticipated determination for DEAs or agency determination for FEAs;
9. Findings and reasons supporting the agency determination or anticipated determination;
10. List of all permits and approvals (State, federal, county) required; and
11. Written comments and responses to the comments under the early consultation provisions and statutory public review periods.

EAs also must assess any adverse effects on cultural resources or traditional cultural practices.

As it is critical to incorporate an imminent rise in sea level into plans for future development, sea level rise and other climate change impacts should also be considered when drafting an EA.

## 6.0 Environmental Impact Statements

An EIS is a disclosure document that analyzes the effects of a proposed project or program on the environment in terms of direct, indirect and cumulative impacts. When examining the potential environmental impacts of proposed actions, the EIS is a more complex screening tool than the EA.

This in-depth study discusses alternative methods, modes or designs of the proposed action, and formulates mitigation to eliminate, reduce, and rectify adverse impacts of the proposed action.

HEPA directs that in cases where an EIS is required, the preparing party (the proposing agency for agency actions, or the applicant for applicant actions) must prepare the EIS, submit it for review and comments, and revise it, while taking into account all critiques and responses. As such, an EIS is more involved - the entire process of consultation, research, dialogue, document preparation and review. The EIS must be written in plain language to allow public understanding of its content.

### 6.1 EIS Process

At each step in the process, the EIS documents (EISPN, DEIS, and FEIS) must be submitted to OEQC for publication in *The Environmental Notice.*

- An EIS may begin with an FEA or bypass the preparation of an EA process completely and proceed to the EIS Preparation Notice (EISPN) that undergoes a 30-day comment period. The consultation process of the EISPN affords agencies, organizations and individuals an opportunity to request to become a consulted party in the preparation of the EIS.
- Next, the study is compiled and printed as a Draft Environmental Impact Statement (DEIS). The DEIS must include copies of comments received and responses sent for the FEA/EISPN or the Act 172-2012 EISPN during the 30-day comment period. The EIS content requirements are provided in Part 6.2 of this guide.
- The DEIS is circulated to consulted parties with a 45-day public comment period. The applicant or approving agency must respond to the comments received during the DEIS public review period in a point-by-point manner. After comments have been received and responded to, the DEIS is finalized with updated information and copies of comments received and responses.
- The final document (FEIS) must be accepted by the accepting authority as complete and technically adequate before the proposed project can be implemented. The acceptance of an FEIS may be challenged.
- Aggrieved parties have 60 days from notification of acceptance/ non acceptance determination in *The Environmental Notice* to challenge the acceptability of the final document in court.

For agency actions, the accepting authority for an EIS on proposed state actions is the governor, and for county actions, the mayor.

For applicant actions, the accepting authority is a state or county agency with the power to grant discretionary permits on the project.



*Please note that for applicant actions, non-acceptance of an applicant's FEIS by the approving agency is grounds for administrative appeal to the Environmental Council. The applicant may choose not to appeal to the Council, and simply prepare and submit a revised DEIS addressing the deficiencies that led to non-acceptance.*

### 6.2 EIS Content Requirements

Section 11-200-17, HAR, prescribes the required contents of a DEIS, while Section 11-200-18, HAR, prescribes the contents of a FEIS.

The rules that govern the EIS process require at least the following elements:

- A concise summary and table of contents;
- A statement of purpose for the project;
- A detailed project description including maps, technical data, economic and cultural effects and historical perspective;
- An analysis of alternatives to the proposed project and an explanation why the alternatives were rejected;
- A description of the environmental setting;
- A statement of the relationship of the proposed action to land use plans, policies and controls for the affected area;
- A description of the probable impacts of the project including the direct, indirect and cumulative impacts, as well as impacts on both the natural and human environments;
- A description of the relationship between short-term uses of environmental resources and long-term productivity (sustainability analysis);
- A statement of the unavoidable environmental impacts caused by the project and a rationale for proceeding with the project in light of these impacts;
- A consideration of all mitigation measures proposed to avoid, minimize, rectify, or reduce the project's adverse impacts;
- A summary of unresolved issues and a discussion of how such issues will be resolved
- A listing of all agencies, organizations and individuals consulted during the preparation of the document; and
- Reproduction of all substantive comments received during the study process and the responses to those comments.

EISs also must disclose any adverse effects on cultural resources or traditional cultural practices.

As it is critical to incorporate an imminent rise in sea level and other climate change effects into plans for future development, these impacts should also be considered when drafting an EIS.

## 6.3 Distribution

The agency or applicant shall distribute the disclosure document to other agencies having jurisdiction or expertise as well as to citizen groups and individuals that the proposing agency reasonably believes to be affected. The agency or applicant shall deposit one copy to the nearest state library in each county in which the proposed action is to occur.

In the EIS process there are mandatory requirements to ensure the disclosure document is distributed and reviewed by agencies, organizations and individuals in a timely manner. DEIS and FEIS submissions (to OEQC and to the accepting authority or approving agency) should be accompanied by a distribution list identifying the recipients of the EIS on or before the start of the 45-day comment period.

OEQC then verifies the accuracy of the distribution list. Verification by OEQC allows the proposing agency or applicant to distribute the document to those on the list (which includes consulted parties).

OEQC recommends that lists be examined in advance, with the understanding that additional requests for documents may be received after the 45-day comment period. The proposing agency or applicant should inform the OEQC of any additions as soon as possible.

To avoid unnecessary printing costs, OEQC recommends contacting the parties identified in the distribution matrix to discuss whether a hard copy or electronic copy of the EIS is preferred.

## 6.4 Supplemental Environmental Impact Statements

HEPA provides that acceptance of an EIS satisfies HEPA's requirements and not further EIS is required for that action. Section 343-5(i), HRS, Section 11-200-26, HAR, in contrast requires that no further EIS is required unless the action has substantively changed "in size, scope, intensity, use, location, or timing, among other things." The rules go on to explain that if the action has changed and the change may have a "significant effect," then the EIS is no longer valid and a supplemental is required.

The Hawaii Supreme Court applied Section 11-200-26, HAR as a two-step process in Unite Here! Local 5 v. City and County of Honolulu, 123 Hawaii 150, 231 P.3d 423 (2010). The court first determined that the timing of the action changed. The court then considered whether a change in timing may have a significant effect. The term "may have a significant effect" applies when the record "raises substantial questions" regarding whether the project will likely have a significant effect on the environment.

A supplemental EIS should also be prepared "when the mitigating measures originally planned are not to be implemented, or where new circumstances or evidence have brought to light different or likely increased environmental impacts not previously dealt with." Section 11-200-17, HAR.

(Note that the application of Section 11-200-27 is disputed. Some interpretations of this section permit consideration of new circumstances or evidence only if the project has also changed in size, scope, location, intensity, use, or timing. The Hawaii Supreme Court did not address whether a supplemental EIS is required when there is no change in the action's size, scope, location, intensity, use or timing.)

# 7.0 Direct to EIS Law 2012

## 7.1 Overview:

- In an effort to streamline the Chapter 343, HRS process and increase efficiency, the Hawai'i State Legislature passed Act 172 in 2012.
- Act 172-2012 allows agencies to bypass the EA and proceed directly to the more comprehensive EIS.
- This determination is based on the agency's judgment and experience with similar actions after applying the significance criteria in Section 11-200-12 HAR.
- This amendment was added to Sections 343-5(b) (agency actions) and 343-5(e) (applicant actions).

## 7.2 Purpose:

Many stakeholders were frustrated that the two-step review process, with an EA to determine if an EIS is needed, can be unnecessarily burdensome and costly for applicants and agencies with projects likely to have significant impacts. The new law allows agencies to exercise their discretion for determining the appropriate level of review based on their experience with similar actions.

This approach is modeled after NEPA which allows an agency to bypass the EA step and proceed directly to an EIS (CEQ Regulations, 40 C.F.R. 1508.22) if the agency determines that significant effects may or will occur. Under NEPA this is a Notice of Intent (NOI).

Although this new law reduces duplication, preparation time and cost, it also cuts opportunities for public participation when the agency chooses not to prepare an EA, but to proceed directly to the EIS preparation notice.

## 7.3 Direct to EIS Consultation:

Because the direct to EIS option omits public participation in the EA process, it is important for agencies and preparers to undertake comprehensive consultation prior to and during the preparation of the DEIS.

Consultation is the most important element of the HEPA process. At the earliest practicable time, an agency is required to consult (or direct an applicant to consult) with the community, other agencies, organizations and individuals that may have an interest or will be affected by the proposed activity (Section 11-200-9, HRS).

** Content requirements for a HEPA Direct to EIS, Act 172-2012 Environmental Impact Statement Preparation Notice (EISPN) differ from the NEPA Notice of Intent (NOI). The NOI is published in the Federal Register, and provides some basic information on the proposed action in preparation for the scoping process.*



## 7.4 Act 172-2012 EISPN Content Requirements:

In the absence of an Environmental Assessment, the EISPN under the new law should at a minimum indicate in a concise manner the following:

1. Identification of applicant or proposing agency;
2. Identification of accepting authority;
3. Brief description of proposed action;
4. Determination;
5. Reasons supporting determination; and
6. Name, address, and phone number of contact person for further information

These elements are prescribed in FEA notice of determination requirements, Section 11-200-11.2 (c) HAR

OEQC recommends that the following elements also be addressed depending on the project specifics:

1. Discussion of the purpose and need of the action. Why is the action being proposed? What and whose need does it serve?
2. Description of the receiving environment. Describe the site. Is it considered a sensitive area or environment? Include any impacts of the receiving environment.
3. What is the planning horizon for the action? What other actions are projected in the reasonably foreseeable future? Have alternatives to the proposed action been considered?
4. Identify and consult with all parties affected by the proposed action both directly and indirectly. What agencies will issue discretionary/ministerial approvals in the future for the action? What community members will be affected?
5. Finally the agency should clearly identify what elements of the significance criteria influenced their decision to precede directly to the EIS preparation. The assessment of significance is integral to the environmental review process. The intent of the 2012 Legislature is to streamline the HEPA process, and it is not intended for proponents to "just do the EIS" instead of the more measured process.

## 8.0 Cumulative Effects

When considering the significance of potential environmental effects, the proposing or approving agency must consider the sum of the effects on the quality of the environment. That same agency must evaluate the cumulative effects of a proposed action including the expected direct and indirect consequences, as well as short-term and long-term effects of the proposed action.

### 8.1 Phased Actions - Project Segmentation

A group of actions proposed by an agency or an applicant shall be treated as a single action when:

A. The component actions are phases or increments of a larger total undertaking;
B. An individual project is a necessary precedent for a larger project;
C. An individual project represents a commitment to a larger project;
D. The actions in question are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole (Section 11-200-7, HAR).

A proposed action must be described in its entirety and cannot be broken up into component parts, which if each is taken separately, may have minimal impact on the environment. Segmenting a project generally is forbidden. If a project includes a later phase that cannot be fully described in the current EA because it will be implemented in the distant future (as opposed to the "reasonably foreseeable future"), the EA should disclose as much detail as possible about the future phase. Should the future phase of such a project eventually be proposed, a new environmental review document will be required at that time.

## 9.0 Environmental Notice

HEPA requires (Section 343-3, HRS) that OEQC publish a periodic bulletin, now called *The Environmental Notice* §343-3. *The Environmental Notice* lists the availability of DEAs, FEAs, FONSIs, EISPNs, DEISs, FEISs, and notices of acceptance. OEQC must publish notice of certain plans/processes relating to incidental take licenses, habitat conservation plans, or safe harbor agreements under the federal Endangered Species Act, and of any application for the registration of land by accretion. As a courtesy, it also lists announcements of environmental concern from other agencies.

The Environmental Notice is published on the 8th and the 23rd of each month and is distributed electronically to state libraries, government agencies, and interested members of the public, consultants and community groups.

## 10.0 Notices of Determination

The notices of determination for environmental assessments and environmental impact statements must be submitted to OEQC on agency letterhead. They are required to contain the following elements (HAR 11-200-11.1(c)):

A. Identification of applicant or proposing agency (include in OEQC Publication Form)
B. Identification of accepting authority or approving agency (include in OEQC Publication Form)
C. A description of proposed action (include in OEQC Publication Form)
D. Determination (include in body of letter to OEQC)
E. Reasons supporting determination (include in body of letter to OEQC)
F. Name, address, and phone number of contact person for further information (include in body of letter). In the body of the letter, please make reference to the supporting documentation used to make the determination (i.e., draft EA or final EA), OEQC publication form, etc.

# 11.0 Environmental Review Entities and Laws

## 11.1 Environmental Review Agencies

The main State government entities that work to implement Hawai'i's environmental reviews are the Office of Environmental Quality Control and the Environmental Council:

1. The Office of Environmental Quality Control (OEQC) advises the Governor on all matters relating to environmental quality control and is responsible for implementing various portions of Chapter 343. The OEQC Director is also responsible for directing the attention of the university community and the general public to environmental and ecological issues by funding research projects and providing environmental education; proposing and encouraging legislation to preserve and protect environmental resources; recommending long-range environmental programs; and offering advice to private citizens and governmental agencies on matters relating to environmental quality control. OEQC reviews all documents pursuant to the EIS process and informs the public of proposed actions through the semimonthly publication known as The Environmental Notice.

2. The Environmental Council has 15 members appointed by the governor and confirmed by the legislature for four year terms. The Council serves as a liaison between the director of OEQC and the general public by soliciting information, opinions, complaints and recommendations concerning ecology and environmental quality. The Council is responsible for the adoption, amendment and repeal of rules under Chapter 343, hears any appeals from applicants who wish to challenge the nonacceptance of an EIS, monitors agency progress in meeting state environmental goals and policies and publishes an annual report, with recommendations for enhancing the quality of Hawai'i's environment.

3. The Environmental Center of the University of Hawaii functions to stimulate, expand, and coordinate education, research, and service efforts of the University relating to ecology, natural resources, and environmental quality. The Environmental Center also reviews EAs and EISs and submits comments and suggestions when appropriate during the environmental review process.

***2013 Changes for the Environmental Center***

The Environmental Center has merged with the Water Resources Research Center (WRRC). WRRC's Environmental Assessment and Protection Division are to continue to fulfill the university's Chapter 341 mandate through the coordinated efforts of its divisions and programs.



### 11.2 Environmental Impact Statements, Chapter 343, Hawai'i Revised Statues

Adopted in 1974, and patterned after the National Environmental Policy Act, Chapter 343 provides the statutory basis for developing and processing environmental assessments and environmental impact statements. This "EIS Law" requires that systematic consideration be given to the environmental and social consequences (in addition to the economic consequences) of proposed state, county or private actions.

### 11.3 Environmental Impact Statement Rules, Chapter 200, Hawai'i Administrative Rules

The administrative rules implementing Chapter 343, HRS, are contained in Title 11, Chapter 200. Chapter 200 prescribes whom the law applies to, how it is implemented, and what the specific requirements are, in a step-by-step format. These rules provide agencies and applicants with procedures, specifications, contents and criteria relating to environmental assessment and environmental impact statements.

### 11.4 Environmental Policy Act, Chapter 344 Hawai'i Revised Statutes

Also adopted in 1974, Chapter 344 established Hawai'i's State Environmental Policy to encourage the conservation of its natural resources and the enhancement of its quality of life. Specific policy guidelines are set forth in the law for implementation by state and county agencies in their planning and decision making.

## 12.0 National Environmental Policy Act

The National Environmental Policy Act (NEPA) became federal law in 1970. NEPA provides a framework for federal agencies to review impacts prior to taking actions. In enacting NEPA, Congress recognized that nearly all federal activities affect the environment in some way and mandated that before federal agencies make decisions, they must consider the effects of their actions on the quality of the human environment.

A proposed project that includes the use of federal lands or funds may require the preparation of a federal EIS. Often, agencies need to comply with the provisions of NEPA, in addition to Chapter 343, HRS.

Section 343-5(H), HRS allows cooperation between state and federal agencies to the fullest extent.

It's important to note, in comparing the state and federal process that an action exempt from review under the NEPA, does not automatically constitute an exemption under HEPA. The federal exemption may be considered in the state or county agency determination, however the state and local agencies are still responsible for compliance with HEPA.

It is important to note, in comparing the two processes that both federal and state agencies that frequently Preparing a joint HEPA-NEPA document that satisfies both laws can be difficult as the content requirements, statutory public comment period and supplemental EIS requirements can differ. Often, the agency resorts to producing tow documents with similar information but different structures. Federal process examines a proposal and results in one of three different determinations, namely a Categorical Exclusion (CE), an Environmental Assessment (EA) that can result in a Finding of No Significant Impact (FONSI) or Notice of Intent (NOI), or a more comprehensive Environmental Impact Statement (EIS).

| HEPA | NEPA |
|---|---|
| Separates the disclosure process and the implementation (or permitting) processes | Does not draw a distinct boundary between the disclosure process and the implementation (or permitting) processes |
| Due to the separation of the disclosure process from permitting / implementation process, multiple agencies are involved | Constitutes a process that is under the oversight of one federal agency from start to finish |
| Review triggered by nine prescribed factors | Review triggered by "major" federal action significantly affecting human environment |



## Glossary of Terms

**Acceptance** – A formal determination that the document required to be filed pursuant to Chapter 343, HRS, fulfills the definitions and requirements of an environmental impact statement as prescribed by Section 11-200-23, HAR. Acceptance does not mean that the action is environmentally sound or unsound, but only that the document complies with Chapter 343, HRS.

**Accepting Authority** – The final official or agency that determines the acceptability of the EIS document.

**Action** – Any program or project to be initiated by any agency or applicant.

**Agency** – Any department, office, board, or commission of the state or county government which is a part of the executive branch of that government.

**Agency actions** – Refers to those proposed by a government agency. The agency proposing the action is responsible for preparing an EA, reviewing the document, submitting the document to OEQC for publication, and issuing a notice of determination on the need for an EIS.

**Applicant** – Any person who, pursuant to statute, ordinance, or rule, officially requests approval for a proposed action. Under HEPA, an applicant cannot be an agency, nor can an agency be an applicant. This mutual exclusivity establishes an important boundary in HEPA and serves to divide the universe of actions in one of two different areas: applicant actions (see Section 343-5(c), HRS) or agency actions (see Section 343-5 (b), HRS). This is described further in Section 1.10.1.

**Applicant actions** – Refers to those that are initiated by a private party and "triggers" an environmental review. The agency with the authority to grant approval of the project requires the applicant to prepare an EA prior to permitting its development.

**Approving agency** – An agency that issues an approval prior to actual implementation of an action and determines the need for an EA or an EIS. The approving agency may also be an accepting authority for an applicant's final EIS>

**Draft Environmental Assessment (DEA)** – The environmental assessment submitted by a proposing agency or an approving agency for public review and comment when that agency anticipates a finding of no significant impact (FONSI) determination.

**Draft Environmental Impact Statement (DEIS)** – The initial statement filed for public review

**Discretionary Consent** – A consent, sanction, or recommendation from an agency for which judgment and free will may be exercised by issuing agency, as distinguished from ministerial consent.

**Environmental Assessment (EA)** – An informational review document prepared by the proposing agency or the private applicant and used to evaluate the possible environmental effects of a proposed action.

**Environmental Impact Statement (EIS)** – An informational document prepared in compliance with the rules adopted under Section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures

proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

**Environmental Impact Statement Preparation Notice (EISPN)** – A determination based on an EA or at the outset when an agency using its judgment and expertise under Act 172-2012 determines that an EIS is required because the subject action may have a significant effect on the environment and therefore, will require the preparation of an EIS.

**Exemption** – Although a project may touch one of the above triggers, it does not necessarily require the preparation of an environmental review document. Certain classes of activities that are routine and minor in scope are exempt from the EA requirement.

**Final Environmental Assessment (FEA)** – Either the EA submitted by a proposing agency or an approving agency following the public review and comment period for the DEA and in support of either a FONSI or EISPN.

**Final Environmental Impact Statement (FEIS)** – The document that has incorporated the public's comments and responses to those comments. It shall be evaluated for acceptability by the respective accepting authority.

**Finding of No Significant Impact (FONSI)** – A determination by an agency based on an EA that an action not otherwise exempt does not have the potential for a significant effect on the environment and therefore does not require the preparation of an EIS. A FONSI is required prior to implementing or approving the action.

**Notice of Determination (FONSIs and Prep Notices)** – issued by an agency and accompanies a FEA. The determination states that the action will either have no significant impact (FONSI), or may have a significant impact. If a FONSI is issued, the project may proceed without further study. Without a FONSI determination, an agency must issue an EISPN stating that a full EIS will be required.

**Office of Environmental Quality Control (OEQC)** – Established in 1970, its goal is to maintain the optimum quality of the State's environment by implementing Chapter 343, HRS, Environmental Impact Statements.

**Person** - Includes any individual, partnership, firm, association, trust, estate, private corporation, or other legal entity other than an agency.

**Proposing agency** – Responsible for preparing an EA, reviewing the document, submitting the document to OEQC for publication, and issuing a notice of determination on the need for an EIS.

**Significance** - Under HEPA, it has been operationally defined in the administrative rules (Section 11-200-12, HAR) that set forth the thirteen criteria that a proposing agency or an approving agency must use in determining whether a proposed action has a significant effect on the environment.



**Office of Environmental Quality Control**
**235 S. Beretania St., Room 702**
**Honolulu, HI 96813**
**Phone (808) 586-4185**
**Fax (808) 586-4186**
**Oeqchawaii@doh.hawaii.gov**
**www.hawaii.gov/health/environmental/oeqc/index.htm**

# Appendix 21

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai`i 96850

In Reply Refer To:
2015-TA-0138

FEB 23 2015

Jeffrey H. Overton
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813

Subject: Technical Assistance for the Proposed Hawaii Dairy Farms, Kauai

Dear Mr. Overton:

The U.S. Fish and Wildlife Service (Service) received your letter, dated January 26, 2015, requesting our comments on the Notice of Preparation of Environmental Impact Statement (EISPN) for the proposed Hawaii Dairy Farms (HDF) on the island of Kauai. Hawaii Dairy Farms, LLC proposes to establish and operate a grass-fed diary, capable of supporting 2,000 dairy cows, including commercial dairy facilities and pastures managed for Kikuyu and Kikuyu-Guinea grasses. The proposed dairy facilities consist of barn and milking parlor, cow walkways, farm roads, effluent settling and storage ponds, water distribution system and tanks, operations buildings, and associated infrastructure (electrical power, wastewater, and communications). The pasture design will include approximately 118 fenced paddocks (~4.5 to 5.0 acres each). The development will be located on approximately 578 acres consisting of portions of three larger parcels (TMK (4) 2-9-003:001 and 006 portion; TMK (4) 2-9-001:001) adjacent to Mahaulepu Road, east of Koloa town. We offer the following comments to assist you in the preparation of the draft Environmental Impact Statement (EIS). Our comments are provided under the authorities of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 *et seq.*), and the Fish and Wildlife Coordination Act of 1934 (FWCA), as amended (16 U.S.C. 661 *et seq.*; 48 Stat. 401).

We reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, as it pertains to federally listed species and designated critical habitat. The following species are known to occur or transit through the proposed project area: the endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), Hawaiian duck (*Anas wyvilliana*) (hereafter collectively referred to as Hawaiian waterbirds);the endangered Hawaiian goose (*Branta sandvicensis*); the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*); and the endangered Hawaiian petrel (*Pterodroma sandwichensis*), the threatened Newell's shearwater (*Puffinus auricularis newelli*), and a candidate for listing the band-rumped storm-petrel (*Oceanodroma castro*) (hereafter collectively referred to as seabirds). The proposed project area is in the vicinity of designated critical habitat

**Exhibit B**







for the following species: two endangered arthropods, the Kauai cave wolf spider (*Adelocosa anops*) and the Kauai cave amphipod (*Spelaeorchestia koloana*) (hereafter collectively referred to as arthropods); and an endangered plant, ohai (*Sesbania tomentosa*). We provide the following comments which include recommendations to avoid and minimize project impacts to listed species, candidate species, and critical habitat.

*Hawaiian Waterbirds and Hawaiian Goose*
The EISPN states that Hawaiian waterbirds and Hawaiian geese are known to utilize water features around the HDF parcel. Our information suggests that considerable numbers of Hawaiian waterbirds frequent the project area. The Service recommends you incorporate the following measures into your project description to avoid and minimize impacts to Hawaiian waterbirds and Hawaiian geese.

Waterbirds and geese may be attracted to the effluent settling and storage ponds as well as managed pastures. Waterbirds and geese attracted to sub-optimal habitat may suffer adverse impacts, such as predation and/or reduced reproductive success, and thus the project may create an attractive nuisance. Measures to minimize their attraction to ponds, such as covering or enclosing the ponds, should be considered. To minimize predation and/or reduced breeding success of waterbirds and geese using pastures, a predator control program should be implemented to control non-native predators, such as feral cats and rats.

Injury or mortality of adults and juveniles may potentially occur due to entanglement or collision with fencing and/or collision with vehicles on farm roads. Additional details on fencing are necessary to assess potential impacts to Hawaiian waterbirds and Hawaiian geese. Electric fencing (commonly used to control movement of cows in pastures) should not be used for fencing as part of the proposed project. To minimize potential collision with vehicles, the Service recommends you install signage near roadways to warn drivers (e.g., farm workers and visitors) to be wary of birds in the areas.

Under certain environmental conditions, *Clostridium botulinum*, a bacteria commonly occurring in nutrient-rich substrate, may produce toxins that when ingested by Hawaiian waterbirds or Hawaiian geese results in paralysis and most often mortality (referred to as avian botulism). The EISPN states that 100% of manure from up to 2,000 dairy cows will be treated and applied to fertilize pasture grasses. The spraying of pastures with decaying animal materials will promote a nutrient-rich bacterial substrate. We recommend you work with our office so that we may assist you in developing measures to avoid fostering conditions that promote avian botulism and a monitoring plan for early detection and response.

Displacement and/or loss of nests may potentially occur during project construction and operation (e.g., clearing areas, disking, and/or mowing of pastures). To minimize and avoid impacts due to displacement and/or loss of nests, we recommend the following measures:

- A biological monitor should conduct Hawaiian waterbird and Hawaiian goose nest surveys at the proposed project site prior to project initiation.
- Any documented nests or broods within the project vicinity should be reported to the Service within 48 hours.

- A 100-foot buffer should be established and maintained around all active nests and/or broods until the chicks have fledged. No potentially disruptive activities or habitat alteration should occur within this buffer.
- The Service should be notified immediately prior to project initiation and provided with the results of pre-construction Hawaiian waterbird and Hawaiian goose surveys.
- A biological monitor(s) should be present on the project site during all construction activities, earth moving activities, land clearing/disking activities, and mowing of pastures to ensure that waterbirds or geese nests are not adversely impacted.
- If a Hawaiian waterbird or Hawaiian goose is observed within the project site, or flies into the site while activities are occurring, the biological monitor should halt all activities within 100 feet of the individual(s). Work should not resume until the Hawaiian waterbird(s) or goose leave the area on their own accord.
- A post-construction report should be submitted to the Service with 30 days of the completion of the project. The report should include the results of surveys, the location and outcome of documented nests, and any other relevant information.

We suggest the draft EIS provide additional information on effluent ponds (e.g., number, location, and sizes), fencing materials and site layout, fertilization practices (e.g., effluent treatment, application amounts, frequency), outline measures to avoid and minimize the various potential impacts described above, and examine potential impacts that may occur as a result of establishment and operation of the HDF project.

*Hawaiian Hoary Bat*
The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Additionally, Hawaiian Hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground. When barbed wire is used for fencing, Hawaiian hoary bats can become entangled. Barbed wire should not be used for fencing as part of the proposed project.

*Seabirds*
Seabirds, including the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. We recommend the following minimization measures be incorporated into your project description:

- Construction activities should only occur during daylight hours. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.





- If exterior facility lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded and/or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

The draft EIS should examine potential impacts to the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel that may occur as a result of construction and the operational use exterior lights associated with the proposed project.

Utility poles and overhead lines may constitute a collision hazard for seabirds as they traverse between the ocean and their breeding colonies. Additional information on the design of the proposed utility system for the development, including the number of utility poles, length of powerline, configuration of powerlines, and height of utility poles and overhead powerlines, in the area is necessary to assess the potential impacts to seabirds. We suggest the draft EIS provide this additional informational as well as determine whether undergrounding power lines in the proposed development area is feasible to avoid impacts to seabirds. If it is not feasible to underground power lines or install power lines at or the below the vegetation layer, other measures to minimize the potential for seabird collision should be analyzed in the draft EIS (e.g., vertical versus horizontal arrays, etc.).

*Arthropods*
The Kauai cave wolf spider and the Kauai cave amphipod are found only on the island of Kauai in the Koloa area from four to six caves respectively. They occur in small, subterranean spaces, voids, and cracks, requiring a woody debris food source. Cave ecosystems are threatened by contamination from surface sources of toxic chemicals from spills, pesticides, and waste disposal which enter caves via streams and/or ground-water seepage. The proposed HDF site is hydrologically linked to the sensitive cave habitats. We recommend the draft EIS address any project components that have the potential to impact the critical habitat (e.g., wastewater and pasture fertilization practices) and minimize potential disturbance.

*Sesbania tomentosa*
*Sesbania tomentosa* occurs on the coast located southeast of the HDF site. The primary threat to the species on the island of Kauai is habitat degradation caused by competition with various introduced plant species, including but not limited to buffelgrass (*Cenchrus ciliaris*), swollen fingergrass (*Chloris barbarta*), sourgrass (*Digitaria insularis*), and haole koa (*Leucaena leucocephala*). Other threats include lack of adequate pollination, fire, destruction by off-road vehicles, other human disturbances, and storms. The Service recommends that your draft EIS address any project components that have the potential to impact the critical habitat and minimize potential disturbance.

Under the ESA, take is defined to mean "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct." Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the

Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering.

When additional information on the proposed project description becomes available, we recommend you contact our office early in the planning process so that we may further assist you with ESA compliance. If it is determined that the proposed project may affect federally listed species or critical habitat, the project proponent(s) should coordinate with us under section 10 of the ESA or consult with us pursuant to section 7 of the ESA as follows. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats, and defines measures to minimize and mitigate those adverse effects.

Additionally, we recommend you incorporate the attached best management practices into your project description to avoid and minimize impacts to water resources that have the potential to occur during establishment and construction of the proposed project.

We appreciate your efforts to conserve protected species. If you have questions regarding this letter, please contact Adam Griesemer, Endangered Species Biologist (phone: 808-285-8261).

Sincerely,

Aaron Nadig
Island Team Manager
Oahu, Kauai, North Western Hawaiian Islands, and American Samoa

cc: Laura McIntyre, HDOH





**U.S. Fish and Wildlife Service**
**Recommended Standard Best Management Practices**

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see *http://www.haccp-nrm.org/Wizard/default.asp*) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

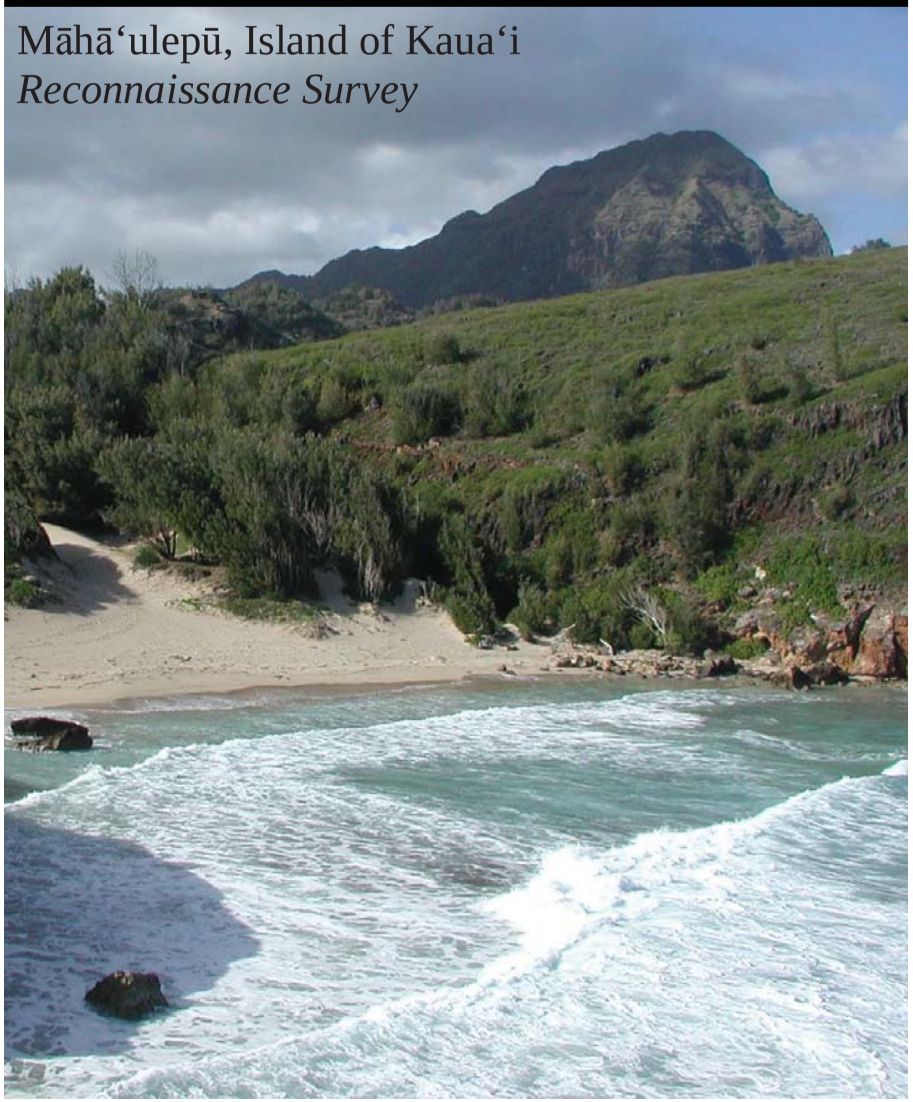
7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

# Appendix 22

National Park Service
U.S. Department of the Interior

Pacific West Region, Honolulu Office
February 2008

# Māhāʻulepū, Island of Kauaʻi
## *Reconnaissance Survey*



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# 1 SUMMARY

At the request of Senator Daniel K. Inouye, in 2006 the National Park Service agreed to conduct a reconnaissance survey of Māhāʻulepū and nearby areas on the island of Kauaʻi, the oldest major inhabited island in the state of Hawaiʻi.

Māhāʻulepū is an ahupuaʻa (historic Hawaiian land division) and watershed running from the Hāʻupu mountain range to the shoreline on Kauaʻi's southeast coast. It sits at the heart of a larger undeveloped 9-mile coastal span that separates the county seat of Līhuʻe from the resort town of Poʻipū. Natural and cultural resources in this area provide respite and recreation for residents and visitors, and are the focus of this study.

Resources of particular interest in this locale include the undeveloped shoreline corridor from Makawehi northeastward through Māhāʻulepū and Kīpū Kai to Nāwiliwili Bay; the Hulēʻia National Wildlife Refuge and historic Alekoko Fishpond along Hulēʻia Stream; and parts of the Hāʻupu mountain range overlooking these areas. These natural and cultural assets are mostly privately owned, and are mostly designated as conservation district by the state of Hawaiʻi. They exist within a broader landscape of vast, private agricultural lands currently used for farming and ranching.

In accord with established NPS planning criteria, this report examines these natural and cultural resources to provide a preliminary evaluation of their significance, and a preliminary evaluation of the suitability and feasibility of helping to protect them within the framework of the national park system. These evaluations are based on limited site visits, research and consultations conducted by staff of the NPS Pacific West Region Honolulu Office in 2007, and are neither final nor definitive. They serve as background material for Senator Inouye as he considers whether to seek Congressional authorization for a full-fledged study of resource protection alternatives for Māhāʻulepū and surrounding areas.

This reconnaissance survey report provides the following preliminary evaluations of the study area:

- The study area shoreline corridor, Hāʻupu mountain range and Hulēʻia Stream are deemed nationally significant on the basis of natural and cultural resources including geologic landforms, rare species and habitats, and features central to stories of native Hawaiian and United States history. Collectively these areas comprise a relatively unspoiled and increasingly threatened coastal landscape that provides unique opportunities for public enjoyment, interpretation and scientific study.
- Resources in these areas represent themes and types suitable for protection within the framework of the national park system, and not otherwise adequately protected in the state or nation. Volcanic features of the study area represent a stage and range of geologic development of the Hawaiian high islands that is not featured at other Hawaiʻi parks. Landforms and fossils of the Māhāʻulepū coast illustrate the reality of global climate and sea level change, as well as the impacts of human settlement on native ecosystems. An extensive and undeveloped Hawaiʻi shoreline within easy reach of population centers, such as that found in the study area, is a rare and rapidly vanishing type of recreational resource prized by U.S. citizens and international visitors as well as Hawaiʻi residents. Protection and management of this resource type is currently inadequate at federal, state and local levels.
- The study area's significant natural and cultural resources are of a collective size and configuration to be feasibly managed for resource protection and public enjoyment at reasonable cost, provided that NPS, affected landowners, and interested state and local entities work in ongoing partnership to identify and reduce resource threats, manage access, and ensure long-term protection of the area's overall scenic quality.

Based on these preliminary evaluations, the National Park Service Pacific West Region recommends that a Special Resource Study be authorized under the stipulations of Public Law 105-391, so long as it focuses on non-traditional management alternatives that a) involve local partners and b) include options for continued farm and ranch operations on private agricultural lands.

# 2 BACKGROUND OF THE STUDY

In 2006, Senator Daniel K. Inouye asked the National Park Service (NPS) to conduct a reconnaissance survey on the Hawaiian island of Kaua‘i, in order to provide a preliminary evaluation of the resources of Māhā‘ulepū and surrounding areas for potential inclusion in the national park system. NPS agreed to conduct the study in the next fiscal year, and began its work in February 2007.

A team of NPS staff conducted a field visit to the study area March 19-21, 2007. The team included Frank Hayes, Pacific Area Director; Keith Dunbar, Chief of Planning for the Pacific West Region; Dr. Larry Basch, Marine Biologist/Science Advisor; Darcy Hu, Ecologist; and Helen Felsing, Planner.

The visit included guided tours of the Makawehi-Pā‘ā dunes trail, Māhā‘ulepū shoreline, Māhā‘ulepū Valley, Makauwahi Cave Reserve, and Kīpū Kai, plus a brief stop at Alekoko Fishpond and Hulē‘ia National Wildlife Refuge. NPS held off-site meetings with the state’s Kaua‘i District archeologist and wildlife manager, the board of directors of nonprofit Mālama Māhā‘ulepū, and the managers of Makauwahi Cave Reserve. Field notes and photographs from the visit were combined with follow-up research and consultations to prepare this report.

For sharing their knowledge of the study area and facilitating access to it, we thank representatives of Grove Farm, National Tropical Botanical Garden, Grand Hyatt Kaua‘i, Mālama Māhā‘ulepū, TEOK Investigations, Hulē‘ia National Wildlife Refuge, and Kīpū Ranch (Waterhouse Trust and caretakers). Mahalo also to Thomas Kaiakapu and Nancy McMahon of the Kaua‘i District office of the Hawai‘i Department of Land and Natural Resources for sharing their valuable time and information.

## 2.1 Purpose and Scope of an NPS Reconnaissance Survey

Special Resource Studies for potential new units of the national park system may be conducted by the NPS only with specific authorization of Congress. However, Congress does permit the NPS to conduct preliminary resource assessments and gather data on potential study areas or sites. The term “reconnaissance survey” has been used to describe this type of assessment.

A reconnaissance survey examines the natural and cultural resources in a study area to provide a preliminary evaluation of their significance, and a preliminary evaluation of the suitability and feasibility of helping to protect them within the framework of the national park system. Unlike a Special Resource Study, the reconnaissance survey does not explore management alternatives. Its findings and recommendations are centered on whether or not a full Special Resource Study is warranted.

If according to the reconnaissance survey a study area appears potentially eligible for inclusion in the NPS system, then NPS may recommend that a full-scale Special Resource Study be authorized by Congress. The Special Resource Study process is an extensive one,



designed to involve the public and affected parties; further examine significance, suitability, and feasibility; and identify and evaluate potential resource protection strategies, boundaries, and management alternatives.

## 2.2 NPS Evaluation Criteria

To be eligible for favorable consideration as a unit of the national park system, a study area must possess nationally significant natural or cultural resources. It must be a suitable and feasible addition to the system, and should be shown to require direct NPS management instead of protection by some other governmental agency or the private sector. These criteria are further described below.

### 2.2.1 Criterion 1: National Significance

Significance evaluation is based on the qualities of the natural and cultural resources present in the study area. Recreational resources, while an important component of most NPS units, are not evaluated independently for their significance. NPS considers a natural or cultural resource nationally significant if it meets four standards: 1) It is an outstanding example of a particular type of resource; 2) it possesses exceptional value or quality illustrating or interpreting the natural or cultural themes of our nation’s heritage, 3) it offers superlative opportunities public enjoyment or scientific study; and 4) it retains a high degree of integrity as a true, accurate, and relatively unspoiled example of the resource. Appendix 6.1 provides examples of types of natural and cultural resources NPS may consider significant.

### 2.2.2 Criterion 2: Suitability

To be considered suitable, an area must represent a type of recreational resource or natural or cultural theme that is not already adequately represented in the National Park System, and not comparably represented and protected for public enjoyment by another land-managing entity. Adequacy of representation is determined on a case-by-case basis by comparing the proposed area to other units in the National Park System for differences or similarities in the opportunities for public enjoyment, and in the type, quality, quantity, or combination of resources present.

### 2.2.3 Criterion 3: Feasibility

To be considered feasible, an area's natural systems and/or historic settings must be of sufficient size and appropriate configuration to ensure long-term protection of the resources and to accommodate public use. The area must have potential for efficient administration at a reasonable cost. Other important feasibility factors include landownership, acquisition costs, access, threats to the resource, and staff or development requirements.

### 2.2.4 Criterion 4: Management Options

Even if a study area’s resources are deemed significant, feasible and suitable for addition to the National Park System, management by the NPS will not usually be recommended if

other entities—such as state or local government or the private sector—can provide adequate protection and management. As a preliminary document, a reconnaissance survey does not address potential management options, however; these are explored only if and when a Special Resource Study is conducted.

# 3 OVERVIEW OF THE STUDY AREA

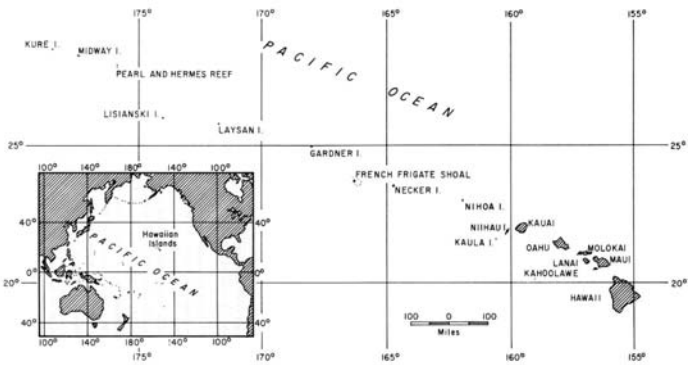
## 3.1 Regional Context

Hawai‘i is unique in our nation—it is the only state that is not part of the North American continent, and the only one made up of volcanic islands. Situated midway between the American and Asian continents, it spans 1500 miles of sea and encompasses nearly as much ocean as land within its boundaries. The isolated Hawaiian archipelago was one of the last places on earth to be occupied by people.

Entirely volcanic in origin, the state’s 132 isles range from the tiny reefs and shoals of the Northwestern Hawaiian Islands to the 4,038-square-mile “Big Island” of Hawai‘i at the southeastern end of the chain. Their varying sizes reflect different stages in a shared and ongoing volcanic process.

For each island that process begins by eruption over the Hawaiian magmatic hot spot (located today beneath the ocean just east of Hawai‘i). Through buildup from successive eruptions, an island emerges from the sea. At the same time it drifts slowly westward—away from the hot spot—along with the underlying Pacific Tectonic Plate. As an island’s distance from the hot spot increases, eruptions cease, and it slowly subsides into the sea.

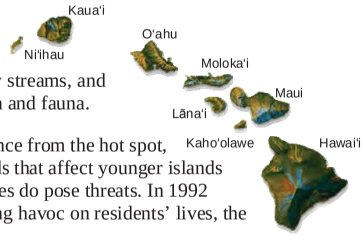
Drifting west at about 3.5 inches per year, all the islands of Hawai‘i will eventually—in millions of years—be drawn back into the earth at the subduction zone where the Pacific plate collides with the plate of the Asian continent.




HAWAIIAN ARCHIPELAGO



Hawai‘i’s human population concentrates on the eight main islands that were most recently formed. Lined up in just a 350-mile stretch at the southeastern end of the archipelago, these populated high islands make up all but three square miles of the state’s 6400 square miles of land.




The Māhā‘ulepū study area is located on Kaua‘i, the oldest and westernmost of the main high islands. At 5 million years of age, Kaua‘i’s volcanic slopes are deeply carved by streams, and its forests host Hawai‘i’s richest array of flora and fauna.

Because of its Kaua‘i’s relative age and distance from the hot spot, it escapes the seismic activity and lava hazards that affect younger islands in the chain. However, tsunamis and hurricanes do pose threats. In 1992 Hurricane Iniki devastated the island, wreaking havoc on residents’ lives, the local economy, and fragile native ecosystems.

Historically, Kaua‘i’s economy was based in agriculture, and its lifestyle today remains rural and relaxed. As development escalates throughout the state, however, visitors increasingly seek the haven of Kaua‘i’s lush environment, scenic beauty and tranquility. The island’s 63,000 residents coexist with a daily visitor population of about 21,000. From 2005 to 2006, Kaua‘i’s annual visitor count rose 10.4%, to over 1.2 million people (DBEDT 2007b). Today new commercial and residential developments are changing both the landscape and the people. These provide needed jobs, but also generate tension about the pace and direction of change on the island.

Of the larger main islands (Kaua‘i, Hawai‘i, Maui, Moloka‘i and O‘ahu), Kaua‘i is the only one that is not home to a unit of the national park system. In the 1960s an NPS study for a national park on the island’s rugged northwest Nā Pali coast and Waimea Canyon met intense local resistance; no NPS designation was pursued.

Māhā‘ulepū, a focus area for this reconnaissance survey, was evaluated in an NPS Natural Landmarks Survey of the Hawaiian Islands in 1981. That survey concluded that “the lands of Māhā‘ulepū are among the most interesting areas in the State both geologically and biologically.” It gave the area a priority ranking of 1, applied to areas that “include outstanding and/or unique examples of geological and ecosystem features characteristic of the Hawaiian Islands and which encompass several such features.” (NPS 1981)

## 3.2 Geography and Climate

The study area encompasses approximately 12 square miles on Kaua‘i’s southeast coast (see Study Area map). Its *makai* or seaward side spans the 9-mile coastal corridor between the county seat of Līhu‘e and the resort town of Po‘ipū, and is bracketed by the bays of Keoneloa and Nāwiliwili. Its inland edge arcs around Māhā‘ulepū valley, across Hā‘upu Ridge and through Kīpu to include Hulē‘ia National Wildlife Refuge and Alekoko Fishpond at Hulē‘ia Stream. These boundaries are tentative ones established only for

purposes of this report and should be reconsidered in consultation with local landowners if and when a more detailed study is authorized by Congress.

The Hāʻupu (Hoary Head) mountain ridge runs east-west across the study area. Land south of the ridge is part of the county's Hanamāʻulu-Poʻipū planning district, which extends from the ridgeline across forests, fields, and old plantation towns to the fast-growing resort area of Poʻipū. Study area land north of the ridge lies in the planning district of Līhuʻe; this district includes Līhuʻe town—Kauaʻi's county seat, population center and business hub—and adjacent Nāwiliwili Harbor, a deepwater port for cargo and cruise ships.

Weather and climate in the study area typify the mild and locally variable conditions for which Hawaiʻi is famous. At Māhāʻulepū, in the lee of the Hāʻupu mountains, rainfall averages 53 inches a year. Average temperatures range from 72-86°F in the hottest months (August and September) and 64-80°F in cool January and February (WRCC 2007). Wetter and cooler conditions prevail north of Hāʻupu ridge, where moisture-laden northeast trade winds are slowed by the nearly 3,000-ft mountain before sweeping over and around to Māhāʻulepū. Along the coast the trade winds run roughly parallel to the shore, shaping the dunes from Kīpū Kai to Makawehi.

Resources of particular interest in the study area lie along the entire shoreline corridor, Hulēʻia Stream, and the Hāʻupu mountain range. While large open agricultural areas at Māhāʻulepū and Kīpū are encompassed by the study area boundary and may contain relevant natural and cultural resources, their primary importance to this study lies in their potential impact upon adjacent natural areas.

The shoreline corridor begins at Makawehi Point, where a trail across the Pāʻā dunes affords pedestrian access from the Poʻipu resort area to Punahoa Point and Māhāʻulepū Beach. From there the accessible shoreline continues north to Haʻula at the foot of the Hāʻupu range. Known as the **Māhāʻulepū coast**, this popular recreation area features crescents of sandy beach, a variety of coastal vegetation, windblown modern dunes, and a fossil-rich lithified dune system that forms fantastic cliffs, points and pinnacles overlooking the water. A privately-owned rutted dirt road affords daytime vehicular access to the Māhāʻulepū coast from Punahoa Point north to Hāʻula Bay.

Beyond Hāʻula is the private coastal property of **Kīpū Kai**, a spectacular and secluded valley isolated from its surroundings by the eastern arms of the Hāʻupu range. Kīpū Kai's two-mile shoreline consists of four beaches separated by low rocky points, set against a backdrop of coastal wetland, green pastures, a perennial stream and soaring cliffs. Public access by land is not allowed. Kīpū Kai teems with birdlife, including many native species, and the coastal marine resources appear to be in pristine condition.

Towering above Kīpū Kai valley is the **Hāʻupu** mountain range, which runs inland nearly eleven miles to Knudsen Gap. The eastern half of the range, dominated by the ancient volcanic caldera of Mt. Hāʻupu, lies within the study area. Rising dramatically between the Kōloa and Līhuʻe basins, Mt. Hāʻupu serves as an orientation point from land and sea, and plays a key role in native Hawaiian myths and legends. Native plant communities high on



Hāʻupu ridge provide nesting areas for endangered birds, and serve as critical habitat for some of the last remaining specimens of endemic Hawaiian flora.

The seaward end of the Hāʻupu mountain range at **Niumalu**, north of Kīpū Kai, terminates in headlands by Nāwiliwili Bay. It includes three ancient volcanic cones—Kalanipuʻu, Keōpāweo, and Hōkūnui—with elevations up to over 1600 feet. Its makai face is a broad and steep sea cliff indented by small valleys, and its inland face descends to Hulēʻia Stream. This undeveloped land lacks public access, is mostly zoned for conservation, and is privately owned except for a small state-owned strip above Nāwiliwili Harbor. It includes dense forest along the Hulēʻia Stream corridor; freshwater springs and streams; designated Critical Habitat for endangered plant species; and expansive open areas of non-native scrub and grassland. In the evening, large numbers of seabirds stream into this area.

The verdant **Hulēʻia Stream corridor** at Hulēʻia National Wildlife Refuge and Alekoko Fishpond marks the northern extent of the study area. Flat valley land by the stream was historically used for growing taro, rice and other foods; today it is regrown with natural vegetation and provides important habitat for endangered birds. Hulēʻia Stream waters and adjacent private forests serve as settings for kayaking and hiking tours, and afford awe-inspiring views of the Hāʻupu mountain range that forms the backbone of the study area.

## 3.3 Land Use and Ownership

Hawaiʻi's State Land Use Commission classifies all real estate into one of four land use designations: Conservation, Agricultural, Rural and Urban. Counties establish more detailed designations and zonings, but these conform to the range of allowable uses under each designation by the state.

In Hawaiʻi, conservation lands are further designated into subzones according to environmental sensitivity; all subzones place strong limits on use, and most uses must be approved by a permit from the state's Board of Land and Natural Resources. Most of the conservation lands in the study area fall into the two strongest subzones.

All of the land in the study area is designated and zoned for agriculture or conservation, and except for a few homes and farm or ranch structures, it remains undeveloped. The conservation lands are found in a narrow strip along the Māhāʻulepū coast, across most of Hāʻupu ridge, and around part of Hulēʻia Stream. Broad agricultural lands occur on both sides of the Hāʻupu range and at Kīpū Kai. (See Regional Land Use map).

The vast majority of the study area is privately owned (see Study Area Landowners map). Grove Farm, one of the oldest and largest landowners in the state, holds all of the parcels that comprise Māhāʻulepū valley and coast (except for a small home lot at Māhāʻulepū Beach and a county-owned water reservoir just inland of Makawehi). Grove Farm was founded in 1864 by George N. Wilcox. Historically a sugar plantation, during the late 20$^{th}$ century it transitioned into real estate development, and ceased sugar production in the 1990s. Around the same time, Grove Farm unsuccessfully sought development permits for coastal land at Māhāʻulepū.

In 2000, the Wilcox family sold Grove Farm to Steve Case of America Online. Today the corporation is involved in major residential and commercial developments in Līhu‘e. In recent years it has leased portions of its Māhā‘ulepū land for various individual and business purposes, including crops, pasturage, a commercial stable, a sand quarry, and a nonprofit research and restoration project at Makauwahi cave. Grove Farm allows daytime vehicle access through the valley to a dirt road that skirts the shoreline, with a gated entry that is locked at night. This beach access is used by both residents and visitors.

While acknowledging the potential development value of the Māhā‘ulepū valley and shoreline, Grove Farm managers say they intend to utilize the valley as an agricultural park with its own branding, and that they have no current plans for resort or residential development there, or along the shoreline. Cultivation of taro has already begun. The long-term conceptual plans for the agricultural park include a possible interpretive pedestrian path around the valley, where hundreds of acres will be dedicated to traditional Hawaiian taro-growing, native Hawaiian healing plants, organic greens, fruit orchards, and other 'grow what you eat' crops.

A second major private property is Kīpū Kai, a 1,117-acre coastal valley owned by the long-time heirs of Jack Waterhouse, and legally slated to be turned over to the state as a wilderness park upon their passing. Its scenic setting has served as a movie location, and until 2006, a cattle ranch. Today resident caretakers live on site, and Waterhouse family and friends vacation in the old Waterhouse home. Residents and commercial tour operators approach this scenic hideaway by boat to play, fish and gather *limu* (edible seaweed) in the nearshore waters; foot traffic is not allowed above the high tide line. It is unclear how the family will sustain the land in the near term under a growing tax burden, and details remain unsettled as to how the state will protect Kīpū Kai’s resources in the long term.

North of Kīpū Kai, in the area known as Niumalu, is a nearly 1400-acre private property that overlooks the ocean, Nāwiliwili Bay and Hulē‘ia Stream. Owned by California resident Donn R. Campion, this land remains undeveloped and unused. Though its conservation zoning allows for construction of a single residence, none has been built. The owner placed the property on the real estate market in 2004; no sale occurred. Access to the Niumalu tract is afforded through the adjacent private Kīpū Ranch.

Kīpū Ranch was purchased by William Hyde Rice in 1881 and has remained in the Rice family, operated first as sugar plantation and then as cattle ranch. The Kīpū property ascends from Hulē‘ia to the Hā‘upu ridge above Kīpū Kai and Māhā‘ulepū, and is zoned for agriculture except on upper portions of the ridge. Uses of the land today include not only cattle ranching, but also ecotourism. Tour operators offer kayak and hiking trips that begin at Hulē‘ia and then venture inland to Kīpū’s pastures and forested slopes. The ranch is home to a variety of non-native wildlife introduced by the Rice family. An ATV operation on site provides guided adventures throughout the Kīpū property. Approximately three-fourths of the ranch lies within our reconnaissance survey study area.

The final major private property in the study area is made up of the Alekoko Fishpond and an adjacent segment of Hulē‘ia Stream. These two parcels totaling just over 100 acres



belong to the O`ahu-based Okada Trucking firm. The pond is designated as conservation land and is listed on the State and National Register of Historic Places. Although public access is prohibited, stream users occasionally enter the pond by kayak. In 2005, the owners attempted unsuccessfully to sell this property.

Adjacent and upstream to the fishpond is the only major public land in the study area, the U.S. Fish and Wildlife Service’s Hulē‘ia National Wildlife Refuge. The refuge was established in 1973 as a managed wetland to provide habitat for Hawai‘i’s endangered waterfowl. It occupies four parcels including both conservation and agricultural land. Like the fishpond, the refuge prohibits public access, but in the absence of on-site enforcement some informal recreation use occurs. A state-owned roadside overlook affords a scenic view of the fishpond and wildlife refuge against the backdrop of the Hā‘upu mountain range.

| **Owner** | **Parcels** | **GIS Acres** |
|---|---|---|
| Grove Farm | 6 | 3477 |
| W.H. Rice | 2 | 1476 |
| D.R. Campion | 3 | 1400 |
| Waterhouse Trust | 1 | 1117 |
| U.S. Fish and Wildlife Service | 4 | 237 |
| Okada | 2 | 102 |
| Small privately owned parcels | 13 | 17 |
| *Total acreage* | | *7826* |

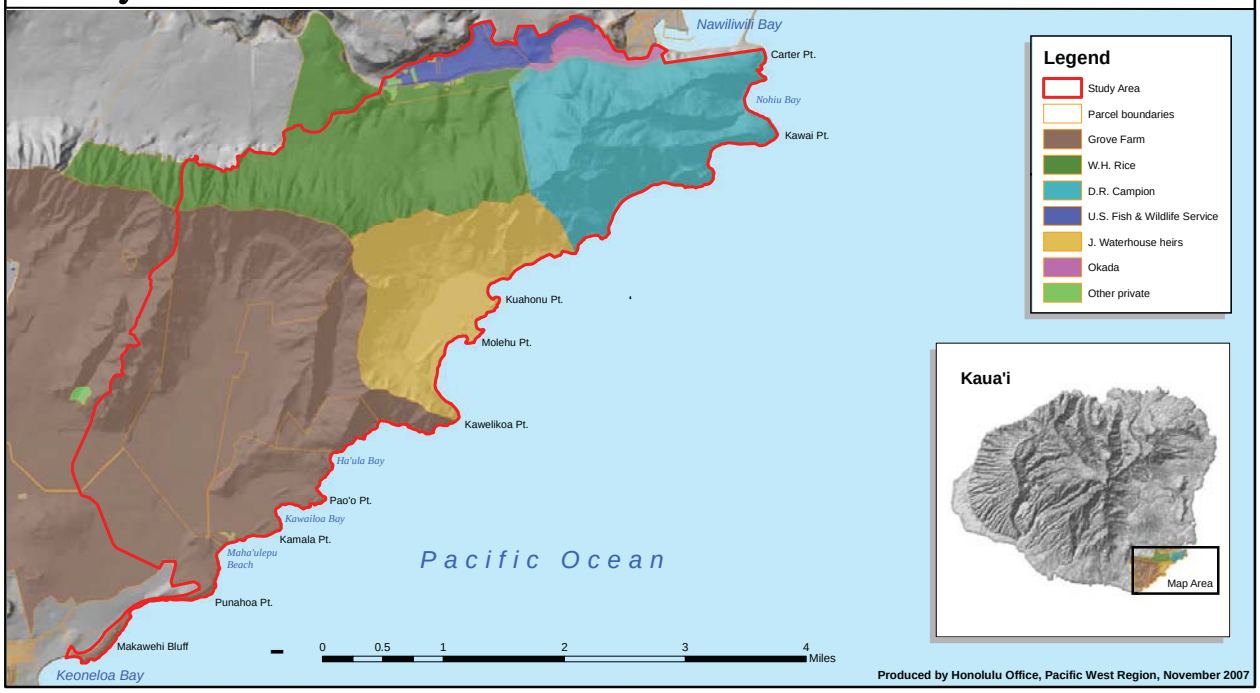
## 3.4 Maps

Study area maps follow.

Maha'ulepu Reconnaissance Survey, Isle of Kaua'i
Hawai'i

National Park Service
U.S. Department of the Interior

# Study Area Landowners

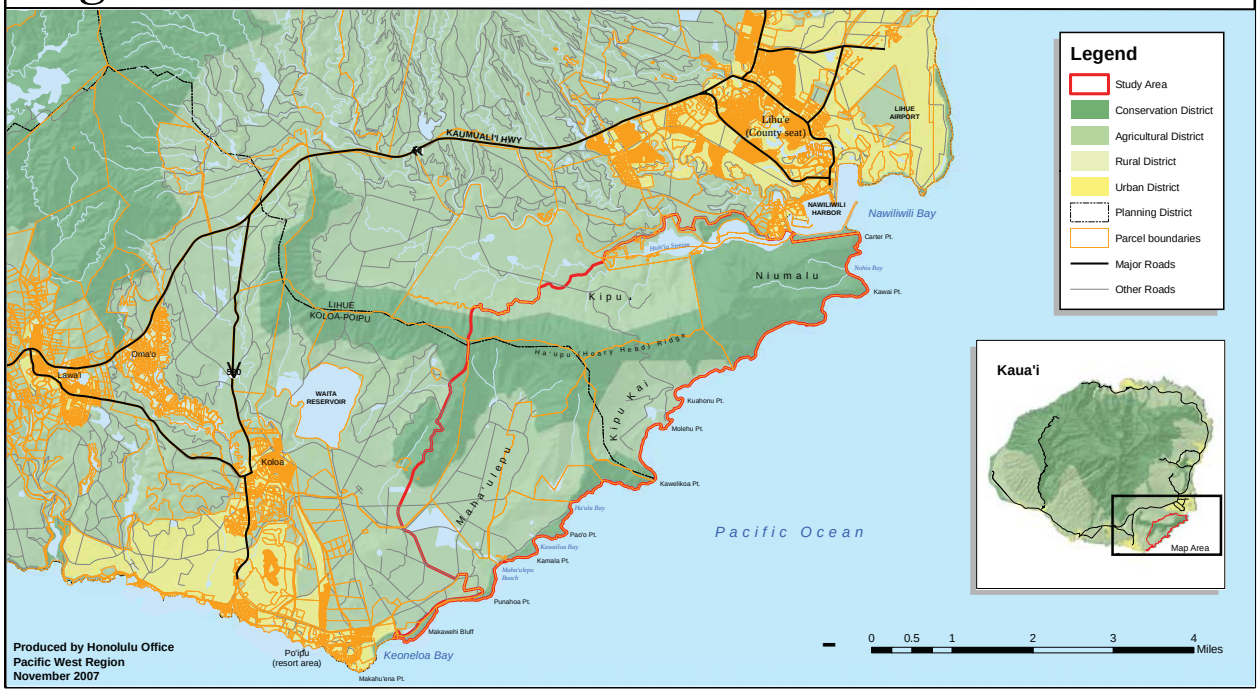



Produced by Honolulu Office, Pacific West Region, November 2007

Maha'ulepu Reconnaissance Survey, Isle of Kaua'i
Hawai'i

National Park Service
U.S. Department of the Interior

# Regional Land Use




Produced by Honolulu Office
Pacific West Region
November 2007

# 4 STUDY AREA RESOURCES

## 4.1 Geological Resources

As the oldest of the state's main islands, Kaua'i features the widest age range of geologic landforms that illustrate the birth of the Hawaiian archipelago. Within the study area, this full age span of high-island volcanics can be seen at one time. The study area also displays a visible geologic record of global sea level changes over the last 300,000 years, and a 10,000-year fossil trove of Hawai'i lifeforms.

### Waimea Basalts

The Hā'upu mountains that cross the the study area are made up of the most ancient volcanic series in the high islands, the Waimea Canyon Basalts. These formed during the shield-building stage of the Kaua'i volcano, as eruptions gradually built up its sides and widened its base. Most of the Hā'upu range is part of the ancient Nāpali member of the Waimea series, dating from 4.35 to 5.1 million years old. The caldera of Mt. Hā'upu is the separate Hā'upu member, which remains undated. (Blay & Siemens 2004)

*Waimea basalts comprise most of the Hā'upu mountain range, and can be readily seen in the slopes and sea cliffs of Kawelikoa Point, at the northeast end of the Māhā'ulepū coast near Hā'ula Bay.*

### Kōloa Volcanics

Māhā'ulepū lands below Hā'upu ridge are part of the Kōloa series that cloaks most of the east half of Kaua'i. It formed as the Kaua'i volcano ceased major eruption and began to erode, with occasional small eruptions at lava domes, cinder cones and spatter cones. These produced a layer of lava that, though not large in mass, nevertheless covered a large area. Kōloa volcanics within the study area at Māhā'ulepū include both underlying lava and visible vents, ranging from .5 to 2.0 million years in age (Blay & Siemens 2004).

**Lithified Dunes**

The Māhāʻulepū coast features a remarkable array of lithified dune features that lie atop the much older Kōloa and Waimea Canyon lavas. First formed when sea level was about 60 feet lower than today, they accumulated over the last 350,000 years, and are still dynamically changing. Extending from below sea level to as high as 500 feet above it, their layers reflect global cycles of glaciation and sea level change. Transitions between layers are marked by depositional and erosional soils that settled there during glacial periods, when sea level dropped and the shoreline lay as much as a mile farther out than it does today. The dunes contain plant and animal fossils that tell the stories of their time.

The dunes vary in their degree of consolidation and weathering according to age. The oldest and most thoroughly cemented layer, the Punahoa member, occurs near Hāʻula and Papamōʻi and covers most of Punahoa Point. It is laced by caves and contains fossils of land snails and plant roots. Mid-range layers (Pāoʻo and Makawehi members) are moderately or well cemented, with fossils of land crab burrows and plant roots. The loosely cemented Pāʻā dunes that run northeast from Makawehi Pt. toward Punahoa comprise the youngest Māhāʻulepū member. Formed 4,000-6,000 years ago, they contain numerous fossils including land crabs, crab burrows, plant roots, land snails and birds. (Blay & Siemens 2004)

*Caliche limestone dunes at Pāoʻo Point*

The Māhāʻulepū formation is an exceptionally rich ground for avian and other fossils. According to Smithsonian Institute researchers, the majority of significant avifauna fossils found in Hawaiʻi were collected along this coast. Many were documented in the 1970s and 1980s, a period when the dunes were active and shifting, exposing pockets of fossils, including bones from three species of goose, a long-legged owl, and a flightless rail. Though vegetation has since partially stabilized the dunes, portions of loose limestone still sometimes break off to reveal new and startling fossil finds. (James 2007)



An adjacent limestone cave/sinkhole that is part of the lithified dune system lies just inland of Punahoa Point. Paleoecologists excavating there have discovered an unparalleled array of plant and animal fossils and human remains from both pre- and post-contact Hawaiʻi; these are described later in this section (see Makauwahi Cave, below and in Section 4.6) Fossils were also found at a sand quarry site next to the cave.

**Modern Dunes and Recent Sedimentary Deposits**

Loose sand deposited during the last 2000 years overlies all the geologic units in the Māhāʻulepū Formation. Modern dunes of up to 50 ft occur at Hāʼula, Papamoi, and Kāmala, as well as farther up the coast at Kīpū Kai. They are partially stabilized by vegetation, but continue to be reshaped by the trade winds that sweep the coast. ʻĀweoweo, a tall fossil sand dune atop basement rock north of Hāʻula, is reported to be the longest, largest burial dune in the Pacific. It consists of partly lithified gray hydromorphic soils that were transported from the Yangtse River valley, China by high altitude winds (Blay 2007).

Beaches along the study area are comprised of recent sedimentary deposits, either in the form of loose sand or bedded calcareous sandstone (beachrock). Geologically recent deposits also formed the alluvial soils in the study area at Hulēʻia river valley, and around the base of the Hāʻupu range at Kīpū Ranch, Māhāʻulepū valley, and Kīpū Kai.

**Makauwahi Cave and Sinkhole**

*A small opening in a limestone bluff affords entrance to the sinkhole.*

A large limestone cave system, hollowed out by groundwater, permeates the dunes of the Māhāʻulepū Formation. The best known part of this cave system is the Makauwahi cave and sinkhole, located on Grove Farm property just inland of Punahoa Point. It is the state's only solution limestone cave (OSP 1992), and has been described as "the largest limestone cave complex, the richest fossil site and the oldest dated ecological site in the Hawaiian Islands." (Hoopaja 2006). Discoveries at Makauwahi were featured in public television's 2001 NOVA series on worldwide species extinction.

In the early Holocene, the Makauwahi Cave was entirely roofed and had a dry floor. But as sea levels rose the nearby ocean increasingly breached the cave. About 7,000 years ago the roof at the center of the cave collapsed, forming a sinkhole open to the sky, and internal collapses sealed the cave off from the sea. Groundwater filled the cave and created a lake. During the millennia that followed, natural soils, sand, bones, plant remains, shells, and human artifacts and debris from the surrounding area swept into the sinkhole lake, building up thick layers of a peat-like substance that eventually turned the lake into a swamp. (Burney & Kikuchi 2006)

Today the sediments are 10 meters deep at the sinkhole's center, and the sinkhole floor sits 1-2 meters above sea level. A coating of silty clay—deposited mostly during the 20th century—cloaks the earlier peat-like strata. The water table, fed by underground springs, sits just below the clay surface. The sinkhole's sheer walls range in height from 6 to 25 meters, forming an irregular opening to the sky that measures 30-35 meters across. (Burney *et al*. 2001)

Cave passages connect to the north and south ends of the sinkhole. The south passage leads to culturally sensitive areas and is protected from public access. The north passage, where researchers and visitors enter the cave, has a crawl-in entrance through a sheer limestone bluff bordering Waiʻōpili Stream.

*The sinkhole walls range in height from 6 to 25 meters.*

Sediment layers in the cave chronicle Hawaiʻi environment, lifeforms and geological events from 10,000 years ago up to the present. The site is exceptional partly because of its excellent stratification, and also because of its unusual degree of preservation of materials that normally perish. The peat's neutral pH, created by the combination of fresh water and limestone, allows for preservation of minute pollen grains as well as bones and shells; one fossilized but intact yam was even uncovered. "This is like a giant pickling jar. Leaves,



whole tree trunks, extinct land snail shells, bird bones, seeds, fish with scales still on—they're all remarkably preserved" (Burney D, quoted in Hoopaja 2006)

To protect this unique resource and make it available for research, the private landowner leases the sinkhole and 17 acres around it to the nonprofit Makauwahi Cave Reserve. Research at the site began in 1992 and first received federal funding in 1996. Sponsors have included National Science Foundation, NOAA, National Tropical Botanical Garden, Fordham University, the Smithsonian Institution, USDA, Kauaʻi Community College, and the National Geographic Society.

Researchers have collected cores throughout the site; described ten stratigraphic units based on age, sediment, and the fossils and artifacts found; and excavated in three pits to depths as much as 5 meters below the water table. To date, they have documented findings from over 200 cubic meters of sediment. According to the lead researchers on site, "Nearly 10,000 years of sedimentary record … has been analyzed for vertebrate bones, invertebrate shells, plant macrofossils, pollen, diatoms, sedimentology, and in the upper layers, human artifacts." Their finds, often cited in journals and featured in public media, are documented in Burney and Kikuchi (2001) and Burney *et al.* (2001), and are summarized below.

*Fossil bird bones from Makauwahi cave and sinkhole.*

Excavations at Makauwahi have uncovered fossils of 45 species of birds. Fully half of these are extinct, and seven or eight are species not previously documented by science. They include a long-legged owl that ate fellow birds; a newly discovered extinct species of bat; flightless grazing birds the size of turkeys; a moa nalo (lost fowl) with a jaw like a turtle; and a tiny duck that fed at night and had eyes set unusually far back on its head. Other finds are nesting boobies, gulls, several forest birds, and the endangered Laysan duck, which still exists elsewhere in the Hawaiian archipelago but was not previously known to inhabit Kauaʻi.

Plant fossils uncovered at Makauwahi are equally surprising. The cave strata yield seeds and pollen of many plant species which today are rare and seen only at higher elevations, and which were previously assumed to be suited only to Hawaiʻi's cooler, wetter upland and mountain areas. Their appearance in significant numbers in core samples from Makauwahi is leading scientists to reconsider these assumptions, and to examine the possibility for extensive native plant restoration efforts in coastal areas.

Other finds include 14 species of extinct land snails, seen in large numbers in lower cave layers but entirely absent in later strata. Their disappearance correlates with the arrival of the Pacific rat, which is believed to have landed in the islands with the first Polynesians. Earliest evidence of rats in the cave layers is dated at 1039-1241 A.D.

Hawai‘i’s native species disappear from Makauwahi’s successive sediment layers in stages that reveal much about human interaction with the island environment. Arrival of people, rats and pigs corresponds with rapid disappearance of large snails, large flightless birds, and certain plants. A second stage of species loss ensues as Polynesian settlers alter the landscape, eat some native species, and introduce new ones. Extinction proceeds apace when Europeans arrive: they introduce goats and cattle, import new species for agriculture, rapidly use forest resources, and alter the landscape in ways that dramatically contribute to erosion and lowland sedimentation.

Even today, a drama of potential extinction is playing out at Makauwahi and other caves in the Māhā‘ulepū Formation. The cave system is designated Critical Habitat for the Kaua‘i cave wolf spider (*Adelocosa anops*) and the Kaua‘i cave amphipod (*Spelaeorchestia Hanamā‘uluna*). Only a few known populations of these species remain; all are small, and all occur in Makauwahi or its immediate vicinity. The U.S. Fish and Wildlife Service is helping to fund plant restorations atop the cave area, in order to foster the native plants whose roots extend downward to the cave ceilings, potentially serving as food for the endangered arthropods (Henry 2007).

## 4.2 Vegetation

Hawai‘i’s geographic isolation and varied volcanic habitats combined to support evolution of unique flora. Nine-tenths of the state’s approximately 1500 indigenous plants grow nowhere else in the world. Because they are adapted to such localized conditions, Hawai‘i’s endemic plants are especially vulnerable to extinction as human population expands, development encroaches, and competition from introduced species increases.

Within the study area, both the undeveloped shoreline and the upper reaches of Hā‘upu ridge provide haven for a variety of native Hawaiian flora, including many rare and endemic species that have been identified as Species of Greatest Conservation Need by the state of Hawai‘i. Extensive portions of ridge and shoreline are designated as Critical Habitat for federally-listed endangered species (see Study Area Features map). In the valleys and on the lower slopes of the Hā‘upu range, non-native species dominate.

### 4.2.1 Coastal Vegetation

Hawai‘i’s native coastal strand vegetation—an array of plants unique in the world—has been destroyed or seriously degraded on beaches throughout the state’s inhabited islands. Along the shoreline of the study area, the fact that public access is relatively limited and adjacent land remains undeveloped provides some protection for this plant community. A wide variety of native coastal flora still grows here, despite the extensive presence of non-natives such as ironwood and koa haole.

*Ma‘o, Hawaiian cotton* (Gossypium tomentosum)

NPS staff noted coastal strand vegetation from Makawehi to Hā’ula and at Kīpū Kai, with the greatest concentration of native species seen from Pā‘o‘o Point northward. U.S. Fish and Wildlife Service has designated Critical Habitat along the entire Māhā‘ulepū shoreline for the endangered ‘ohai *(Sesbania tomentosa)*.

Other endemics (species found only in Hawai‘i) include Hawaiian cotton *(Gossypium tomentosum)*; beach spurge *(Chamaesyce degeneri)*; pa‘uohi‘iaka *(Jacquemontia ovalifolia)*; koki‘o *(Kokia Kaua‘iensis)*; nehe *(Lipochaeta integrifolia)*; ma‘oli‘oli *(Schiedea* sp.*)*; noni tree *(Morinda citrifolia);* the tree *Munroidendron racemosum*; two species of loulu *(Pritchardia* cf *minor, Pritchardia elmerrobinsoni)*; and the Hawaiian caper *(Capparus sandwichiana)* and hinahina kahakai *(Nama sandwicensis)*, both designated as USFWS Species of Concern.

*Pohuehue, beach morning-glory* (Ipomea pes-caprae)

Indigenous species (native to Hawai‘i but also found elsewhere) include two species of pohuehue (morning-glory); naio (false sandalwood); hala (screwpine); ‘akulikuli (sea purslane); ‘ilima; milo (portia tree); and ‘uhaloa. Common non-natives near the shoreline are beach pea, tree heliotrope, and niu (coconut palm).

*Koko, beach spurge* (Chamaesyce degeneri)

One item of special note is *Ruppia martima*, an indigenous seagrass recorded in the north end of the study area. Although not seen by NPS, according to staff of the National Tropical Botanical Garden, this is one of three previously known Kaua‘i populations of this species, and it is likely that is the only one still persisting. It is characterized by NTBG staff as the “nicest presentation of [the species]” (Burney and Flynn 2007).

*‘Ilima* (Sida fallax)

Coastal strand species sighted or reliably reported during the survey appear in Appendix 6.2.1. One non-coastal tree, the native leguminous wiliwili, appears in the list. While not a coastal strand species, it was found quite near the beach in a remote spot. This merits attention due to the recently introduced Erythrina gall wasp that has attacked most wild wiliwili in the state.

### 4.2.2 Upper Elevation

NPS staff did not visit upland sites during the reconnaissance survey visit, but botanist Ken Wood, a conservation biologist for the National Tropical Botanical Garden, compiled records of native flora and fauna on and around the summit region of Mt. Hā‘upu (1800-2300 ft elevation) during a recent research trip. He describes an impressive inventory of native vascular plant species in this isolated ecosystem (Wood 2005).

*Matting ferns such as uluhe (*Dicranopteris linearis*) and uluhe lau nui (*Diplopterygium pinnatum*) mix with a scattering of trees, primarily ʻōhiʻa (*Metrosideros polymorpha*), on Hāʻupu's east slope and upper summit.*

Throughout the Mt. Hāʻupu summit area, native vegetation still dominates in a mostly open landscape of shrubs, ferns, and scattered trees. The estimated amount of native vegetation varies by location—from 60% on the summit and east slopes to as much as 85% on the precipitous north face. (Wood 2005).

The summit hosts at least 112 native plant species (Wood 2005). Of these, nearly ninety are endemic to Hawaiʻi. Over two dozen are endemic to Kauaʻi only, and some are restricted to just Mt. Hāʻupu.

Wood singled out seventeen endemic vascular plants on Mt. Hāʻupu that merit especially urgent conservation efforts due to their rarity (Appendix 6.2.2). Among them are three of Hawaiʻi's Genetic Safety Net species—those of which fewer than fifty individuals are known to remain alive in the wild. They include *Schiedea perlmanii*, *Tetraplasandra bisattenuata* (ʻoheʻohe), and *Delissea rhytidosperma*. The thirteen Schiedea on Hāʻupu are the only known living examples of their species. A group of thirty ʻoheʻohe trees found by Wood provides cause for celebration: until recently, only two individuals of this single-island endemic were known to exist.

*Delissea rhytidosperma*, a Genetic Safety Net species.

Three of the plants identified by Wood on Hāʻupu may be previously unknown species. Another, *Pittosporum gayanum*, is a unique Hāʻupu form of the hōʻawa tree that appears to hold horticultural promise (Wood 2005). USFWS has designated six species known on Hāʻupu as endangered, one as threatened and six as Species of Concern. Parts of Hāʻupu ridge are designated Critical Habitat for eleven endemic plant species.



## 4.3 Terrestrial Wildlife

### 4.3.1 Birds

NPS staff recorded nine native bird species while on the reconnaissance and documented another seven via research or by interviews with local biologists. Of the total, seven are endemic at the species or sub specific level, five are indigenous, and the remaining four are migratory birds that winter in Hawaiʻi. Five of the seven endemic species are designated by USFWS as Endangered, and one as Threatened.

The endemic Endangered birds known in the study area are the Hawaiian coot (ʻalae keʻokeʻo), common moorhen (ʻalae ʻula), Hawaiian duck (koloa); Hawaiian stilt (aeʻo); and Hawaiian goose (nēnē). All but the coot and the nēnē were observed by NPS during the site visit.

*Nēnē, Hawaiian goose*

Habitat for these species is scattered throughout the study area. Manmade reservoirs at Waitā, Puʻu Hi and Māhāʻulepū provide a year-round attraction, as do the golf course ponds at the adjacent Grand Hyatt resort. Intermittent streams and wetlands at Māhāʻulepū and Kīpū Kai also provide habitat. Bottomlands at Kīpū Kai were the site of a deliberate reintroduction of nēnē several decades ago; the increasing numbers of nēnē now seen on south Kauaʻi outside Kīpū Kai are believed to be descendent populations from that group. According to a state source, nēnē, koloa and other waterfowl frequent the taro lease land in Māhāʻulepū valley, and a broad natural depression in the valley that fills with water after heavy rain draws many waterbirds. Sixty koloa individuals were counted during one such event (Kaiakapu 2007).

*Koloa maoli, Hawaiian duck*

The most extensive habitat for waterbirds in the study area is at the Hulēʻia National Wildlife Refuge. Hulēʻia was established in 1973 to provide open, productive wetland and is considered a Core Wetland in the USFWS Recovery Plan for Hawaiʻi's Endangered coot, moorhen, duck and stilt (USFWS 2005). It provides breeding habitat to all four of these Hawaiian waterbirds plus the indigenous black-crowned night-heron. Two endemic birds characteristic of open country also nest on the refuge: the endangered nēnē and the pueo. Migratory water fowl and shorebirds are common seasonal inhabitants.

Newell's shearwater, a Threatened endemic species, nests in the study area on Hāʻupu ridge. A known nesting site recognized in the USFWS Recovery Plan for the Newell's

Shearwater is at Kaluahonu, northeast of Waitā Reservoir (USFWS 1983) by the west edge of the study area. Biologists who spend research time on Mt. Hāʻupu report hearing approximately 100-120 individuals arriving in summit areas around 8pm and departing back to sea in the early mornings between 3 and 5 am. Based on audial observations they believe that most of these birds were headed to the Kaluahonu area, but that perhaps 15-20 pairs were nesting nearer their summit camp (Wood 2005).

*ʻAʻo, Newell's shearwater*

The endemic short-eared or Hawaiian owl (pueo) was reported by a biologist and seen by NPS during the survey; both sightings occurred on or near the east end of the Hāʻupu ridge (Wood 2005).

*Pueo, Hawaiian owl*

Five indigenous species are known by NPS to frequent the study area: the black-crowned night heron, white-tailed tropicbird, great frigatebird, wedge-tailed shearwater, and red-tailed tropicbird. The black-crowned night heron finds breeding habitat at Hulēʻia NWR and was spotted during the survey. Biologists describe frigatebird sightings at Māhāʻulepū and on Mt. Hāʻupu, where seven individuals were seen flying together (Wood 2005). Researchers at the Makauwahi Cave Reserve and on Mt. Hāʻupu report repeated sightings of white-tailed tropic birds (Burney 2007, Wood 2005) and NPS staff saw several during the reconnaissance survey.

*Koaʻe kea, white-tailed tropicbird*

Wedge-tailed shearwaters regularly nest in the nooks and crannies of the Māhāʻulepū coast, and red-tailed tropicbirds are also known to nest there. However, in recent years feral and domestic dogs wreaked havoc on accessible nests in this popular area (Kaiakapu 2007, Zaun 2007). Presumably successful nesting still occurs along sea cliffs in the northeastern part of the study area where access is limited.

Four migratory species that winter in Hawaiʻi and return to the arctic to breed were noted in the study area. We observed three of these: the Pacific golden plover, ruddy turnstone, and wandering tattler. The fourth migrant, the sanderling, has been reported by residents (MM 2004). Additional migratory shorebirds probably frequent the coastline occasionally,



and other seabird species likely transit the coast. A state study notes that seabirds use the coastal sea cliffs and foothills for nesting and loafing (OSP 1992).

We neither observed nor learned of any native passerines in the study area. In a 2005 record of birds seen on the summit of Mt. Hāʻupu during botanical research, biologists reported two introduced passerine species (hwamei and Japanese white-eye), but no native ones (Wood 2005). As is common on all the main Hawaiian islands, songbird habitat along this coast has been severely altered or eliminated, and disease-bearing alien mosquitoes that infect the passerines are presumably present at least seasonally at all elevations.

The extensive limestone formations of the Māhāʻulepū coast are an exceptionally rich ground for avian fossils. Fossilized bird bones from three species of goose, a long-legged owl, and a flightless rail were recovered from the lithified dunes, and fossilized bird prints from an extinct bird, possibly one of the moa nalo species, were recently found. Nesting boobies (possibly shrub-nesting red-footed boobies) are known from fossil remains recovered from the Makauwahi Cave Reserve.

The seldom-accessed Niumalu portion of the study area, which was not visited by NPS, is a potential location for seabird sightings and research. A website for Hawaiʻi birders describes Ninini Point—outside the study area but directly across Hulēʻia Stream from Niumalu—as "probably the best seawatching site in Hawaiʻi," with thousands of birds observable under good conditions (e.g., mornings in spring through fall, with northeast tradewinds):

> Most of the birds offshore will be Wedge-tailed Shearwaters and Red-footed Boobies, but large gatherings of Newell's Shearwaters and smaller groups of Hawaiian Petrels can also be seen. Brown Boobies (below) are regularly seen as are Sooty Terns, Black and Brown Noddies, Laysan and Black-footed Albatross and less frequently Tropicbirds and Frigatebirds. Groups of 100 or more Newell's Shearwaters and 50+ Hawaiian Petrels have been recorded as well as many other migrant seabirds. Sooty Shearwater is regular in the Spring, usually in small numbers but over 500 were recorded in one evening in 1999. Other migrants and vagrant seabirds recorded here have included Masked Booby, Mottled Petrel, Short-tailed Shearwater, Ring-billed and Laughing Gulls, Grey-backed Tern, Common Tern and White Tern. Bristle-thighed Curlews have been reported several times passing the Point during the spring and fall and are always worth keeping an eye, and ear, out for. Ruddy Turnstone and Sanderling are sometimes seen on the rocks here and a Dunlin was seen nearby in 1997. Barn Owls regularly hunt the nearby airfield and often fly low over the Point whilst searching for prey, such as mice and rats. Short-eared Owls (or Pueo) are less regular at the Point but are seen occasionally…(Birding Hawaiʻi 2007).

Appendix 6.2.3 provides a species list of native birds identified by NPS in the study area. It includes nine species seen on the March 2007 site visit and seven noted during interviews or by research.

### 4.3.2 Terrestrial Invertebrates

The study area hosts two notable and extremely rare terrestrial invertebrates: the Kaua‘i cave wolf spider (*Adelocosa anops*) and the Kaua‘i cave amphipod (*Spelaeorchestia Hanamā‘uluna*). In 2000, both the spider and the amphipod were federally listed by USFWS as endangered species. All known populations occur in the Kōloa basin on Kaua‘i, within a 4-square-mile area (CBD 2007) that lies partly within the study area.

*Kaua‘i cave wolf spider*

The Kaua‘i cave wolf spider—sometimes called the "no-eyed, big-eyed wolf spider"—grows to about 1.5 inches. It has so completely adapted to deep, dark moist caves that it has no eyes. The spider uses venom to capture small prey—including the Kaua‘i cave amphipod—but is harmless to humans. The Kaua‘i cave amphipod, also sightless, is a smaller shrimp-like creature (~.4 inch). It eats decomposing matter, mostly plant parts and roots, found in the caves.

At least three-fourths of the historic habitat for these two species has been “rendered uninhabitable by development projects” (CBD 2007). Both species have been reduced to a few small populations; exact numbers remain unknown. Researchers say the spider is seen regularly in only one cave with a population of 16 to 28 individuals (USFWS 2005).

The cave-laced corridor along the Māhā‘ulepū coast of the study area, from Makawehi Point to Kawelikoa Point, is designated by USFWS as Critical Habitat for both of these endangered species. At Makauwahi cave and sinkhole, located within the study area near Punahoa Point, the USFWS is funding plant restoration atop the cave system in order to foster the native plants whose roots extend downward to the cave ceilings and serve as food for the endangered arthropods (Henry 2007).

NPS uncovered little additional information on terrestrial invertebrates in the study area. Results are pending from a recent study (Wood 2005)in which botanists from the National Tropical Botanical Garden observed, recorded and collected specimens of arthropods and molluscs on and around the summit of Mt. Hā‘upu. Specimens were sent to Bishop Museum for further identification. Results will provide a window into species distribution and diversity within Hā‘upu’s native plant communities.



## 4.4 Marine Resources

This section summarizes the large marine vertebrates, fishes, algae, and marine invertebrates in the study area that were noted by NPS during the survey and reported by reliable sources. The NPS site visit included hiking and observations along the entire shoreline from Makawehi to Hā’ula, and a separate excursion to Kīpū Kai. We were unable to access the steep coastal cliffs of Niumalu on the private property that extends from Kīpū Kai north to Nāwiliwili Harbor. Observations were necessarily limited by time, as well as by rough ocean conditions. Staff took notes, GPS points, and photographs; no specimens were collected. We recorded about 80 marine species across all taxonomic groups.

The study area coast is exposed to strong tradewinds and turbulent surf, and lacks any major well-protected bays. The geomorphology of its undulating shoreline offers a variety of habitats for hardy marine life. Above Hā’ula, around Kīpū Kai, and northward to Nāwiliwili Harbor the stratified basalts of the Hā‘upu mountain range terminate in cliffs and headlands that drop precipitously to the sea. Below Hā‘ula along the Māhā‘ulepū coast, the ancient lithified dunes that overlay basalt bedrock are eroded into elaborate cliffs, caves and pinnacles angled over the water.

The cliffs and headlands are separated by small bays, coves or shelves, often with nearshore rock reef benches or boulders that partly protect the shallow waters. White carbonate sand or cobble beaches and basalt benches occupy the intertidal zones (olivine sand occurs in one location). Modern loose sand dunes back many of the beaches and storm-deposited colonies of aged coral rubble are occasionally found high up on shore.

Tidepools in the basalt benches serve as important nursery habitats for marine invertebrates and fishes. The most extensive tidepool complexes we saw during the site visit are at Makawehi and Kīpū Kai. NPS staff observed juveniles of several marine species at both locations, with the greatest diversity occurring at Kīpū Kai.

Limited information is available on the study area’s subtidal composition and bathymetry, except for a few sample sites. Below the cliffs by Hā‘ula Bay, the nearshore bottom is consolidated reef and beachrock with some sediment, and the offshore bottom is sand; depth drops to 50 feet within 0.3 miles. At Makawehi, the bottom is basalt with a thin veneer of non-reefal marine life, and depth drops to 50 feet within 0.2 miles.

Compared to other Hawai‘i shorelines near population areas, the coastal marine habitats of the study area appear relatively unmodified and undisturbed by humans. To date these habitats—and the species they harbor—remain largely unstudied, probably because of rough ocean conditions combined with restricted access.

### 4.4.1 Large Marine Vertebrates

The beaches and nearshore waters of the study area are home to three important large marine vertebrates: the endangered Hawaiian monk seal, known in Hawaiian as ‘īlio holo i ka uaua (*Monachus schauinslandi*); the endangered humpback whale or kohala (*Megaptera*

*novaeangliae*); and the threatened green sea turtle or honu (*Chelonia mydas*). All three were sighted during NPS's March 2007 visit.

**Hawaiian Monk Seal**

Endangered Hawaiian monk seals regularly haul out on the beaches of the study area to bask. During the brief NPS field reconnaissance we observed adult seals resting onshore at Kawailoa Beach and at Kīpū Kai. Successful monk seal puppings occurred at Māhāʻulepū in 2000 and 2007, at nearby Poʻipu Beach in 2000 and 2001, and at Kīpū Kai in 2006.

The Hawaiian monk seal is one of only two mammals endemic to Hawaiʻi, and the most endangered marine mammal unique to U.S. waters (KMSWP 2007). In 1976 it was declared depleted under the Marine Mammal Protection Act, and endangered under the Endangered Species Act. Despite these protections, seal populations plummeted. An estimated 1200 Hawaiian monk seals remain alive today; experts predict there will be fewer than 1000 within five years (NOAA 2007b).

Ninety percent of the surviving Hawaiian monk seals live around the tiny unoccupied islets of the northwestern Hawaiian archipelago. However, within this group few juveniles are living to reproductive age. By contrast, the much smaller group of seals that inhabits the main islands is slowly growing.

*Hawaiian monk seal seen basking during March 2007 NPS site visit.*

About 25 seals are known to live around Kauaʻi (KMSWP 2007). They feed on fish, eels, lobsters and octopi in the nearshore waters, and haul onto shore to bask. Females look for safe, gently sloping beaches by shallow water where they can give birth. They stay onshore to nurse their young for about six weeks, and the pup generally lingers at the birth beach for another month or two after weaning. Kauaʻi is considered the hot spot for seals in the main islands (Eagle 2007).

Monk seals in the study area and elsewhere attract crowds: a healthy adult seal weighs in at an impressive 400 to 600 pounds, and a pup grows from 25 to 200 pounds or so during its six weeks of nursing. The Kauaʻi Monk Seal Watch Program monitors seal use of island



beaches. Its volunteers establish cordons and round-the-clock watches to protect ill seals or mothers and pups from disturbance. (KSMWP 2007)

Monk seal occurrences within the study area take on increasing significance as the overall population continues declining at about 4 percent each year. The updated Recovery Plan for the Hawaiian Monk Seal, released in August 2007, states that the species "is headed to extinction if urgent action is not taken." Its recovery strategy calls for actions to ensure continued growth of the seal population in the main Hawaiian Islands. (NOAA 2007b)

**Green Sea Turtles**

Residents report green sea turtles basking and nesting on sandy beaches in the study area and foraging in nearshore waters. During the site visit NPS staff spotted green sea turtles swimming at Kīpū Kai.

Green sea turtles swim in warm seas around the world, but the undisturbed environments they require as major breeding sites and the untrammeled sandy beaches they need as nesting areas are becoming increasingly rare. In 1978, the species was listed as Threatened under the Endangered Species Act in all areas under U.S. jurisdiction. Despite this protection the Pacific population is continuing to decline overall. No major breeding sites remain in the Pacific. (NOAA 1998)

Nine out of ten green sea turtle nests in Hawaiʻi occur in the remote northwestern end of the archipelago. Growing turtles range hundreds of miles, however, to find foraging grounds. They feed in shallow waters, mainly on algae and sea grasses, and bask on open beaches. To nest and give birth, they return to the beach where they were born.

Increasingly, green sea turtles frequent the waters and beaches of Hawaiʻi's main islands, including Kauaʻi. Within the state the species appears to be making a comeback. At the same time, these Hawaiʻi turtles are plagued by fibropapilloma tumors. Because of this affliction, plus mortality from poaching and gillnet capture throughout the Pacific, officials say the conservation future for the species is "seriously compromised." (NOAA 1998)

**Humpback Whale**

According to a summary of humpback whale sightings recorded in 2002-2005, the Māhāʻulepū coast featured Kauaʻi's best spot for whale-watching (NOAA 2006). On the March 2007 site visit, late in whale season, NPS noted three humpback whales in waters offshore of the study area.

Each winter about 5,000 humpback whales migrate to Hawaiʻi from their Alaska feeding grounds to mate, calve and nurse their young. After centuries of population decline by whaling, in the 1970s this massive marine mammal—adults reach over 40 tons—was declared endangered under the Endangered Species Act and depleted under the Marine Mammal Protection Act. Today the species is slowly making a comeback. Hawaiʻi is the only state in the nation where humpbacks reproduce.

During annual whale counts—an extensive volunteer effort coordinated by NOAA—observers record whale presence and surface activity at sites around the islands. Four sites in or immediately adjacent to the study area coast are included in the annual count: Ninini Lighthouse at Nāwiliwili Bay, Hā'ula Bay and Makawehi dunes at Māhāʻulepū, and Makahūena Point just south of Māhāʻulepū (NOAA 2006).

Preliminary results for 2007 show the Māhāʻulepū coast area (Hā'ula, Makawehi and Makahūena sites) with the three highest whale sighting counts on Kauaʻi (NOAA 2007).

### 4.4.2 Fishes

Kauaʻi residents describe the nearshore waters of the study area as a "prime fishing area." Telltale pipes for holding fishing poles are embedded at favored sites along the shoreline. Fish abundance is also implied by the presence of monk seals—the seals feed on reef fish as well as octopus, lobster, and eel.

Fish fauna offshore of the study area appear similar to those seen at other shallow water sites throughout the Hawaiian archipelago. Snorkel fish surveys by trained volunteers for the Reef Environmental Education Foundation recorded 24 species of fish at Kawailoa Bay (Māhāʻulepū), and 43 species at Kīpū Kai. During the site visit NPS noted eight marine species, and an additional eight appeared in records kept by proprietors at Kīpū Kai.

In study area tidepools we saw the zebra rockskipper blenny, as well as juveniles of several families found commonly in Hawaiian intertidal pools and shallow nearshore rock reefs. One brackish-water fish, the Western mosquitofish (*Gambusia affinis*) was seen in the *mulivai* (brackish water wetland) at Kīpū Kai.

A species list of fishes seen by NPS or reliably reported by others appears in Appendix 6.2.4. It should be noted that we were not able to observe or reliably confirm fish species of Hulēʻia Stream or Nāwiliwili Bay during the reconnaissance survey.

### 4.4.3 Algae

NPS observed and identified 23 algal taxa from shore and at wading depth during our brief site visit. Based on the locations we saw, algal and benthic invertebrate cover appear to be in equilibrium throughout the study area. We saw no invasive or alien algae. A 2007 limu inventory along the Māhāʻulepū coast by a local biologist reportedly noted small amounts of invasive hypnea but an otherwise diverse and healthy array of species.

The only indication of algal overgrowth observed by NPS is on shallow, gently sloping rocky intertidal benches, where cover is dominated by limu kala (*Sargassum echinocarpum)* or a diverse assemblage of foliose and turf algae. Where limu kala dominates, other algal species present include *Asparagopsis taxiformis*, *Dictyota sandvicensis*, *Dictyosphaeria cavernosa*, *Laurencia* sp., *Padina* sp., *Turbinaria ornata*, *Ahnfeltiopsis coccinea*, and *Wrangelia elegantissima*. On large boulders exposed to strong waves, crustose coralline red algae are particularly abundant.



Limu is a valued food source in Hawaiʻi. Caretakers of Kīpū Kai report that during low tides Kauaʻi residents arrive by boat to glean for limu kohu (*Asparagopsis taxiformis*) and other edible algae. Evidence of excessive harvesting and poor harvesting of limu kohu is reported along the Māhāʻulepū coast.

A species list of algae sighted by NPS during the survey appears below in Appendix 6.2.5. The list reflects the survey's limited scope and should not be considered comprehensive.

### 4.4.4 Marine Invertebrates

Marine invertebrates noted by NPS during the site visit included nine corals, a relatively rare sea anemone, and 29 other macroinvertebrates.

Occurring as widely scattered colonies on basalt, all corals observed had the encrusting, mound, or robust branching morphologies characteristic of species adapted for life on high energy exposed coasts. Corals seen in the study area's wave-protected embayments reflect good water quality, and presumably low levels of runoff and sedimentation from adjacent undeveloped lands. While the number of coral species we saw is fairly low for shallow coastal areas in the Hawaiian Islands, we believe this reflects more the limits on observation (time, sea conditions) than a depauperate coral fauna.

We recorded eight species of stony coral, one zoanthid soft coral, and the relatively rare Mann's anemone (*Cladactella manni)*, the largest intertidal sea anemone in Hawai'i. The most commonly encountered corals across all sites were encrusting *Porites lobata*. More protected areas like Long Beach and Mōlehu Point at Kīpū Kai hosted a slightly broader range of species: *Porites lobata*, *Pocillopora meandrina*, *Montipora flabellata* and the zoanthid soft coral *Palythoa caesia*. Small recruits of *Pocillopora meandrina* were common on the tidal bench at Long Beach.

*Mann's anemone* (cladactella manni), *Hawaiʻi's largest intertidal sea anemone.*

Similar patterns of coral colonization may occur in nearshore subtidal depths, but we were not able to confirm this. It has been reported that a small fringing reef exists off Kuahonu Point (Fletcher et al. 2002), and that an intact reef of *Porites compressa* is located off Kawailoa Point (OSP 1992).

Towed-diver surveys conducted offshore of the study area by NOAA in 2005/2006 recorded relatively low coral cover, seldom over 10%. The notable exception was at depths of 20-30 feet between Pāoʻo Point and Kamala Point, where they noted cover of 20-30% with medium to high habitat complexity. (Asher 2007)

Non-coral macroinvertebrates noted during the NPS site visit were typical for rocky intertidal waters in Hawaiʻi. Molluscs were most prevalent: we saw ʻopihi (*Cellana exarata)*, false ʻopihi (*Siphonaria normalis)*, reticulated clam (*Periglypta reticulate*), and 15 species of snails including cone shells, cowries, tube snails, nerites, periwinkles, Hawaiian turbans and others. At Makawehi Point, nearest to populated areas, evidence of ʻopihi appeared as old middens containing small shells. In the remoter northeast coast of the study area we saw abundant live ʻopihi up to 7 cm in size.

After molluscs, the next most abundant marine invertebrates sighted by NPS were echinoderms: we identified four species of urchins and two sea cucumbers. Other species noted were the spaghetti worm (*Loimia medusa*), spiny lobster (*Panulirus* sp. [molt]) and three types of crab. Shingle urchins (*Colobocentrotus atratus*) and a'ama crabs (*Grapsus tenuicrustatus*) are abundant at some places, especially Pakamoi and Kīpū Kai. A full list of marine invertebrates recorded during the site visit appears in Appendix 6.2.6.

## 4.5 Hydrological Resources

The study area lands encompass portions of five Kauaʻi watersheds: Hulēʻia, Puali, and Nāwiliwili in the area north of the Hāʻupu ridge; Kīpū Kai at the ridge's east end; and Māhāʻulepū from the ridgeline southeast to the coast. Collectively these watersheds feature one perennial stream at Hulēʻia; intermittent streams at Māhāʻulepū, Kīpū Kai, and Niumalu; a mosaic of varied wetland habitats; and two major freshwater aquifers.

**Hulēʻia**

Lowlands of the Hulēʻia, Pūʻali and Nāwiliwili watersheds converge at Hulēʻia Stream, the only perennial stream within the study area. The Hawaiʻi Stream Assessment (DLNR 1990) identifies it as one of eight "Outstanding Riparian Resources" on the island of Kauaʻi, noting the presence of recovery habitat, four species of threatened or endangered birds, and a significant amount of palustrine wetland. The stream's aquatic resources are also rated outstanding: a native indicator species, ʻoʻopu nākea (awaous stamineus), and six other native aquatic species were observed during the 1990 survey. Threats identified during the assessment included invasive hau, California grass, and pigs.

Hulēʻia is partially protected due to the presence of the National Wildlife Refuge, which was established in 1973 to provide wetland habitats for Hawaiian waterbirds. The refuge is designated a Core Wetland by the USFWS. Currently it is managed to control invasive vegetation species through disking and water-level manipulation. Proposed future activities include improved water delivery, mangrove removal at the adjacent fishpond (PCJV 2005) and wetland restoration (FWS/DU 2005). However, limits on funding and staff appear to have curtailed any active planning for such improvements.



The lower reach of Hulēʻia Stream leading into Nāwiliwili Bay is listed as impaired due to turbidity and nitrite/nitrate levels. This area—rated in the 1990 stream assessment as an "Outstanding" recreational resource—is heavily used by residents and tourist for water-based recreation, and is now the target of state and local monitoring and restoration efforts (UH Manoa 2007).

**Kīpū Kai**

Kīpū Kai watershed descends from the eastern ridges of the Hāʻupu mountain range to the ocean. During periods of heavy rain, waterfalls course down the steep coastal pali. A freshwater spring surfaces near the ridge and an intermittent stream flows through the valley. The Hawaiʻi Stream Assessment recognizes Kīpū Kai stream for its "Substantial" riparian and recreational resources, and documents the presence of four species of threatened and endangered birds.

Since access to this watershed is tightly controlled, its water resources have not been well-studied. NPS staff who visited the site report a brackish water wetland or muliwai behind the beach at Kīpū Kai. With sufficient rain it flows directly to the ocean by a channel and concrete mākāhā, and also joins with the nearby intermittent stream. The muliwai contains the aquatic grass *Ruppia maritima* and the introduced Western mosquitofish, and provides a secluded and protected habitat for Hawaiʻi's threatened and endangered waterfowl.

**Māhāʻulepū**

The portion of Māhāʻulepū watershed that lies within the study area stretches from the Hāʻupu ridgeline southward through Māhāʻulepū valley and eastward to the coast.

Agricultural operations began in the mid-1800s in Māhāʻulepū valley; its intermittent streams and wetlands were long ago modified for irrigation purposes. The landowner Grove Farm operates a water system that includes wells, ditches, tunnels and reservoirs. Māhāʻulepū Reservoir, at the back of the valley, is part of that system. Both it and the County-owned Puʻu Hi reservoir (at the very southern end of the study area) serve as important attractors for Hawaiʻi waterfowl. Irrigated taro loʻi in the valley provide additional waterbird habitat. A broad natural depression in the valley also fills with water after heavy rains and temporarily draws waterbirds in large numbers.

Though Māhāʻulepū valley's streams and wetlands were modified, their remnants remain; these expand and become especially visible during wetter periods. The former Waiʻōpili stream—largely subsumed by the ditch system within the cultivated area at Māhāʻulepū—emerges in more natural form near Makauwahi Cave at the south end of the study area, where it joins forces with a natural spring and a remnant of the once much larger Kapunakea Pond. This wetland juncture attracts waterbirds and serves as nursery habitat for native fish. It is linked hydrologically to the important Makauwahi Cave complex, a critical habitat for endangered arthropods that rely on seepage of nutrient-rich water.

*Waiʻōpili Stream at Māhāʻulepū Beach*

Research and restoration have been ongoing in Waiʻōpili Stream/Kapunakea Pond area since 1992. On fifteen acres leased from Grove Farm, volunteers are restoring native grassland and riparian areas. A statewide wetland strategy calls for continuation of these efforts, and protection of "this unique area in perpetuity through conservation easements, cooperative agreements with the landowner, and/or direct acquisition." (PCJV 2005).

Along the Māhāʻulepū watershed coastline, other small wetland ecosystems fed by rain and groundwater lie just inland of the dunes. These, too, attract native waterfowl; biologists believe they once supported larger populations, and have excellent restoration potential.

Resource specialists told NPS that Māhāʻulepū and Kīpū Kai, in combination with Hulēʻia, provide a much-needed mosaic of varied wetland habitats that should be protected and restored to be reliably available for endangered Hawaiian waterbirds.

**Groundwater**

Rain is Kauaʻi's sole source of water. Rainfall not lost to runoff or evaporation seeps into the lava flows that make up the island, forming freshwater aquifers. In the study area this seepage is generally slow, since the types of lava found here are relatively impermeable overall. However, they do contain some spaces where water collects to form underground



aquifers. Large amounts of fresh water perch in the Kōloa volcanics atop denser layers of soil, ash or lava. Fresh basal groundwater occurs in the basalt lavas that comprise most of Hāʻupu ridge, and scattered springs emerge around the base of the mountain range. County of Kauaʻi and major landowners, including Grove Farm, collect and distribute fresh water from area streams and basal sources through ditches, wells, tunnels and reservoirs. Two separate aquifers—Kōloa and Hanamāʻulu—supply the water system in the study area.

Because of the limited permeability of lavas in the study area, few freshwater springs discharge into the ocean. In the permeable limestone dunes along the coast, the basal water is brackish.

## 4.6 Cultural Resources

Scholars say Polynesians seafarers in canoes discovered Hawaiʻi over a millennium ago, possibly as early as 300 AD. Cultural resources in the study area tell the story of Hawaiʻi's subsequent transformation by human settlement—from the first Polynesian settlers, to the wave of later immigrants who launched the ranching and plantation era, to the mixed communities and modern agriculture and tourism operations in place today.

The whole coast of the study area was populated by native Hawaiians when the first westerner, explorer Captain James Cook, sailed through Kauaʻi waters to land in Waimea in 1778 (McMahon 2007). At that time Hawaiians distributed their settlements and shared land and resources through a system of land divisions known as *ahupuaʻa*. Boundaries of ahupuaʻa were delineated to maximize occupants' access to a range of natural resources needed for sustenance—from nearshore reefs to upland forests.

Cook's arrival set the stage for an influx of newcomers from around the world and catalyzed a dramatic transformation of Hawaiʻi's land use and demographics. Cook introduced cattle to the islands; a gift to the government, they quickly multiplied and spread across the landscape. Whaling ships, traders and missionary expeditions soon brought new immigrants from America, Asia and Europe. In the decades from the 1830s to 1870s the native Hawaiian population declined by over half, largely due to introduced diseases. An American land ownership framework replaced Hawaiian ways of managing resources and a western-style economy rapidly took hold, enabling ambitious immigrants to acquire major landholdings.

By 1850, American entrepreneurs launched large-scale sugar plantations in southeast Kauaʻi. Their efforts heralded the beginning of Hawaiʻi's plantation era, which lasted into the late 20$^{th}$ century. Over that same period, the Hawaiian kingdom fell to United States political interests. With the 1893 overthrow of Queen Liliʻuokalani, the islands were claimed as a United States Territory; in 1959, Hawaiʻi became our nation's fiftieth state.

In the study area today, a range of natural and cultural resources reflect the state's evolution through the periods of Hawaiian settlement and expansion, Western contact, and plantation life.

### 4.6.1 Hawaiian Settlement and Expansion

The lands examined in this reconnaissance study encompass portions of five different traditional Hawaiian ahupuaʻa: Haiku, Kīpū , Niumalu, Kīpū Kai, and Māhāʻulepū. Changes in these ahupuaʻa as a result of modern agriculture, ranching or natural events buried many sites and features from the period of native Hawaiian settlement and expansion. Most which remain are on private land, where archeological investigation is likely to occur only if the owner seeks development permits.

According to the state's archeologist, basic sites in the region are known and some burial reinterments have occurred, but generally speaking, researchers have not done extensive fieldwork in the study area (McMahon 2007). Notable documented cultural resources which are rooted in the period of native Hawaiian settlement and expansion—and which remain visible today—are described below.

**Hulēʻia Valley**

Hulēʻia Valley—the land designated today as Hulēʻia National Wildlife Refuge—was natural breadbasket for early Hawaiians on Kauaʻi. Rich in the resources that sustained native settlers, its lands formed the lowland junction of three ahupuaʻa: Kīpū, Niumalu, and Haiku.

In the drier portions of the valley, people grew *ʻulu* (breadfruit), *wauke* (mulberry, for making tapa cloth), *ʻawa* (for ceremonial drink), and other crops. In wetter areas near streams, they shaped *loʻi* (irrigated pond fields) for cultivating the staple *kalo* (taro). Records indicate that by the early 1800s, and probably well before, the valley hosted a healthy agricultural community with native Hawaiian homes, fields, and at least 113 separate taro loʻi. (FWS 2005)

With the changes in land use laws and demographics in the mid-19th century, however, taro patches soon became "a rarity among the profusion of rice fields." Westerners purchased large agricultural acreages, and Grove Farm—still a major landowner in the study area today—began cultivating sugar in Hulēʻia valley. (FWS 2005)

Archeologists have documented an entire loʻi and *ʻauwai* (ditch) system on the valley floor; agricultural terraces delineated by boulders in the valley's western end; conical depressions in rock that appear to be prehistoric native Hawaiian bait cups (for preparing fish bait); and two *loʻi* (taro paddy) complexes created within the last decade by FWS lessees. In site investigations they also identified or recovered Hawaiian artifacts including basalt flakes and a polished basalt scraper. Researchers recommend studies of exposed soil profiles if excavation is undertaken as part of future wetland restoration at the Hulēʻia National Wildlife Refuge.

**Alekoko Fishpond**

Makai of the Hulēʻia National Wildlife Refuge is Alekoko Fishpond, a native Hawaiian aquaculture site that dates to approximately 1200 AD. Alekoko—sometimes known as



Menehune Fishpond— is listed on the National Register of Historic Places and widely recognized as one of the most important cultural features on Kauaʻi.

While aquaculture existed in other island cultures, prehistoric Hawaiʻi's aquaculture endeavors were far more extensive and innovative than elsewhere in the Pacific. In hundreds of ponds throughout the islands Hawaiians raised and harvested fish—mainly *awa* (milkfish) and *ʻanae* (mullet)—and other products. Though usually ponds were built along the ocean shoreline, in some places they were located inland to take advantage of stream waters. Of the 65 fishponds known on Kaua'i, at least nine were located on Hulēʻia Stream (Cockett 2001). Inland freshwater ponds were known as *loko wai*.

Some ponds were simply natural enclosures, but most were constructed laboriously from rocks. A unique feature of many Hawaiʻi ponds was the *mākāhā*, or sluice grate, which improved the pond from a tide-dependent fishtrap into an aquatic arena that could be controlled, regardless of tide, to manage movement of fish between the pond and adjacent stream or ocean waters.

The success of Hawaiʻi ponds made them a treasured resource for Hawaiʻi's royalty:

> By the end of the 18th century, more than 300 fishponds were conspicuously owned by the high chiefs. Accessibility to these ponds and their products was limited to the elite minority of the native population—the chiefs and priests. Ownership of one or more fishponds was one of the ultimate, high-status symbols in the status-conscious Hawaiian culture…

*Hulēʻia Stream and Alekoko Fishpond*

Alekoko is a royal fishpond of the *loko wai* type. It is the largest manmade inland fishpond in the state (McMahon 2007), and was built using cut stones, a technique rarely employed by ancient Hawaiians. Its extensive rock wall embankments remain, hidden by mangrove, and the mākāhā openings still exist. Although listed on the National Register, the pond has not been fully studied; it is privately owned and access is restricted to viewing from a nearby state-owned overlook. Alekoko is not used today for fish production: water diversion upstream and breakwater jetties downstream altered the rate of flow, and sediments have increased the water turbidity.

A statewide study of Hawaiian fishponds for NPS in 1975 identified remnant Hawaiian fishponds "worthy of preservation as part of the cultural heritage of the State of Hawai‘i and the United States of America." Highest value was given to ponds "judged to have deviated least from their conditions when in operation." The study authors rated Alekoko fifth out of 56 extant royal Hawaiian fishponds for its potential restorability. The state's aquatic resources biologist on Kaua‘i says the pond could serve as a research site and be restored as "an incredible teaching and demonstration resource for Hawaiian aquaculture."

Since the NPS study, mangrove has overgrown and interpenetrated the fishpond walls, posing an increased challenge for restoration. Study authors noted in 1975 that the extent of mangrove invasion strongly affects a pond's potential, since "mangrove removal may involve cranes and underwater sawing. In removing mangrove roots grown into man-made pond walls, the walls would have to be wrecked and rebuilt." Recently more sophisticated mangrove-removal machinery has become available, however. Opinions of experts we spoke with vary widely as to whether restoration of Alekoko is feasible.

**Makauwahi Cave and Sinkhole**

Makauwahi cave and sinkhole, discussed in section 4.1 for its paleoecological importance, is equally important for the light it sheds on Hawai‘i's human story. According to scientists working at the site, it contains "in a single stratigraphic sequence an encapsulated view of the full span of human occupation, including the millennia preceding human arrival, earliest human evidence, subsequent population increase and cultural change, European contact, and modern transformation" (Burney and Kikuchi 2006).

Due to its neutral pH environment, Makauwahi's fossil and artifact finds are exceptionally well preserved. Its sinkhole walls surround an ordered column of sediment layers that tell a nearly unbroken tale of conditions on Kaua‘i, from before the arrival of people through the changes wrought by a millennium of human activity. Researchers are piecing together new and detailed views of Kaua‘i's past based on analysis of the cave's sediments, combined with oral and archival sources.

They have identified consistencies between local oral traditions dating back to the 1300s and data retrieved from the cave's hidden layers. In sediments from the historic period over the last two centuries, their finds show consistency not only with oral accounts, but also with historic maps, drawings, photographs, and Land Court Award records (Burney and Kikuchi 2006).



Bones of the Pacific rat, believed to have arrived in Hawai‘i with Polynesian voyagers, are dated at 1039-1241 A.D. in the cave and provide the earliest evidence of people in its immediate vicinity. Sediment layers above the first rat bones show an increasing abundance and diversity of whole or partial human artifacts. Documented by Burney and Kikuchi (2006), they include:

- tools such as files, picks, scrapers, and adzes
- fishing gear including hooks, octopus lures, and stone weights
- game stones, sling stones, and hammerstones
- gourds and a wide range of food remnants
- fiber cordage
- wooden fragments of canoes, paddles and tool handles
- a stone stool and evidence of a platform
- ornaments, including drilled shells and a drilled, polished basalt mirror pendant.

The increase in human artifacts through successive layers corresponds with a decrease in native flora and fauna. Some species abruptly vanish when humans arrive, while others gradually decline in size over the centuries and eventually disappear, especially after European contact. In the 1800s and 1900s, as feral animals and agriculture strip nearby land, the number of native plants and birds drops dramatically.

Discoveries at Makauwahi lend weight to an ongoing discussion among scholars about the ways in which Polynesian settlers may have significantly altered the landscape and native biota of Hawai‘i, even prior to European arrival.

Archeological finds at Makauwahi cave and sinkhole to date are from only three excavation pits; presumably many future discoveries remain hidden in the cave sediments. Burney and Kikuchi (2006) note that the cave strata "provide an ongoing record of human activity near the site [that] can be thought of as not just an 'album of snapshots' of past life, but perhaps, in combination with the oral histories and early documents, maps, and pictures … a sort of epic movie of human ecology stretching over a thousand years."

**Mt. Hā‘upu**

A notable landmark in the study area, Mt. Hā‘upu, is of special meaning to native Hawaiians. In 1998, proposals to build a communications tower on Hā‘upu Ridge prompted the state's Office of Hawaiian Affairs to document the cultural importance of Mt. Hā‘upu. In a 3-week period they collected information from elders, traditional religious practitioners, teachers of hula and chant, and historians. Their results were summarized in a written appeal to the Federal Communications Commission (OHA 1998) that successfully stopped plans to erect the tower. Points they outlined in the appeal are noted and quoted below.

In Hawaiian culture, a "sacred familial union" joins people to the land.

> "If a time arises when the ‘āina is threatened, we, as Hawaiians, will be there, not by choice, but by our deep aloha to protect our fellow family

> member. No amount of Western influence, cultural assimilation, or persuasion can sever this relationship between Hawaiians and the land, for the land is our kin." (OHA 1998)

In this reality, Hāʻupu ridge is a *wahi kapu* (sacred place).

> "Hāʻupu is our kin, descendant of Papa [Earth mother] and Wakea [Sky father], and older sibling of the Hawaiian people. This is the main underlying reason why we, as Hawaiians, hold Hāʻupu sacred in our hearts." (OHA 1998)

Hāʻupu is said to be named after a warrior demi-god who tore a large rock (*pohaku*) from Kauaʻi and threw it across the channel to kill an enemy chief on Oʻahu, forming the islet there known as Pohaku o Kauaʻi. Hāʻupu in the Hawaiian language means a sudden recollection; the mountain is known for its ability to jolt a memory, or alternatively, open a view to the future. A small heiau atop Mt. Hāʻupu is dedicated to Laka, the goddess of hula, whose *kinolau* (embodied form) lives in the wild and sacred plants of the upland forest that are used by hula practitioners. Both the heiau and the wooded area at Hāʻupu's summit are known by the place name Keolewa, which appears in a variety of prayers, chants and oral traditions. (OHA 1998)

Hāʻupu Ridge is revered as a meeting place where the powerful fire-goddess Pele made passionate love with the demi-god Kamapuaʻa. The Kōloa region south of the ridge was controlled by Pele; its dry and rocky landscape reflects her harsh, impatient and dominant personality. The lusher Līhuʻe side of the ridge was home to the pig god Kamapuaʻa, who is associated with "taro, fertility and the creation of fertile springs necessary to sustain life," and who is known to excel as a lover. According to tradition,



> "Pele and Kamapuaʻa are believed to have been involved in a tumultuous love affair with each other in the vicinity of Hāʻupu and the topography of the area is believed to have been shaped by the fury of their love-making…Hāʻupu Ridge is the dividing line between the two areas controlled by Pele and Kamapuaʻa and Hawaiian religious practitioners believe these gods continue to dwell there. In times of drought, the fertile and lush domain of Kamapuaʻa is said to be inhabited by Pele, whereas in times of heavy rains the dry and arid domain of Pele is said to be inhabited by Kamapuaʻa. It is at these times that their love affairs are believed to continue." (OHA 1998)

Ku and Hina, the earliest Hawaiian god and goddess, reside on Hāʻupu Ridge. They are patron gods of fishermen and "the special protectors of all the generations of Hawaiians whose ancestors came from Kahiki [Tahiti]." Ku and Hina also represent the male and female procreative powers; their images, seen in rock formations atop the mountain, are a focal point for Hawaiian cultural and religious practitioners. (OHA 1998)

Hawaiian proverbs and poetical sayings reflect Hāʻupu's cultural importance. The phrase *Hāʻupu mauna kilohana i ka laʻi* (Hāʻupu, a mountain outstanding in the calm) honors the mountain itself, and is also a description for someone who achieves outstanding things. Mary Kawena Pukui's *Olelo No Eau* includes seven sayings centered on Hāʻupu, a relatively large number for a place that is not a habitation site. (OHA 1998)

Visible from as far as sixty miles at sea, Mt. Hāʻupu was an important navigational landmark for traditional Hawaiian fishermen in canoes. Hawaiian fishermen today use modern navigation technology, but continue to look to the mountain as both a physical and spiritual guide. (OHA 1998)

**Waiʻōpili Heiau**

Waiʻōpili Heiau is located near Makauwahi cave, on the land leased from Grove Farm for a sand quarry operation. In a 1974 surface survey archeologists recognized the heiau as "undoubtedly the most important site" known at that time along the southeast Kauaʻi coast, and rated it in the state's "Valuable" category—i.e., significant sites in excellent condition that are good examples of a feature type. They recommended the heiau be "stabilized and/or restored" and described its unique qualities:

> This temple is only one of 4 major heiau, in good condition, which still exist between Hanapepe and Māhāʻulepū (in fact, if one were to continue up the east coast of the island of Kauaʻi the next comparable temple would be those in and around the State Park at Wailua)…The large pahoehoe slabs used in the construction of the south wall is unique as is the stone "tower" near the corner of the south and west walls. Waiʻōpili is also the only remaining temple in the ahupuaʻa of Māhāʻulepū. (Ching et al 1974)

Quarry operations were already underway when the site was examined in 1974. The walls and interior of the heiau were readily seen, but the unique tower formation, noted as substantial by previous archeologists 40 years earlier, had been reduced to "a pile of lava," apparently as a result of quarry operations pushing against the heiau (Ching et al 1974).

Twenty years later conditions had worsened: a 1992 state study noted commented that the heiau was "sitting directly underneath the rock crusher" (OSP 1992). Archeologists and residents who have visited the quarry recently say the heiau is difficult to see but appears to have been further degraded.

Several local sources told NPS that the quarry operator is preparing to close the current site in the near future and move operations to a second permitted site above Hā'ula Bay. According to the state's archeologist on Kaua'i, quarry permit conditions require the operator to revegetate the existing site and restore Wai'ōpili Heiau upon shifting locations.

**Burials**

The coastal sand dunes of the study area are all known to contain Hawaiian burials. 'Āweoweo, a tall dune north of Hā'ula, is reported to be the longest, largest burial dune in the Pacific. Excavation and grading for the Hyatt hotel, adjacent to the study area, uncovered human remains in the Makawehi dunes. Burials occasionally erode out of other coastal dunes in the study area, and some have been found in study area caves. Newly discovered burials are protected and reinterred through protocols established by the local Native Hawaiian Burial Council.

Little is definitively known about the numerous dune burials. From the early to late 1800s, written accounts refer to great numbers of bones visible in the dunes of Pā'ā and Māhā'ulepū. In 1867, entrepreneur Sanford Dole wrote a letter describing the scene:

> Over this whole extent of sand beaches and hills, human bones are thickly scattered….Ten years ago they were much more numerous than now. The wind is constantly uncovering the skeletons, and when exposed, they are quickly destroyed by the weather and the feet of cattle…[Formerly] it was easy to find perfect skeletons in the exact position in which they were buried. This is now impossible and even perfect crania are becoming more scarce with every year. In olden times the natives often made use of the soft sand beaches for sepulture, but the immense number that is buried here forbids the idea that it was any common burying place. The present generation of natives know nothing definite on the subject. (Ching et al 1974, citing Wyman 1868)

Some 19th century Hawaiians told questioners that the dunes were simply easy places to accomplish common burials. Others said the burials were the result of a great battle in which Kaua'i warriors defeated invading forces. One version placed the battle in the 13th century; the best-known versions—still popular today—describe it as a 1796 battle in which the warriors of Kaua'i's chief, Kamuali'i, defeated Kamehameha's warriors from O'ahu (Ching 1974). To date, none of these battle legends have been confirmed archeologically (McMahon 2007).

**Petroglyphs**

Known petroglyphs in the study area occur on Māhā'ulepū beach; on privately-owned coastal lands between Hā'ula and Nāwiliwili Bay; and on Grove Farm agricultural lands in Māhā'ulepū valley.

*Petroglyphs on rock ledges underlying Māhā'ulepū beach are occasionally exposed by high tide and waves.*

At Māhā'ulepū beach and at Keoneloa Bay just outside the study area, dozens of petroglyphs and carvings decorate expanses of rock that are usually buried deep in sand, but occasionally exposed by high tides and waves. The markings range up to six feet in length and show historic influences mixed with ancient designs (Clark 1990). Their origin is unknown. In the late 1800s, elders from the area reported the petroglyphs had "always" been there (Ching et al 1974). Rocks in the shallow water at Māhā'ulepū Beach exhibit grooves made by the sharpening of adzes. Underwater archeology may reveal additional features of interest.

Inland, in the upper reaches of Māhā'ulepū Valley, is a mystifying petroglyph boulder measuring nearly 4 meters across. It features approximately twenty carved figures, and on its top are two cup-like carved holes; the larger of the two is 4" deep and 1 ft in diameter, and is connected to the edge of the boulder by a shallow carved groove. Researchers have speculated on the meaning and purpose of this configuration—some think it may symbolize or even map a stream and/or spring, and others suggest that it might have served a sacrificial purpose. The actual function and meaning are entirely unknown. (Ching et al 1974; McMahon 2007; KCC 1973)

**Other Archeological features**

Through ship's logs and drawings, historians know that Kaua'i's southeast coast was well populated by Hawaiians when Captain Cook arrived in 1778. Unfortunately, the village complexes he saw did not survive the two centuries of social and physical upheaval that

followed. An archeological surface survey in coastal portions of Māhāʻulepū in 1974 noted "…many of the sites within the study area were destroyed, otherwise obliterated, or in an advanced stage of deterioration…a reflection of the changing land use patterns of the region" (Ching et al 1974).

Surface sites and features that do remain are mostly scattered and isolated. They include shelter caves, remnants of rock walls and house sites. Three heiau are preserved on the Hyatt hotel property abutting the south end of the study area. An 1896 map by Monsarratt shows house lots and salt ponds near Waiʻōpili Stream and Kapunakea Pond, but evidence of these has been destroyed or obscured, and even the stream and pond have been drastically altered by agricultural operations.

On private properties in the north end of the study area a range of sites and features are reported to exist. These include burials, village and house sites, heiau, rock walls, middens, agricultural terraces, taro loʻi, a clay-mining cave, and a fishpond site. Hunters tell of a place in Niumalu that is said to be the house and burial site of a princess from the island of Hawaiʻi.

Some of these have been documented and a few were viewed by NPS staff during the site visit, but overall the documentation to date has not been thorough. Given the habitation dates revealed at Makauwahi Cave, and the known existence of coastal villages in the study area through the 18th century, a more thorough survey and excavation would likely yield new finds and insights.

### 4.6.2 First Western Contact

The ocean off Māhāʻulepū was the location of the first documented contact between native Hawaiians and people of the Western world on January 19, 1778. Captain James Cook recorded the rendezvous in his diary (as cited in MM 2004):

> January 19, 1778…I stood for the East end of the second island [Kauaʻi] …the nearest part about two leagues distant. At this time we were in some doubt whether or not the land was inhabited, this doubt was soon cleared up, by seeing some canoes coming off from shore towards the Ships, I immediately brought about to give them time to come up, there were three and four men in each and we were agreeably surprised to find them of the same nation as the people of Otahiete [Tahiti] and the other islands we had lately visited…

This fateful meeting marked the first economic encounter between two vastly different cultures. A brief flurry of trade between the Hawaiians in canoes and the Westerners in ships marked the first exchange in the series of economic transactions that would eventually transform Hawaiʻi's people, laws, and landscape:

> …It required but little address to get them to come along side, but we could not prevail upon any one to come on board; they exchanged a few fish they had in the Canoes for any thing we offered them, but valued nails, or iron above every other thing; they only weapons they had were a few stones in

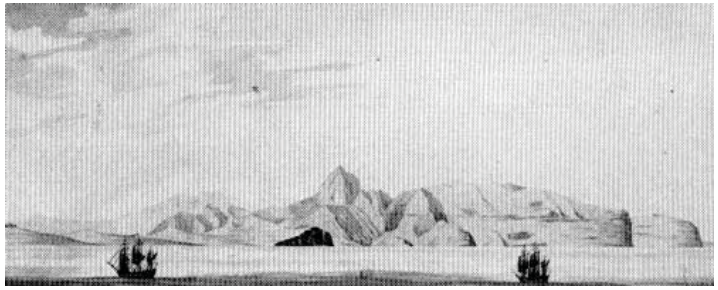


> some of the Canoes and these they threw overboard when they found they were not wanted.

Lack of a good anchorage led Cook to proceed around the island to Waimea, but as he skirted Kauaʻi's southeast coast, he described the view across Kōloa and Māhāʻulepū to the Hāʻupu Ridge, with its steep stratified basalt headlands at Kīpū Kai and Niumalu:

> …The land on this side of the island rises in a gentle slope from the sea shore to the foot of the Mountains that are in the middle of the island, except in one place, near the East end where they rise directly from the sea; here they seemed to be formed of nothing but stone which lay in horizontal stratus.

The first drawing of Hawaiʻi by a European is William Ellis' depiction of the Māhāʻulepū Coast, with Mt. Hāʻupu as its focal point (Ainakumuwai 2001).



### 4.6.3 Plantation and Ranching Era

Scattered physical remnants of plantation life are visible in and around the study area. Kōloa Plantation—the 19th century owner of Māhāʻulepū lands that now belong to Grove Farm—gave birth to Hawaiʻi's commercial sugar industry. Remnants of the company's first mill are in nearby Kōloa town, and a second mill constructed in 1912 stands on Grove Farm property just outside Māhāʻulepū Valley.

Kīpū Ranch and Grove Farm—two agricultural entities that shaped Hawaiʻi's historic plantation and ranching era—still manage active operations on lands within the study area, with some historic facilities remaining in use. At Kīpū Kai, cattle operations ended just two years ago.

The histories of these properties illustrate Hawaiʻi's transformation since the early 1800s—the troubled transition to a Western-style land ownership system; the acquisition of vast acreages by American missionary families; the diversion of water to support commercial sugar crops; the tide of imported laborers needed to maintain production; and the mid-20th century decline of plantation life as laborers left the fields for other work opportunities.

They stop just short of the modern chapter in the story—the wave of subdivision and development that has recently broken up many of the state's vast and historic agricultural holdings.

Kipu Ranch abandoned sugar in 1942 and narrowed its focus to cattle ranching. The Rice family, owner of the land since 1872, continues cattle operations today. In recent years the ranch trimmed staff, replaced horses with ATVs, launched an ecotour operation, and served as a location for Hollywood movies. (Yamanaka and Rice 1998)

Grove Farm stopped actively cultivating sugar in the 1970s. A lessee grew sugar on Grove's Koloa lands for twenty more years—1996 marked their final harvest and the closure of the historic Koloa Mill just outside Māhāʻulepū Valley (Yamanaka 2000). Over the last two decades, Grove Farm engaged in extensive real estate development outside the study area, but its Māhāʻulepū valley land remained in crops and pasture.

In their current state, both Kīpū Ranch and Grove Farm offer windows into Hawaiʻi's past. Interestingly, both are invested in business strategies that highlight that past. Kipu Ranch offers ecotours emphasizing the ranch's history, while Grove Farm plans interpretive features focused on local agriculture.

## 4.7 Recreation and Community Use

Despite the study area's location between the population centers of Līhuʻe and Poʻipū, no public lands within it are managed for recreation purposes. However, residents and tourists enjoy both informal and commercial recreation along the study area shoreline, in the adjacent ocean, on Hulēʻia Stream, and on some of the privately-owned lands. Community uses include traditional cultural activities such as fishing, hunting and gathering.

**Shoreline**

The Māhāʻulepū and Kīpū Kai shorelines have long served as secluded recreation places for local residents. Lately a growing tourist presence has added to the mix; over one-third of the petition-signers in a community initiative to protect Māhāʻulepū's shoreline resources identified themselves as visitors to the island (MM 2007).

The study area shoreline is accessible at its south end via a footpath leading from Keoneloa Bay and the Hyatt hotel along the Makawehi/Pāʻā dunes. Businesses and community groups jointly prepared an interpretive guide for this trail and sponsor occasional guided walks from the hotel to Punahoa Point.

Grove Farm allows daytime vehicle access through its property to a rutted road that parallels the Māhāʻulepū coast from Punahoa Point to Hā'ula Bay. Punahoa Point is a popular place to fish for ulua, pāpio, and ʻōʻio; pipes for holding poles are permanently anchored into the rock here and at other high points along the shoreline. Māhāʻulepū Beach is favored for windsurfing and kite surfing, and its long white stretch of sand appeals to sunbathers and walkers. Kāmala Point Beach, Kawailoa Bay and Hāʻula Beach are all



popular swimming spots. A commercial stable just inland of Punahoa Point provides horseback riding tours along the shoreline.

*The Māhāʻulepū coast offers varied and readily accessible recreation opportunities in a wilderness type atmosphere.*

The entire four-mile stretch from Makawehi Point to Hā'ula offers a scenic hike in a wilderness atmosphere with no visible development except a single house at Māhāʻulepū Beach. A narrow and rutted dirt road reaches most of the way to Hāʻula; at favored spots it can be packed with vehicles on weekends and holidays, when local families converge for daytime and overnight fishing, spearfishing and camping.

Kīpū Kai encompasses five separately named beach areas, but these are not accessible to the public by land, and foot travel is allowed only below the high tide line. The single road that leads over the ridges of the Ha'upu Range into Kīpū Kai is private property and blocked by gates. Most visitors arrive by boat or kayak.

Most of the public recreation at Kīpū Kai occurs at Long Beach, which is suitable for swimming, snorkeling, bodysurfing, bodyboarding, surfing, fishing, and beachcombing. A small cove in the arc of Mōlehu Point at the north end of Long Beach is a popular snorkel site for tour boats. By agreement between commercial boat operators and Kīpū Kai landowners, onshore tour activities are confined to the adjacent beach area, below the high tide line (Clark 1990). On the smaller and rockier beaches beyond Long Beach, residents often arrive by boat to harvest edible algae (e.g. limu kohu) and capture shallow reef fish and octopus (he'e or tako).

The study area coast lacks well-sheltered harbors and is exposed to strong waves, currents and tradewinds, so boat-based ocean uses are often limited by rough sea conditions. During calm periods, however, small vessels from nearby Nāwiliwili Bay or Kukuiʻula Bay (west of Po'ipū) fish offshore. Charter boats and commercial kayak, dive, snorkeling and sightseeing craft skirt the study area shoreline and enter coves along the way when conditions allow, particularly in winter when high surf precludes tours along the Nā Pali coast. Ocean-based tours to Kīpū Kai—where public access by land is not allowed—are increasingly popular.

**Hulēʻia Stream and Kīpū Ranch**

The waters of Hulēʻia Stream are a peaceful kayaking spot for local residents and independent tourists. Local outfitters also offer guided kayak tours along two miles of the sheltered Hulēʻia waterway, through scenic forests that are often used as film locations for adventure movies. Paddlers glide past Alekoko Fishpond and through the Hulēʻia National Wildlife Refuge, then hike through the forest to waterfalls and swimming holes. One kayak tour operator, by agreement with the landowner, leads hikes into Kīpū Ranch that feature a covered wagon tour, a treehouse picnic, and a zipline ride across a waterfall.

Kīpū Ranch is also the site of commercial ATV tours. Sponsors tout the varied terrain through forests and along Hulēʻia Stream; opportunities to learn about Hawaiian culture; stops at Hollywood movie locations; encounters with cattle, wild pigs, and game birds; and spectacular "ocean, mountain and jungle" views, including a look at the private and inaccessible valley of Kīpū Kai.

**Hāʻupu Ridge**

Hāʻupu Ridge was formerly a popular hunting area accessible to the public. Due to growing vandalism, poaching, and risk of fire on the ridge and adjacent land, owners now allow access only by permission.

## 4.8 Resource Threats

**Human Land Use and Activities**

Changing land uses and activities pose current and potential threats to important natural and cultural resources within the study area.

An active sand quarry excavation operates adjacent to Makauwahi cave and sinkhole—so close that one small cave opening in the west sinkhole wall rises diagonally only about 50 feet before it ends in a surface collapse at the edge of the quarry (Burney and Kikuchi 2006). Heavy equipment in use at the quarry can sometimes be felt within the cave environment, causing fear of potential rockfall or collapse. A heiau on the quarry site has already suffered significant damage. A future quarry site farther north at ʻĀweoweo may potentially impact dune burials.

Kauaʻi's endangered arthropods in the study area are especially vulnerable to impacts from quarrying and other activity on the marginal agricultural soils overlying their cave habitats. Grading, fill, and excavation result in disturbance, compaction or blockage of the subterranean cracks where these species find refuge during drought. Blocked areas break up the cave system into separate areas, isolating the already small populations and increasing their risk of extinction.



Endangered birds rely on a mix of natural and manmade resources in the study area that are readily subject to change. At Kīpū Kai—the release site for a small population of nēnē that grew and catalyzed resurgence of nēne on Kauaʻi—the mowed and grazed grassy areas favored by nēne have been substantially reduced since the cessation of cattle operations in the valley. On Hāʻupu ridge, pig predation and fire risk are ongoing threats to the Newell's shearwater nesting habitat. Potential development in the shearwater's land-sea flight path also poses a threat if it results in increased lighting, which disorients and downs birds in transit.

Recreational use of the study area shoreline is growing in tandem with Kauaʻi's resident and visitor populations. Along the accessible Māhāʻulepū coast, user conflicts are common; and at relatively inaccessible Kīpū Kai, trustees express concerns about the increasing arrivals by boat. Neither site is currently managed to assess and monitor coastal-marine resources or actively manage use. Without active management, shoreline cultural and natural assets run the risk of damage from overuse before they have even been well studied. If activities get out of hand at Māhāʻulepū, Grove Farm could choose to block access through its property, effectively limiting public use of an important recreational resource.

A potential threat to resources is future development on the private lands that are now designated for agriculture, and that are intertwined with important natural and cultural elements in the study area. Past proposals by Grove Farm, for example, included luxury resorts, large home sites, businesses, and a marina along the Māhāʻulepū coast. Kīpū Ranch lands hold obvious value for potential development. A 2004 sales brochure for the Campion property at Niumalu suggests the buyer could apply to "change zoning for a commercial type development" and notes that "when this application was approved obviously the value would multiply."

Despite current owner intentions to keep lands in agriculture, without permanent legal protection, their redesignation and development remain possible. Such development would destroy the scenic integrity of the study area, exacerbate competition for shoreline use, and potentially cause unacceptable impacts on adjacent natural areas.

**Invasive Alien Plant Species**

Non-native species dominate parts of the study area, and threaten or encroach on significant resources on the shoreline, at Hulēʻia, and on Hāʻupu ridge. Once established, some of these aliens are difficult to remove.

At Alekoko Fishpond, red mangrove completely covers the pond's rock walls. Study area coastal lands are invaded by ironwood, Christmas berry, koa haole, kiawe, false kamani and prickly pear. At Kīpū Kai, NPS staff noted one small patch of a *Canavalia*, or beach pea; fruit or flowers are needed to confirm the identification. This species was not recorded from Kaua'i in the *Manual of the Flowering Plants of Hawai'i* (Wagner et al. 1990), and thus has likely been introduced in the past decade (L. Pratt, pers. comm.).

Albizia, guinea grass and java plum are major invasives on parts of Hāʻupu Ridge. Non-natives such as rose myrtle, passion flower, cat's claw, and thimbleberry have also gained a foothold; some of these are able to spread quickly through the forest understory, competing for habitat with Hāʻupu's rare native species (Wood 2005). In the absence of active management, alien invasives can eventually destroy native plant communities within the study area.

A species list of introduced plant and animal threats identified during the reconnaissance survey appears in Appendix 6.3.

**Grazers and Predators**

Pigs and goats seriously threaten native habitat in the study area. After Grove Farm ceased sugar operations and began leasing out crop and pasture at Māhāʻulepū, they closed hunters' access to Hāʻupu ridge through their property. Habitat degradation and destruction by feral pigs, always a problem, has since grown unchecked. Large numbers of feral goats also clamber across the slopes of the Hāʻupu range. During the reconnaissance survey site visit, NPS staff counted 89 goats on the ridge between Kīpū Kai and Niumalu.

Ungulate disturbance destroys native vegetation, increases erosion, and provides fertile ground for invasive species. Throughout Hawaiʻi, feral ungulates are ravaging native ecosystems. The study area is no exception. Ungulate control on Hāʻupu ridge is a critical need.

Dogs, both domestic and feral, threaten populations of native seabirds on the study area coast. Dogs are blamed for killing remnant or nascent Wedge-tailed Shearwater colonies along the coast (Kaiakapu 2007, Blaich 2007). Dogs have killed nesting albatrosses and nēnē elsewhere and threaten all ground-nesting birds. Feral dog removal and domestic dog control are sensitive social issues—ones that demand attention if native species in the study area are to be protected.

Rats pose a special threat in the forests of Hāʻupu, where they can wreak havoc on small and vulnerable populations of endemic plants by eating precious seeds. Rats are a persistent pest in agricultural areas and a threat to nesting birds.

Non-native predatory birds in the study area include the barn owl, which has been recorded preying on both Newell's shearwaters (Ainley et al. 1997) and Hawaiian stilts; and the cattle egret, which may take young of endemic waterbirds (USFWS 2005) and compete with native waterbirds for food (Hawaii Audubon Society 2005).

Of particular positive note, Kaua'i is the largest island in the state that appears free of the mongoose, a voracious eater of bird eggs and chicks. Likely in part because of its absence, Kaua'i remains the stronghold of the threatened Newell's ahearwater (ʻa'o) and is home of a growing nēnē population, especially in and around the study area. Isolated individual mongoose sightings have been reported on the island; an established mongoose population would be a serious threat to the study area and all of Kauaʻi.



**Environmental Events**

Environmental events such as hurricanes, fires, tsunamis and landslides are potential study area threats that can not only wreak direct havoc, but also set into motion long-term landscape changes—such as erosion and alien plant invasion—that gradually degrade and destroy native habitats. State officials report that two hurricanes in recent decades damaged Newell's Shearwater habitat on Hāʻupu ridge, and allowed invasives to spread across newly-eroded slopes. Kīpū Kai representatives say the mountainsides above their valley were lushly vegetated before the hurricanes. By the time of the NPS site visit, the slopes were bare and roamed by goats, and a small recent landslide was apparent on the upper part of the access road.

The entire study area shoreline is highly vulnerable to storms and hurricanes. Long-term coastal erosion hazard is high at Māhāʻulepū Beach and moderately high at Kawailoa Bay, Hāʻula, Kīpū Kai beaches, and the southern portion of Niumalu. (KC 2003)

Located far from the Hawaiʻi magmatic hot spot, the study area is not at direct risk from volcanic or seismic events. However, potential tsunami hazard intensity is considered high along the Māhāʻulepū coast between Punahoa Point and Hāʻupu Bay, and at Long Beach in Kīpū Kai. These moderately sloped areas are also vulnerable to coastal stream flooding from seasonal rainfall (KC 2003).

## 4.9 Resource Protections

Besides the National Wildlife Refuge designation at Hulēʻia, the strongest existing resource protection mechanism applied in the study area is state designation of Conservation lands along the shoreline corridor and much of Hāʻupu ridge (See Regional Land Use Map). Most of these lands fall into the state's two strongest Conservation subzones, which place strong limits on use, and which require state permits for most uses (DLNR 2005b).

Federal Critical Habitat designations along the Māhāʻulepū shoreline and portions of Hāʻupu ridge provide minimal protection. A Critical Habitat designation does not affect situations where a federal agency is not involved—for example, a landowner project on private land that involves no federal funding or permit. Similarly, Alekoko Fishpond's listing on the National Register of Historic Places only modestly assists in its protection: under federal law, private property owners can do anything they wish with their National Register-listed property provided that no federal license, permit, or funding is involved.

Several state planning documents related to tourism, recreation, and historic trails emphasize the importance of recreational access and resource protection along this coast, especially in light of increasing public use (OSP 1992). These documents establish ideals and goals that are not reflected in enforceable policy. They do not necessarily result in actual resource protection or maintenance of existing public access.

In 1992, Hawaiʻi 's Office of State Planning conducted a land use review that recognized Māhāʻulepū's "combination of outstanding coastal recreational areas, native coastal strand

vegetation and significant physiographic, archaeologic and scenic resources." Anticipating future development pressure, it said "measures will need to be taken to assure that the sensitive resources here will be protected." Suggested ways to achieve that protection included transfer of development rights and purchase of easements (OSP 1992).

The 2000 update of the Kaua'i County General Plan—a direction-setting policy document that precedes and guides zoning regulations—discusses important resources in the study area (KC 2000). In Section 6.3, Līhu'e, it notes the value of the Hā'upu mountains, Alekoko Fishpond, Hulē'ia, Kīpū Kai, and the Niumalu coastline; establishes policy to ensure that future urban development on bluffs above the fishpond is placed out of sight from the fishpond overlook; and envisions a future in which Hulē'ia Stream and valley are well-managed, and the scenic qualities of Hā'upu ridge are preserved.

General Plan policy statements in Section 6.4, Hanamā'ulu-Po'ipū, promote a community-based approach to protecting Māhā'ulepū resources:

> Involve the community in planning for the future of Māhā'ulepū. Planning should take into consideration various interests and factors, including but not limited to: the long-term need for managing Māhā'ulepū lands to preserve their significant natural and cultural features; the owner's desire to develop revenue-producing uses in a way that is sensitive to the area's unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park.
>
> …This area needs a community-based planning effort that engages the landowner and local community interests, drawing upon the County government, the State DLNR, and various professional experts, as needed. Options for the area include some development in exchange for a park and/or preservation areas; or purchase of the land for a State park.

In 2001 the Kaua'i County Council approved a resolution to work with the state to preserve the entire Māhā'ulepū ahupua'a (Sommer 2001a), and the State Legislature passed a concurrent resolution saying "This body supports a collaborative planning effort to explore options that would make it possible to preserve the irreplaceable natural and cultural resources of Māhā'ulepū, and to sustain the special experience of this place" (HI 2001). Hawai'i's Governor declared his intent to add Māhā'ulepū to an envisioned statewide "string of pearls", made up of wilderness parks with minimal infrastructure and no commercial activity (TenBruggencate 2001). The Governor met with Grove Farm owners, but could not strike a satisfactory deal to acquire the land.

Kaua'i County's Open Space Commission, an advisory group that gathers public input and recommends priorities for allocation of the county's Open Space Fund, names Māhā'ulepū as one of the island's ten "Priority Sites for Acquisition." Since little money is allocated to the fund—coffers amounted to $1.2 million at the beginning of 2007—actual acquisition in the near future via this funding source appears unlikely. (KC 2006)



# 5 CONCLUSIONS OF THE STUDY

## 5.1 Preliminary Evaluations Based on NPS Criteria

Based on the reconnaissance survey site visit, research and consultations in 2007, the NPS Pacific West Region Honolulu Office provides the following preliminary evaluations of the national significance of the study area resources, and the suitability and feasibility of helping to protect them within the framework of the national park system.

### 5.1.1 Significance

> *A natural or cultural resource is considered nationally significant if it is an outstanding example of a particular type of resource; possesses exceptional value or quality illustrating or interpreting the natural or cultural themes of our nation's heritage; offers superlative opportunities public enjoyment or scientific study; and retains a high degree of integrity as a true, accurate, and relatively unspoiled example of the resource.*

Within the Māhā'ulepū reconnaissance survey study area, the resources of the Māhā'ulepū coast, Makauwahi Cave, Kīpū Kai, Hā'upu range, and Hulē'ia Stream are deemed nationally significant. These areas encompass unique geologic landforms and fossils, rare species and habitats, and storied sites important to native Hawaiian and United States history. Together they comprise a relatively unspoiled landscape that affords exceptional opportunities for interpretation, enjoyment and study.

The lithified dune system of the Māhā'ulepū coast is a rare remnant of a landscape type that has almost vanished in Hawai'i due to human settlement and development. Its visible layers reveal the story of global sea level changes—and accompanying changes in landscape—over the last 300,000 years. The dunes and Makauwahi cave harbor an abundance of rare and extinct plant and animal fossils including 45 species of extinct birds. Sediment layers sealed within Makauwahi sinkhole afford a unique sequential look at Hawai'i biota over a span of 10,000 years. Māhā'ulepū dunes and underlying caves, especially Makauwahi, have been the site of significant natural resource discoveries over the last two decades, and are the ongoing focus of international scientific interest.

The volcanic vents of the Kōloa plain, ancient layered basalts of Hā'upu Ridge, and dunes of Māhā'ulepū are manifestations of geologic processes dating from the birth of the high Hawaiian islands to the present—an observable age range available only on Kaua'i, the state's geologically oldest high island.

Habitats of the study area provide critical refuge for endemic Hawaiian plant and animal species whose survival is in jeopardy.

- The only known living examples of two endangered arthropods—the Kaua'i cave wolf spider and the Kaua'i cave amphipod —cling to life in the confines of caves on the Māhā'ulepū coast.

- Mt. Hāʻupu's summit hosts nearly ninety plant species endemic to Hawaiʻi, including more than two dozen endemic to Kauaʻi only, and some restricted to just Mt. Hāʻupu. USFWS has designated six species as endangered, one as threatened and six as Species of Concern. Parts of Hāʻupu ridge are designated Critical Habitat for eleven endemic plant species.
- The endangered and nearly extinct Hawaiian monk seal rests and nurses its pups on study area beaches.
- Hawaiʻi's four endemic endangered waterfowl—the Hawaiian duck, stilt, coot and moorhen—breed at Hulēʻia and other protected sites, and feed at remnant wetlands and manmade water features throughout the study area.
- The endemic endangered nēnē, or Hawaiian goose, is making a comeback on Kauaʻi thanks in part to breeding habitat at Kīpū Kai and foraging opportunities at study area sites.
- Newell's shearwater, a Threatened endemic species, nests on Hāʻupu ridge.
- Native coastal strand vegetation includes thirteen endemic plant species at increasing risk of disappearance due to continuing shoreline development throughout Hawaiʻi. The Māhāʻulepū coastal corridor is designated Critical Habitat for the endangered ʻohai (*Sesbania tomentosa)*.

By definition, these endemic species—found in Hawaiʻi and nowhere else—have always been uncommon. Today, they depend on habitats in the study area for their continued survival on earth.

Relatively intact native plant communities, made up mostly of endemic and indigenous species, persist in the coastal strand vegetation and on the upper reaches of Hāʻupu ridge. Indigenous and migrant birds roost and nest at Hulēʻia, Niumalu, Kīpū Kai, and undisturbed sites along the Māhāʻulepū coast.

Dramatic topography and unusual contrasts in form create a study area landscape with outstanding scenic qualities. Mt. Hāʻupu and its arms rise majestically out of the Kōloa plain, a green beacon visible from all directions. Along the Māhāʻulepū shoreline, the weathered seacliffs, dunes and limestone crannies offer an intriguing window into the past, and the lateral coastal vista remains entirely undeveloped. Untrammeled beaches and a backdrop of green help establish the feeling of a remote wilderness, despite the study area's accessible location between two population centers

Nationally significant cultural resources within the study area are Mt. Hāʻupu, Makauwahi Cave, and Alekoko Fishpond; other sites may prove significant upon further investigation. Mt. Hāʻupu is a revered *wahi kapu*, or sacred place, within native Hawaiian culture. Ku and Hina—the earliest Hawaiian god and goddess, the patron gods of fishermen, and the embodiments of procreative power—reside on Hāʻupu Ridge. A notable landmark and navigation aid for seafarers, Hāʻupu features in the first documented sighting of Hawaiʻi by a westerner, Captain James Cook. The first European drawing of Hawaiʻi is of the Māhāʻulepū Coast, with Mt. Hāʻupu as its focal point.

Makauwahi cave's uniquely well-preserved fossils and artifacts tell a nearly continuous tale of Hawaiʻi people on the land over the last millennium. Remnants of tools, ornaments,



food, craft supplies and fishing gear provide a record of human activity; fossilized seeds, shells, bones and organic debris reveal a changing mix of native and nonnative plants and animals; and sediment strata speak of environmental events that shaped both land and people. In combination with oral and archival sources, the finds at Makauwahi Cave shed new light on Hawaiʻi's human story, and chronicle the transformation of Hawaiʻi's landscape and biota through a thousand years of dynamic cultural change.

Alekoko Fishpond, an aquaculture site built by early Hawaiians around 1200 A.D., was recognized by NPS over thirty years ago as "worthy of preservation as part of the cultural heritage of the State of Hawaiʻi and the United States of America." Hawaiʻi's prehistoric manmade ponds were the most extensive and innovative in the Pacific; the best ones were held by royalty as both a symbol of status and a source of food. Among the examples that survive today, Alekoko is a rare example of a royal pond located on a stream, rather than at the ocean, and it is the largest inland manmade historic fishpond in Hawaiʻi. Alekoko remains worthy of preservation as part of the state and national heritage, provided that overgrown mangrove can be removed from its rock walls without undue damage.

Bracketed between two population centers, the study area nevertheless still embraces significant places with relative resource integrity, against a backdrop of current and historic agricultural lands. Poised at the brink of the 21st century but not yet urbanized, this span of undeveloped coast offers unique opportunities for understanding the dynamic forces that shaped Hawaiʻi—volcanic birth, sea level changes, human settlement and expansion, and native ecosystems struggling to survive the impacts of people and natural events. The Māhāʻulepū coast in particular affords excellent venues not only for interpretation and education, but also for outdoor recreation. Other significant sites such as Alekoko Fishpond, Kīpū Kai, Hāʻupu ridge, and Makauwahi cave merit extensive further scientific study, and careful management to assure appropriate use.

### 5.1.2 Suitability

> *To be considered suitable, an area must represent a natural or cultural theme or type of recreational resource that is not already adequately represented in the National Park System or is not comparably represented and protected for public enjoyment by another land-managing entity. Adequacy of representation is determined on a case-by-case basis by comparing the proposed area to other units in the National Park System for differences or similarities in the character, quality, quantity, or combination of resources, and opportunities for public enjoyment.*

Significant resources in the study area represent themes and types that are suitable for protection within the framework of the national park system, and are not otherwise adequately protected in the state or nation. Volcanic features of the study area represent a stage and range of geologic development of the Hawaiian high islands not available at other Hawaiʻi parks. Landforms and fossils of the Māhāʻulepū coast illustrate the reality of global climate and sea level change, as well as the impacts of human settlement on native ecosystems. An extensive and undeveloped Hawaiʻi shoreline within easy reach of population centers, such as that found in the study area, is a rare and rapidly vanishing type

of recreational resource prized by U.S. citizens and international visitors as well as Hawai‘i residents. Protection and management of this resource type is currently inadequate at federal, state and local levels.

### 5.1.3 Feasibility

> *To be considered feasible, an area's natural systems and/or historic settings must be of sufficient size and appropriate configuration to ensure long-term protection of the resources and to accommodate public use. The area must have potential for efficient administration at a reasonable cost. Other important feasibility factors include landownership, acquisition costs, access, threats to the resource, and staff or development requirements.*

The study area’s significant resources are of a collective size and configuration that would be feasible to manage for protection and public enjoyment, provided that NPS, affected landowners, and local and state stakeholders collaborate to identify and reduce threats, manage access, and ensure long-term protection of the area’s overall scenic quality. To manage costs, NPS would need to emphasize partnerships and minimize outright land acquisition.

Because sensitive conservation areas are mingled with active agricultural land throughout the study area, future activities on agricultural land could cause major impacts on significant resources. In addition, vehicular public access to the Māhā‘ulepū coast—the portion of the study area best suited for public recreation—depends on roadways through private land. Successful resource protection and management will depend on willing cooperation by all parties.

The National Park Service manages a variety of designated units including parks, recreation areas, seashores, national historic sites, monuments, reserves and preserves. In some cases, enabling legislation for a designated NPS unit provides for continued private land ownership, ongoing community uses, and sharing of management costs and responsibilities via agency or community partnerships.

For example, Ebey’s Landing National Historic Reserve includes extensive private land, with NPS holding some 3500 acres in easement to retain historic agricultural lands and exclude rural subdivisions. Craters of the Moon National Monument and Preserve allows for hunting and grazing on Preserve acreage. City of Rocks National Reserve encompasses private land within its boundary, where NPS holds conservation easements and grazing is permitted. In potential units where nonprofit land trusts can secure conservation easements on agricultural lands and/or certain significant natural and cultural resources, NPS can focus on the remaining significant resources that would benefit most from NPS management.

Scrutiny of such options and how they might apply to the current study area is beyond the scope of this reconnaissance survey. If a Special Resource Study is conducted, it would identify, examine and compare alternatives that appear to hold promise.



## 5.2 Other Findings

Notable partners have been involved in research, management, or resource protection within the study area, or have expressed interest in involvement. Besides the landowners, they include local land trusts, Trust for Public Land, The Nature Conservancy, National Tropical Botanical Garden, Mālama Māhā‘ulepū, Sierra Club, Smithsonian Institution, National Geographic Society, Bishop Museum, County of Kaua‘i, Kaua‘i Community College, and State of Hawai‘i Department of Land and Natural Resources.

Since the development of the Hyatt Resort by the south end of the study area in the 1980s, residents and government officials have expressed ongoing concern about the potential for further development that would impact resources and affect public use of the Māhā‘ulepū coast. To some extent discussion has become polarized, with preservation advocates and landowners viewing each other through a cloud of mutual suspicion and wariness, and shaping their communications with each other based on that view. Great potential exists for creative management of resources within the study area, but a constructive framework for stakeholder discussion is needed.

It is also worth noting that since 2002, Hawai‘i Congressional officials on behalf of Hawai‘i residents asked the National Park Service to conduct reconnaissance surveys on three southeast shores of Hawaiian islands: at Keone‘ō‘io on Maui, Ka‘ū on Hawai‘i, and Māhā‘ulepū on Kaua‘i. In general, these coasts are relatively dry, traditionally rural and lacking in infrastructure; they are the last major bastions of undeveloped, unmanaged accessible shoreline in Hawai‘i.

In all three instances, residents unsuccessfully sought state and local protections, and then expressed interest in the concept of a National Seashore, in the hope that such a designation would protect the resources in perpetuity and allow for continued community uses. The request for federal protection is an index of fear that Hawai‘i residents express about growing tourism, population and development, and a concomitant loss of access to coastal wilderness.

Hawai‘i serves as a multi-island playground for the nation and the world, hosting nearly 7.6 million visitors per year, but its tax base depends on a statewide resident population of only 1.3 million people (USC 2007). Local and state financial resources may be insufficient to protect sensitive Hawaii seashores from development.

## 5.3 Recommendation

The National Park Service Pacific West Region recommends that a Special Resource Study be authorized under the stipulations of Public Law 105-391, so long as it focuses on non-traditional management alternatives that a) involve local partners and b) include options for continued farm and ranch operations on private agricultural lands.

# 6 APPENDICES

## 6.1 How NPS Evaluates Significance of Resources

Natural resource significance may be associated with the following types of sites:

- an outstanding site that illustrates the characteristics of a landform or biotic area that is still widespread;
- a rare remnant natural landscape or biotic area of a type that was once widespread but is now vanishing due to human settlement and development;
- a landform or biotic area that has always been extremely uncommon in the region or nation;
- a site that possesses exceptional diversity of ecological components (species, communities, or habitats) or geological features (landforms, observable manifestations of geologic processes);
- a site that contains biotic species or communities whose natural distribution at that location makes them unusual (for example, a relatively large population at the limit of its range or an isolated population);
- a site that harbors a concentrated population of a rare plant or animal species, particularly one officially recognized as threatened or endangered;
- a critical refuge that is necessary for the continued survival of a species;
- a site that contains rare or unusually abundant fossil deposits;
- an area that has outstanding scenic qualities such as dramatic topographic features, unusual contrasts in landforms or vegetation, spectacular vistas, or other special landscape features;
- a site that is an invaluable ecological or geological benchmark due to an extensive and long-term record of research and scientific discovery.

Cultural resource significance may be attributed to districts, sites, structures, or objects that possess exceptional value or quality in illustrating or interpreting our heritage and that possess a high degree of integrity of location, design, setting, materials, workmanship, feeling, and association. Specific examples include:

- a resource that is associated with events that have made a significant contribution to and are identified with, or that outstandingly represent the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained;
- a resource that is importantly associated with the lives of persons nationally significant in the history of the United States;
- a resource that embodies distinguishing characteristics of an architectural type specimen, exceptionally valuable for study of a period, style, or method of construction, or represents a significant, distinctive and exceptional entity whose components may lack individual distinction;
- a resource that is composed of integral parts of the environment not sufficiently significant by reason of historical association or artistic merit to warrant individual recognition but collectively composes an entity of exceptional historical or artistic significance, or outstandingly commemorates or illustrates a way of life or culture;
- a resource that has yielded or may be likely to yield information of major scientific importance by revealing new cultures, or by shedding light upon periods of occupation over large areas of the United States.

Many units of the national park system have been established to recognize their important role in providing recreational opportunities. The potential for public use and enjoyment is an important consideration in evaluating potential new additions to the National Park System. However, recreational values are not evaluated independently from the natural and cultural resources that provide the settings for recreational activities.

## 6.2 Study Area Species Lists

The species lists shown below are based on NPS observations, limited research, and reliable reports from local researchers, government officials, and residents. Locations of specific sightings are intentionally omitted.

### 6.2.1 Coastal Vegetation

Since staff had limited time to explore or botanize, this list should not be considered to cover all species present or their full range of distribution.

E=Endemic (found in Hawaii and nowhere else); I=Indigenous (native to Hawai‘i but not endemic); A=Alien; SOC= federal Species of Concern (USFWS); END=federally listed Endangered Species; GCN=State of Hawai‘i Species of Greatest Conservation Need.

| Scientific Name | Common / Hawaiian Name | Family | Status |
|---|---|---|---|
| *Boerhavia repens?* | Alena, anena, nena | Nyctaginaceae | I |
| *Capparis sandwichiana* | Hawaiian caper, maiapilo | Capparaceae | E, SOC, GCN |
| *Chamaesyce degeneri* | beach spurge, koko, 'akoko | Euphorbiaceae | E |
| *Cocos nucifera* | coconut palm, niu | Arecaceae | A |
| *Cordia subcordata* | kou | Boraginaceae | I |
| *Dodonaea viscosa* | 'a'ali'i | Sapindaceae | I, GCN |
| *Erythrina sandwicensis* | Wiliwili | Fabaceae | E, GCN |
| *Gossypium tomentosum* | Hawaiian cotton, ma'o, uluhulu | Malvaceae | E, GCN |
| *Heliotropium anomalum* var. *argenteum* | Beach heliotrope, hinahina, hinahina ku kahakai | Boraginaceae | I , GCN |
| *Ipomea indica* | Morning glory koali 'awa | Convolvulaceae | I |
| *Ipomea pes-caprae* | Beach morning glory, pohuehue | Convolvulaceae | I, GCN |
| *Jacquemontia ovalifolia* subsp. *Sandwicensis* | Pa'u o Hi'iaka | Convolvulaceae | E |
| *Kokia Kaua'iensis* | koki'o | Malvaceae | E, GCN |
| ?*Lipochaeta integrifolia* | nehe, ko'oko'olau | Asteraceae | E, GCN |
| *Morinda citrifolia* | noni tree, noni kuahiwi | Rubiaceae | E |
| *Munroidendron racemosum* | tree | Araliaceae | E, GCN |
| *Myoporum sandwicense* | false sandalwood, naio | Myoporaceae | I, GCN |
| *Osteomeles anthyllidifolia* | u'ulei | Rosaceae | I, GCN |

| | | | |
|---|---|---|---|
| *Pandanus tectorius* | screwpine, hala | Pandanaceae | I, GCN |
| *Pritchardia* cf *minor* | loulu | Arecaceae | E |
| *Pritchardia elmerrobinsoni* | Ni'ihau lolou palm, loulu | Arecaceae | E |
| *Ruppia martima* | ditchgrass, widgeon grass | Potamogetonaceae | I |
| *Scaevola taccada* | Beach naupaka, naupaka kahakai | Goodeniacea | I |
| *Schiedea* sp. | ma'oli'oli | Caryophyllaceae | E |
| **Sesbania tomentosa* | 'ohai | Fabaceae | E , END, GCN |
| *Sesuvium portulacastrum* | Sea purslane, 'akulikuli | Aizoaceae | I, GCN |
| *Sida fallax* | 'Ilima, 'ilima ku kahakai, 'ilima papa | Malvaceae | I, GCN |
| *Thespesia populnea* | portia tree, milo | Malvaceae | I |
| *Tournefortia argentea* | tree heliotrope | Boraginaceae | A |
| *Waltheria indica* | 'uhaloa | Sterculiaceae | I |

* Federally designated Critical Habitat along Māhā'ulepū coastal corridor. Not seen during survey.

### 6.2.2 Notable Rare Plants of Hā'upu

Of 112 native plant species identified on the summit of Mt. Hā'upu during research in 2005, botanist Ken Wood identified a subset of endemic vascular plants which urgently need action to carry out conservation collections, due to their rarity. Shown below, they are taken from Wood's *Summary Report of Botanical Research, Hā'upu Summit, Kaua`i, Hawai'i (550—700 m [1800—2297 ft] elevation), August 2005.*

E=Endemic (found in Hawaii and nowhere else); I=Indigenous (native to Hawai'i but not endemic); A=Alien; SOC= federal Species of Concern (USFWS); END=federally listed Endangered Species; GCN=State of Hawai'i Species of Greatest Conservation Need; GSN=State of Hawai'i Genetic Safety Net species.

| Species | Common / Hawaiian Name | Family | Status |
|---|---|---|---|
| *Bonamia menziesii* | | Convolvulaceae | E, END, GCN |
| *Delissea rhytidosperma* | | Campanulaceae | E, SIE, END, GCN, GSN |
| *Dubautia laxa* subsp *pseudoplantaginea* [ New sp.?] | na'ena'e, pua melemele | Asteraceae | E [ New sp.?] |
| *Hedyotis fluviatilis* | kamapua'a, pilo | Rubiaceae | E, SOC |
| *Hedyotis* sp. nov. [unnamed] | | Rubiaceae | ? |
| *Hibiscus kokio* | koki'o 'ula, mākū | Malvaceae | E, SOC |
| *Isodendrion longifolium* | aupaka | Violaceae | E,T, GCN |
| *Lepidium orbiculare* | 'ānaunau | Brassicaceae | E,SIE |
| *Lipochaeta micrantha* var. *exigua* | nehe | Asteraceae | E,SIE,END |
| *Lobelia Ni'ihauensis* | | Campanulaceae | E,END |
| *Lobelia* sp. [new sp.?] | | Campanulaceae | E [new sp.?] |
| *Munroidendron racemosum* | | Araliaceae | SIE, GCN |
| *Myrsine linearifolia* | kōlea | Myrsinaceae | E,V,SIE, GCN |
| *Peucedanum sandwicense* | makou. | Apiaceae | E,T, GCN |
| *Pittosporum gayanum* | hō'awa | Pittosporaceae | E, SIE |
| *Schiedea perlmanii* | | Caryophyllaceae | E,SIE, END, GCN |
| *Tetraplasandra bisattenuata* | 'ohe mauka | Araliaceae | E, SIE,SOC, GCN, GSN |



### 6.2.3 Native Birds

This list includes nine native bird species noted on the March 2007 NPS site visit, plus seven others documented during interviews or from research. It should not be considered a definitive list of all native bird species in the study area.

E = endemic at the species or subspecific level; I = indigenous; M = migrant; T = federally listed Threatened Species; END = federally listed Endangered Species.

| Species | Common / Hawaiian Name | Family | Status |
|---|---|---|---|
| *Anas wyvilliana* | Hawaiian Duck, Hanamā'ulu | Anatidae | E, END |
| *Arenaria interpres* | Ruddy Turnstone, 'Akekeke | Scolopacidae | M |
| *Asio flammeus sandwichensis* | Short-eared or Hawaiian Owl | Strigidae | E |
| *Branta sandvicensis* | Hawaiian Goose, Nēnē | Anatidae | E, END |
| *Calidris alba* | Sanderling, Hunakai | Scolopacidae | M |
| *Fregeta minor palmerstoni* | Great Frigatebird, 'Iwa | Fregatidae | I |
| *Fulica alai* | Hawaiian Coot, 'Alae keo'keo | Rallidae | E, END |
| *Gallinula chloropus sandvicensis* | Common Moorhen, 'Alae 'ula | | E, END |
| *Heteroscelus incanus* | Wandering Tattler, 'Ulili | Scolopacidae | M |
| *Himantopus mexicanus knudseni* | Hawaiian Stilt, Ae'o | Recurvirostridae | E, END |
| *Nycticorax nycticorax hoactli* | Black-crowned Night-heron, 'Auku'u | Ardeiidae | I |
| *Phaethon lepturus dorotheae* | White-tailed Tropicbird, Koa'e kea | Phaethontidae | I |
| *Phaethon rubricauda melanorhynchos* | Red-tailed Tropicbird, Koa'e 'ula | Phaethontidae | I |
| *Pluvialis fulva* | Pacific Golden Plover, Kolea | Charadridae | M |
| *Puffinus auricularis newelli* | Newell's Shearwater, 'A'o | Procellidae | E, T |
| *Puffinus pacificus* | Wedge-tailed Shearwater, 'Ua'u kani | Procellidae | I |

### 6.2.4 Marine Fishes

Fishes shown here are taken from three sources: NPS observations during the site visit; recorded observations at Kipu Kai and Māhā'ulepū by trained volunteers for Reef Environmental Education Foundation (REEF); and information from David Waterhouse of Kipu Kai, based on fish catches noted in Kipu Kai guestbooks.

| Species | Common / Hawaiian Name | Family |
|---|---|---|
| *Abudefduf abdominalis* | Hawaiian Sergeant, mamo | Pomacentridae |
| *Abudefduf sordidus* | Blackspot Sergeant, kupipi | Pomacentridae |
| *Acanthurus achilles* | Achilles Tang, paku'iku'i | Acanthuridae |
| *Acanthurus nigrofuscus* | brown surgeonfish, ma'i'i'i | Acanthuridae |
| *Acanthurus nigroris* | Bluelined Surgeonfish, maiko | Acanthuridae |
| *Acanthurus olivaceus* | Orangeband Surgeonfish, na'ena'e | Acanthuridae |
| *Acanthurus triostegus* | convict tang, manini | Acanthuridae |
| *Aetobatus narinari* | Spotted Eagle Ray, hihimanu | Myliobatidae |
| *Arothron meleagris* | Guineafowl Puffer, moa | Tetraodontidae |
| *Aulostomus chinensis* | Trumpetfish, nunu | Aulostomidae |
| *Cantherhines sandwichiensis* | Squaretail Filefish, o'ili lepa | Monacanthidae |
| *Canthigaster jactator* | Hawaiian Whitespotted Toby | Tetraodontidae |
| *Caranx ignobilis* | giant trevally, ulua aukea | Carangidae |

| | | |
|---|---|---|
| *Caranx melampygus* | bluefin trevally, omilu | Carangidae |
| *Caranx ignobilis* | juvenile giant trevally, papio | Carangidae |
| *Chaetodon* sp. | butterfly fish, kikakapu | Chaetodontidae |
| *Chaetodon auriga* | Threadfin Butterflyfish, kikakapu | Chaetodontidae |
| *Chaetodon fremblii* | Bluestripe Butterflyfish kikakapu, | Chaetodontidae |
| *Chaetodon lunula* | Raccoon Butterflyfish, kikakapu | Chaetodontidae |
| *Chaetodon miliaris* | Milletseed Butterflyfish, lau wiliwili | Chaetodontidae |
| *Chaetodon multicinctus* | Multiband Butterflyfish, kikakapu | Chaetodontidae |
| *Chaetodon quadrimaculatus* | Fourspot Butterflyfish, lauhau | Chaetodontidae |
| *Chaetodon unimaculatus* | Teardrop Butterflyfish, kikakapu | Chaetodontidae |
| *Chlorurus sordidus* | Bullethead Parrotfish, uhu | Scaridae |
| *Chromis vanderbilti* | Blackfin Chomis | Pomacetridae |
| *Cirrhitops fasciatus* | Redbarred Hawkfish, pilikoa | Cirrhitidae |
| *Coris gaimardi* | Yellowtail Coris, hinalea 'akilolo | Labridae |
| *Dascyllus albisella* | Hawaiian Dascyllus | Pomacetridae |
| *Echidna nebulosa* (juvenile) | snowflake eel, puhi kappa | Muraenidae |
| *Gambusia affinis* | Western mosquitofish (Introduced) | Poeciliidae |
| *Gomphosus varius* | Bird Wrasse, hinalea i'iwi | Labridae |
| *Gymnothorax undulatus* | undulated moray, puhi | Muraenidae |
| *Holacanthus arcuatus* | Bandit Angelfish | Pomacanthidae |
| *Istiblennius zebra* | zebra rockskipper, pao'o | Blenniidae |
| *Kuhlia sandvicensis* | Hawaiian flagtail, aholehole | Kuhliidae |
| *Kyphosus sp.* | Gray/Highfin/Lowfin Chub, nenue | Kyphosidae |
| *Labroides phthirophagus* | Hawaiian Cleaner Wrasse | Labridae |
| *Lutjanus fulvus* | Blacktail Snapper, to'ao | Lutjanidae |
| *Lutjanus kasmira* | Bluestripe Snapper, ta'ape | Lutjanidae |
| *Melichthys niger* | Black Durgonm humuhumu ele ele | Balistidae |
| *Melichthys vidua* | Pinktail Durgon, humuhumuhi'ukole | Balistidae |
| *Monotaxis grandoculis* | Bigeye Emperor, mu | Lethrinidae |
| *Mugil cephalis* | mullet (juvenile), 'ama'ama | Mugilidae |
| *Mulloidichthys flavolineatus* | Yellowstripe Goatfish, weke'a | Mullidae |
| *Mulloidichthys vanicolensis* | Yellowfin Goatfish, wele 'ula | Mullidae |
| *Myripristis berndti* | Bigscale Soldierfish, 'u'u | Holocentridae |
| *Naso lituratus* | Orangespine Unicornfish, umaumalei | Acanthuridae |
| *Naso unicornis* | bluespine unicornfish, kala | Acanthuridae |
| *Oplegnathus punctatus* | Spotted Knifejaw | Oplegnathidae |
| *Ostracion meleagris* | Spotted Boxfish, moa | Ostraciidae |
| *Paracirrhites arcatus* | Arc-Eye Hawkfish, piliko'a | Cirrhitidae |
| *Paracirrhites forsteri* | Blackside Hawkfish, hilu piliko'a | Cirrhitidae |
| *Parupeneus bifasciatus* | Doublebar Goatfish | Mullidae |
| *Parupeneus multifasciatus* | Manybar Goatfish, moano | Mullidae |
| *Plectroglyphidodon johnstonianus* | Blue-eye Damselfish | Pomacetridae |
| *Polydactylus sexfilis* | 6-fingered threadfin, moi | Polynemidae |
| *Priacanthus meeki* | Hawaiian Bigeye, "Åweoweo | |
| *Pseudocheilinus octotaenia* | Eightstripe Wrasse | Labridae |
| *Rhinecanthus rectangulus* | Reef Triggerfish, humuhumu nukunuku apua'a | Balistidae |
| *Selar crumenopthalmus* | bigeye scad, akule | Carangidae |
| *Seriola dumerili* | greater amberjack, kahala | Carangidae |
| *Stegastes fasciolatus* | South Pacific Gregory | Pomacetridae |
| *Sufflamen bursa* | Lei Triggerfish, humuhumu lei | Balistidae |
| *Thalassoma duperrey* | Saddle Wrasse, hinalea lauwili | Labridae |
| *Thalassoma trilobatum* | Christmas Wrasse, 'awela | Labridae |
| *Zanclus cornutus* | Moorish Idol, kihikihi | Zanclidae |



### 6.2.5 Algae

| Species | Common / Hawaiian Name | Family |
|---|---|---|
| *Asparagopsis taxiformis* | limu kohu, limu lipehe | Bonnemaisoniaceae |
| ?*Centroceras* cf. *clavulatum* | | Ceramiaceae |
| *Cladophora* sp. | green filamentous algae | Cladophoraceae |
| *Codium arabicum* | limu 'a 'ala'ula | Codiaceae |
| *Dasya iridescens* | iridescent red algae | Dasyaceae |
| *Dictyota* sp. | | Dictyotaceae |
| *Dictyota sandvicensis* | | Dictyotaceae |
| *Halimeda discoidea* | green calcareous algae | Halimedaceae |
| *Dictyosphaeria cavernosa* | green bubble algae | Siphonocladaceae |
| *Colpomenia sinuosa* | brown bubble algae | Scytosiphonaceae |
| *Laurencia* cf. *mcdermidiae* | | Rhodomelaceae |
| *Martensia fragilis* | fragile red algae | Delessariaceae |
| *Asteronema breviarticulatum* | intertidal brown filimentous algae | Scytothamnaceae |
| *Padina* sp. | | Dictyotaceae |
| *Peysonnellia* sp. | crustose red algae | Peysonneliaceae |
| *Galaxaura* sp. | | Galaxauraceae |
| *Sargassum echinocarpum* | limu kala | Sargassaceae |
| *Turbinaria ornata* | | Sargassaceae |
| *Ahnfeltiopsis coccinea* | limu 'aki'aki | Phyllophoraceae |
| *Wrangelia elegantissima* | | Ceramiaceae |
| ?*Haliptilon subulatum* | | Corallinaceae |
| ?*Stenopeltis gracilis* | red calcareous algae | Liagoraceae |
| *Lithophyllum* sp. | red coralline algae, crustose coralline algae | Corallinaceae |

### 6.2.6 Marine Invertebrates

| Species | Common / Hawaiian Name | Family |
|---|---|---|
| *Corals (Cnidaria)* | | |
| *Cladactella manni* | Mann's anemone | Actiniidae |
| *Palythoa caesia* | soft coral, limu make o Hana | Zoantharia |
| *Fungia* sp. skeleton juveniless | solitary coral, 'ako'ako'a kohe | Fungiidae |
| *Montipora capitata* | rice coral, 'ako'ako'a, ko'a | Acroporidae |
| *Montipora* cf. *flabellata* | blue rice coral, ako'ako'a, ko'a | Acroporidae |
| *Pocillopora* sp. | 'ako'ako'a, ko'a, puna kea | Pocilloporidae |
| *Pocillopora meandrina* | cauliflower coral, 'ako'ako'a, ko'a | Pocilloporidae |
| *Pocillopora edouxi* | cauliflower coral, ako'ako'a, ko'a | Pocilloporidae |
| *Porites evermanni* | mound coral, pohaku puna | Poritidae |
| *Porites lobata* | mound coral, pohaku puna | Poritidae |
| *Worms (Annelida)* | | |
| *Loimia medusa* | spaghetti worm | |
| *Molluscs ( Mollusca):* | | |
| *Cassis cornutus* | conch snail, pu puhi | Cassididae |
| *Cellana exarata* | black-foot limpet, 'opihi makaiauli | Patellidae |
| *Conus* sp. | cone snail, pupu 'ala | Conidae |
| *Cypraea* spp, | cowry, leho | Cypraeidae |
| *Cypraea granulata* | cowry, leho 'okala, leho opu 'upu'u | Cypraeidae |
| *Dendropoma gregaria* | tube snail, kauna'oa | Vermetidae |

| | | |
|---|---|---|
| *Drupa morum* | snail, makaloa | Thaididae |
| *Drupa ricina* | snail, makaloa | Thaididae |
| *Hipponix foliaceus* | hoof snail | Hipponicidae |
| *Littoraria pintado* | periwinkle snail, pipipi kolea | Littorinidae |
| *Nerita picea* | black nerite snail, pipipi | Neritidae |
| *Nerita polita* | polished nerite, kupe'e | Neritidae |
| *Periglypta reticulata* | reticulated clam | Veneridae |
| *Purpura aperta* | snail | Muricidae |
| *Serpulorbis* sp. | tube snail, kauna'oa | Vermetidae |
| *Serpulorbis variabilis* | tube snail, kauna'oa | Vermetidae |
| *Siphonaria normalis* | false 'opihi, 'opihi-'awa | Siphonariidae |
| *Turbo sandwicensis* | Hawaiian turban, 'alilea, pupu mahina | Turbinidae |
| *Crustaceans (Arthropoda)* | | |
| *Calcinus* sp. | hermit crab, unauna | Diogenidae |
| *Grapsus tenuicrustatus* | rock crab, 'a'ama | Grapsidae |
| *Ocypode pallidula* | pallid ghost crab, 'ohiki | Ocypodidae |
| *Panulirus* sp. (molt) | spiny lobster, ula | Palinuridae |
| *Echinoderms (Echinodermata)* | | |
| *Brissus latecarinatus* | keeled heart urchin, ha'uke'uke kaupali | Brissidae |
| *Colobocentrotus atratus* | shield urchin, | Echinometridae |
| *Echinometra* sp. | boring sea urchin, 'ina kea | Echinometridae |
| *Heterocentrotus mammillatus* | pencil urchin, ha'uke'uke 'ula'ula | Echinometridae |
| *Actinopyga mauritiana* | white-spotted sea cucumber, loli | Holothuriidae |
| *Holothuria atra* | black sea cucumber, loli okuhi kuhi | Holothuriidae |

### 6.2.7 Introduced Plant and Animal Threats

Threats as observed by NPS staff or reported by researchers or state wildlife officials.

| Scientific Name | Common / Hawaiian Name | Family |
|---|---|---|
| ?*Canavaliea sericea* | Beach pea, silky jackbean | Fabaceae |
| ?*Verbesina enceloides* | golden crown-beard | |
| *Albizia sp.* | Albizia | Fabaceae |
| *Caesalpinia decapetala* | Cat's claw, Puakelekino | Fabaceae |
| *Casuarina equisetifolia* | Ironwood, p'āina | Casuarinaceae |
| *Leucaena leucocephala* | Koa haole, ekoa | Fabaceae |
| *Opuntia* sp | prickly pear cactus, panini, papipi | Cactaceae |
| *Paederia foetida* (*P. scandens*) | (coffee family), Maile pilau | Rubiaceae |
| *Panicum maximum* | Guinea grass | Poaceae |
| *Passiflora laurifolia* | Yellow water lemon, passion flower | Passifloraceae |
| *Prosopis sp. Prosopis pallida* | mesquite, Kiawe | Fabaceae |
| *Psidium cattleianu* | Strawberry guava, Waiawi, 'ula'ula | Myrtaceae |
| *Psidium guajava* | Guava, Kuawa | Myrtaceae |
| *Rhizophora mangle* | Red mangrove | Rhizophoraceae |
| *Rhodomyrtus tomentosa* | Downy rose myrtle | Myrtaceae |
| *Rubus rosifolius* | Thimbleberry, Olaa | Rosaceae |
| *Schinus terebinthifolius* | Christmas berry, naniohilo, wilelaiki | Anacardiaceae |
| *Syzygium cumini* | Java plum | Myrtaceae |
| *Terminalia catappa* | false kamani tree, kamani haole | Combretaceae |
| *Capra hircus* | Feral goats | Bovidae |
| *Rattus sp.* | Rats | Muridae |
| *Sus scrofa* | Feral pigs | Suidae |



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| 4.1 | 12 | Lithified dunes (2) | NPS – Larry Basch |
| 4.1 | 13 | Cave opening | NPS – Larry Basch |
| 4.1 | 14 | Sinkhole walls | NPS – Larry Basch |
| 4.1 | 15 | Fossil bird bones | NPS – Larry Basch |
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EXPERIENCE YOUR AMERICA

# Appendix 23

The Honorable Bernard P Carvalho, Jr.
Mayor, Island of Kauai

October 13, 2014

Good Morning Sir,

My name is Carlos White. I am an entomologist living with my wife in Princeville II. I graduated from the University of Illinois where I did my Master's thesis research on the common house fly, *Musca domestica* L.

I have been asked to write a short letter to you giving my opinion of the proposed dairy operation near Po'ipu in relation to my area of expertise. I am pleased to do so.

The house fly developmental cycle is remarkable in both its speed and frequency of generation turn-over. Due to the warmth of the medium (manure) in which fly larvae (maggots) develop, and the fact that insects develop at the rate of the temperature of their environment, one fertile fly can result in billions of descendants within a few months time. Under ideal conditions, which we have in Kauai, each generation of flies can be as short as 12 days. Multiply this by the number of generations, and the 300 eggs laid per fly, the numbers become astronomical. In a climate that is always conducive to their development in both temperature and rainfall, this translates into even greater fly production. Those are the conditions we face in Kauai.

Another factor is the types of flies that develop in manure. Among these are horn flies, stable flies, deer flies, and horse flies (all piercing, sucking flies that exist on blood meals). These are present on Kauai and cause grief not only to the cows but will, given the opportunity, bite people. We can expect the development of all these species of flies in the exceptionally moist, massive amounts of manure defecated by this large number of cows in such a small area. The only realistic control for flies in cow manure is through moisture control. I did not notice any mention of moisture control measures to reduce flies in the HDF protocol. There is only the hope that the concentrated manure in these small paddocks will be dried naturally by the sun and wind. The proposed overhead irrigation to bring the grass back for suitable grazing is definitely a boon to fly production. Added to the wetness from these irrigations are the frequent rains we experience on Kauai. If the manure is sufficiently concentrated and compacted, as in the proposed HDF concentrated dairy farm, the manure remains in a moist condition much longer than would be the case from a more scattered herd of animals. This condition is what we are dealing with here in the dairy model proposed by HDF.

I have worked in the capacity as a fly control entomologist in the San Joaquin Valley of California. The above situations I have outlined are the realities of fly control in farm animals. Any other entomologist engaged in the field will verify and validate these facts.

Since the house fly is capable of at least a 5 mile dispersal from its origin, and probably more with the winds of Kauai, this would include much of the Po'ipu area. This lovely coast line, with some of the loveliest resorts in the world, would be subject to clouds of very high fly populations throughout the year. I can't help but believe there would be litigation over this. These resorts would certainly react to this harm to their business model. Not only would there be a surge in flies but, when the wind is in the right direction, odors could be very intense. This would certainly affect many residents, as well.

I believe these are the facts and I speak from the research I have done in the field. Kauai is lovely and to place its reputation in peril is not only foolish, but certainly doesn't make good business sense, especially when Kauai's business is tourism!

Carlos White, Industrial Entomologist
4080 Aloalii Drive
Princeville, HI 96722

# Appendix 24

U.S. Department of Commerce (//www.commerce.gov/) | Blogs (//www.census.gov/about/contact-us/social_media.html) | Index A-Z (//www.census.gov/about/index.html) | Glossa
(//www.census.gov/glossary/) | FAQs (//ask.census.gov

Search

/www.census.gov/en.html)

U.S. Census Quick Facts

# QuickFacts

## Kauai County, Hawaii

QuickFacts provides statistics for all states and counties, and for cities and towns with a population of 5,000 or more.

| All Topics | KAUAI COUNTY, HAWAII |
|---|---|
| ***People*** | |
| ***Population*** | |
| Population estimates, July 1, 2015, (V2015) | 71,735 |
| Population estimates base, April 1, 2010, (V2015) | 67,090 |
| Population, percent change - April 1, 2010 (estimates base) to July 1, 2015, (V2015) | 6.9% |
| Population, Census, April 1, 2010 | 67,091 |
| ***Age and Sex*** | |
| Persons under 5 years, percent, July 1, 2015, (V2015) | 6.4% |
| Persons under 5 years, percent, April 1, 2010 | 6.4% |
| Persons under 18 years, percent, July 1, 2015, (V2015) | 22.3% |
| Persons under 18 years, percent, April 1, 2010 | 22.7% |
| Persons 65 years and over, percent, July 1, 2015, (V2015) | 18.0% |
| Persons 65 years and over, percent, April 1, 2010 | 14.9% |
| Female persons, percent, July 1, 2015, (V2015) | 49.8% |
| Female persons, percent, April 1, 2010 | 49.8% |
| ***Race and Hispanic Origin*** | |
| White alone, percent, July 1, 2015, (V2015) (a) | 33.8% |
| White alone, percent, April 1, 2010 (a) | 33.0% |
| Black or African American alone, percent, July 1, 2015, (V2015) (a) | 0.7% |
| Black or African American alone, percent, April 1, 2010 (a) | 0.4% |
| American Indian and Alaska Native alone, percent, July 1, 2015, (V2015) (a) | 0.6% |
| American Indian and Alaska Native alone, percent, April 1, 2010 (a) | 0.4% |
| Asian alone, percent, July 1, 2015, (V2015) (a) | 31.3% |
| Asian alone, percent, April 1, 2010 (a) | 31.3% |





| | |
|---|---|
| Native Hawaiian and Other Pacific Islander alone, percent, July 1, 2015, (V2015) (a) | 9.1% |
| Native Hawaiian and Other Pacific Islander alone, percent, April 1, 2010 (a) | 9.0% |
| Two or More Races, percent, July 1, 2015, (V2015) | 24.5% |
| Two or More Races, percent, April 1, 2010 | 24.9% |
| Hispanic or Latino, percent, July 1, 2015, (V2015) (b) | 11.1% |
| Hispanic or Latino, percent, April 1, 2010 (b) | 9.4% |
| White alone, not Hispanic or Latino, percent, July 1, 2015, (V2015) | 30.1% |
| White alone, not Hispanic or Latino, percent, April 1, 2010 | 30.7% |
| ***Population Characteristics*** | |
| Veterans, 2010-2014 | 4,615 |
| Foreign born persons, percent, 2010-2014 | 15.8% |
| ***Housing*** | |
| Housing units, July 1, 2015, (V2015) | 30,503 |
| Housing units, April 1, 2010 | 29,793 |
| Owner-occupied housing unit rate, 2010-2014 | 62.7% |
| Median value of owner-occupied housing units, 2010-2014 | $483,800 |
| Median selected monthly owner costs -with a mortgage, 2010-2014 | $2,232 |
| Median selected monthly owner costs -without a mortgage, 2010-2014 | $473 |
| Median gross rent, 2010-2014 | $1,265 |
| Building permits, 2015 | 205 |
| ***Families and Living Arrangements*** | |
| Households, 2010-2014 | 22,395 |
| Persons per household, 2010-2014 | 3.03 |
| Living in same house 1 year ago, percent of persons age 1 year+, 2010-2014 | 87.4% |
| Language other than English spoken at home, percent of persons age 5 years+, 2010-2014 | 21.5% |
| ***Education*** | |
| High school graduate or higher, percent of persons age 25 years+, 2010-2014 | 91.0% |
| Bachelor's degree or higher, percent of persons age 25 years+, 2010-2014 | 26.9% |
| ***Health*** | |
| With a disability, under age 65 years, percent, 2010-2014 | 6.9% |
| Persons without health insurance, under age 65 years, percent | ⚠ 6.5% |
| ***Economy*** | |
| In civilian labor force, total, percent of population age 16 years+, 2010-2014 | 63.2% |
| In civilian labor force, female, percent of population age 16 years+, 2010-2014 | 60.6% |
| Total accommodation and food services sales, 2012 ($1,000) (c) | 831,487 |
| Total health care and social assistance receipts/revenue, 2012 ($1,000) (c) | 311,622 |
| Total manufacturers shipments, 2012 ($1,000) (c) | D |
| Total merchant wholesaler sales, 2012 ($1,000) (c) | D |
| Total retail sales, 2012 ($1,000) (c) | 1,013,489 |
| Total retail sales per capita, 2012 (c) | $14,810 |
| ***Transportation*** | |
| Mean travel time to work (minutes), workers age 16 years+, 2010-2014 | 22.0 |
| ***Income and Poverty*** | |

| | |
|---|---|
| Median household income (in 2014 dollars), 2010-2014 | $62,946 |
| Per capita income in past 12 months (in 2014 dollars), 2010-2014 | $27,079 |
| Persons in poverty, percent | ⚠ 12.3% |
| ***Businesses*** | |
| Total employer establishments, 2014 | 1,988 |
| Total employment, 2014 | 25,824 |
| Total annual payroll, 2014 | 925,683 |
| Total employment, percent change, 2013-2014 | 2.5% |
| Total nonemployer establishments, 2014 | 6,709 |
| All firms, 2012 | 7,938 |
| Men-owned firms, 2012 | 3,840 |
| Women-owned firms, 2012 | 2,953 |
| Minority-owned firms, 2012 | 3,797 |
| Nonminority-owned firms, 2012 | 3,653 |
| Veteran-owned firms, 2012 | 855 |
| Nonveteran-owned firms, 2012 | 6,507 |
| ***Geography*** | |
| Population per square mile, 2010 | 108.2 |
| Land area in square miles, 2010 | 619.96 |
| FIPS Code | 15007 |

⚠ This geographic level of poverty and health estimates are not comparable to other geographic levels of these estimates

Some estimates presented here come from sample data, and thus have sampling errors that may render some apparent differences between geographies statistically indistinguishable. Click the Quick Info icon to the left of each row in TABLE view to learn about sampling error.

The vintage year (e.g., V2015) refers to the final year of the series (2010 thru 2015).
Different vintage years of estimates are not comparable.

**(a)** Includes persons reporting only one race
**(b)** Hispanics may be of any race, so also are included in applicable race categories
**(c)** Economic Census - Puerto Rico data are not comparable to U.S. Economic Census data

**D** Suppressed to avoid disclosure of confidential information
**F** Fewer than 25 firms
**FN** Footnote on this item in place of data
**NA** Not available
**S** Suppressed; does not meet publication standards
**X** Not applicable
**Z** Value greater than zero but less than half unit of measure shown

QuickFacts data are derived from: Population Estimates, American Community Survey, Census of Population and Housing, Current Population Survey, Small Area Health Insurance Estimates, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits.





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**PEOPLE & HOUSEHOLDS**
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# Appendix 25

# For-Profit Investments

## Hawaii Dairy Farms

Striving to produce fresh, nutritious local milk for Hawaii's families using a pasture-based, rotational grazing dairy that's good for the economy and environment.

### BACKGROUND

In 2013, Ulupono committed $17.5 million to Hawaii Dairy Farms for a proposed pasture-based dairy on Kauai's South Shore in an effort to produce fresh, nutritious local milk for Hawaii's families. It will be the first pasture-based, rotational grazing dairy in the state.

Located at Mahaulepu valley, the 557-acre dairy will utilize a proven, sustainable pasture-based rotational grazing system and state-of-the-art technology to increase the statewide local milk production with roughly 1.2 million gallons per year, create local jobs, and provide partnership opportunities for local ranchers.

### WHY WE INVESTED

Ulupono Initiative recognized the need for a local, sustainable dairy in the islands to produce fresh, nutritious milk at import parity pricing. We believe that forming Hawaii Dairy Farms is an important step toward revitalizing the dairy industry in Hawaii, where local dairies produced all of the state's milk until 1984. This is integral to Ulupono's mission to increase affordable and sustainable local food production, and we believe this dairy's success could lead to additional pasture-based, rotational grazing dairies statewide.

Draft EIS Facts - Our Commitment to Kauai

### IMPACT

Revitalizes Hawaii's dairy industry

Catalyzes a sustainable, profitable dairy industry statewide using a pasture-based model rather than relying on imported feed

Partners with local stakeholders and global experts to identify cattle, grasses and dairy systems that are best for Hawaii

Provides fresh, local milk at import parity pricing

### AT A GLANCE

Hawai'i Dairy Farms
MAHA'ULEPU, KAUA'I
Grass farmers with a passion for dairy.

**Investment Area**
Food, Waste

**Financial Model**
For-Profit

**Partners**

Dairy Solutionz (NZ) Ltd.
Finistere Ventures, LLC
Atlantic Dairy Consulting, LLC

**Website**

HawaiiDairyFarms.com

# Appendix 26

May 2014

# Ocean Acidification in the PACIFIC NORTHWEST

The evidence for ocean acidification in the Pacific Northwest is compelling. It consists of published scientific literature representing a large number of laboratory and field observations. The scientific evidence comes from investigations of the natural and anthropogenic (human-generated) changes to the biogeochemistry of Pacific Northwest waters, responses of organisms to present-day and future conditions, and observations made in aquaculture settings. This fact sheet summarizes our growing understanding of the causes and consequences of ocean acidification in Pacific Northwest marine waters.

**1 Ocean acidification (OA) is a progressive increase in the acidity of the ocean over an extended period**, typically decades or longer, caused primarily by uptake of carbon dioxide ($CO_2$) from the atmosphere. OA can also be caused or enhanced by other chemical additions or subtractions from the ocean. Acidification can be more severe in areas where human activities further increase acidity, such as through nutrient inputs that fuel biological production and respiration processes.

**2 Ocean acidification has been well documented** through global observations conducted over several decades by hundreds of researchers. It has been definitively attributed to anthropogenic (human-generated) $CO_2$ in the atmosphere that has been released primarily by fossil fuel combustion and deforestation.

**3 Acidity can be thought of as simply the hydrogen ion concentration ($H^+$) in a liquid**, and pH is the logarithmic scale on which this concentration is measured. It is important to note that acidity increases as the pH *decreases*.

**4 Average global surface ocean pH has already fallen** from a pre-industrial value of 8.2 to 8.1, corresponding to an increase in acidity of about 30%. Values of pH 7.8–7.9 are expected by 2100, representing a doubling of acidity.

**5 The pH of the open-ocean surface layer is unlikely to ever become *acidic***, because seawater is buffered by dissolved salts. The term "acidification" refers to a pH shift towards the acidic end of the pH scale, similar to the way we describe an increase in temperature from well below freezing to just above freezing: it's still cold outside, but we say it's "warming."

**6 Ocean acidification causes changes in seawater carbonate chemistry.** As seawater acidifies, concentrations of dissolved $CO_2$, hydrogen ions, and bicarbonate ions *increase*, and the concentration of carbonate ions *decreases*. As a result, the stability of calcium carbonate ($CaCO_3$) biominerals like aragonite and calcite also decline. The stability of these $CaCO_3$ biominerals in seawater is defined in terms of their saturation state ($\Omega$), which is largely determined by the concentration of carbonate ions. When carbonate ion concentration is high, $\Omega$ is correspondingly high and biomineral formation is favored; when carbonate ion concentration is low enough that $\Omega$ drops below the threshold level of 1, the biominerals begin to dissolve. In the context of OA, seawater with $\Omega_{aragonite} < 1$ is termed "corrosive" because it is capable of dissolving the aragonite shells of marine organisms.

**7 Areas that could be particularly vulnerable to ocean acidification** include 1) coastal regions that receive large volumes of freshwater, especially when the freshwater contains high levels of dissolved nutrients or organic material; and 2) regions where upwelling brings colder $CO_2$-rich deep water onto the continental shelves, such as along the west coast of North America. Upwelled water is naturally $CO_2$-rich due to biological respiration in the subsurface waters, which depletes dissolved oxygen and generates $CO_2$. During the summer upwelling season in the Pacific Northwest, this deeper $CO_2$-rich low pH seawater mixes with the surface layer, which carries its own burden of anthropogenic atmospheric $CO_2$. The combined effect is an approximate reduction in the $\Omega_{aragonite}$ of ~0.25-0.5 units along the outer coast.

**8 Changes in pH and carbonate chemistry force marine organisms to spend more energy** regulating internal chemistry. For some organisms, this may leave less energy for other biological processes like growth, reproduction, or coping with other environmental stresses.

**9 The biological impacts of ocean acidification will vary**, because marine organisms exhibit a wide range of sensitivities to changing seawater chemistry. In particular, many shell-forming marine organisms are sensitive to changes in pH and carbonate chemistry, including corals, bivalves, pteropods (sea butterflies), and phyto- and zooplankton species that build their hard parts out of $CaCO_3$ biominerals. The juvenile stages of many Pacific Northwest shellfish species (e.g. oysters, clams, and mussels) are particularly vulnerable to acidification because the biomineral they use to build their shells—aragonite—has the greatest tendency to dissolve at $CO_2$ levels currently being observed in Pacific Northwest marine waters.

**10 Impacts from ocean acidification at any life stage can reduce the ability of a population to grow or to recover** from disturbance or stress. Research clearly indicates that many larval forms are vulnerable to acidification. Juvenile and adult forms also have been demonstrated to be sensitive to OA. Exposure to OA among early life stages can cause detectable effects later in life.

**11 Natural and anthropogenic factors combine to intensify ocean acidification in Pacific Northwest waters.** Natural and anthropogenic factors that contribute to OA in Pacific Northwest waters include $CO_2$ emissions, upwelling of $CO_2$-rich waters, freshwater inputs, and non-$CO_2$ acidifying gases. Nutrient inputs that fuel biological production add $CO_2$ through respiration and microbial breakdown of organic matter. The effects of these multiple factors are additive, and explain why acidification in our coastal region is more severe than model predictions based on $CO_2$ alone. Addressing local factors such as nutrient pollution could offset some of the local acidification impacts, but this needs further study.

**12 The human contribution to acidification in the Pacific Northwest is quantifiable and has increased the frequency, intensity, and duration of harmful conditions.** In Hood Canal, 24-49% of the total increase in $CO_2$ in subsurface waters since the industrial revolution is linked to human activity. Off the Oregon coast, undersaturated conditions ($\Omega_{aragonite}$ <1), once rare, now occur 30% of the time during the summer upwelling season. Anthropogenic $CO_2$ is the largest human-derived source of acidifying pollution in Pacific Northwest waters, adding an amount of $CO_2$ that can significantly worsen naturally-low $\Omega_{aragonite}$ conditions for shelled organisms. The human contribution essentially 'makes a bad day worse' for shellfish and other organisms, and it causes those bad days to become more frequent.

**13 Pacific Northwest shellfish are sensitive to reduced $\Omega_{aragonite}$ within the current range of conditions.** Even prior to the industrial revolution, the aragonite saturation state of Pacific Northwest waters was lower than the global ocean average (~2.5 versus ~3.0) because our marine waters are colder, fresher, and contain more $CO_2$ from respiration processes at depth compared with waters further offshore. Over the last ~150 years, anthropogenic $CO_2$ emissions have reduced the global ocean average surface $\Omega_{aragonite}$ by 0.5 units, or 17%. For Pacific Northwest shellfish living close to the saturation state threshold of 1.0, this further reduction can—and sometimes does—cause problems now. Significant losses in Pacific oyster production have been observed in shellfish hatcheries in Washington and Oregon under slightly saturated conditions ($\Omega_{aragonite}$ ~1.0 - 1.7), because shell formation in developing larvae requires supersaturated conditions ($\Omega_{aragonite}$ >1.7).

**14 Native species are affected.** Studies of the native Olympia oyster showed that survival and growth of larvae and juveniles decreased with exposure to low pH and $\Omega_{aragonite}$ in the laboratory and in field settings. The same appears to be true for other native species like pteropods, red sea urchins, northern abalone, and turban snails. Although these calcifying invertebrates seem to be most sensitive during their larval phase, negative effects have been observed in multiple developmental stages, from fertilization through adulthood.

**15 Small changes in the environment can cause large responses among living organisms.** While most marine organisms can tolerate a range of environmental conditions, at some point their tolerance fails; even small changes in the environment can cause an abrupt biological response when the limits of tolerance are passed. This holds true for exposure to low pH and $\Omega_{aragonite}$. Significant effects of rising anthropogenic atmospheric $CO_2$ are being observed in Pacific Northwest waters now, and these effects will worsen as $CO_2$ levels increase. Vulnerable organisms such as pteropods and oyster larvae can suffer mortality or abnormal development following even brief exposures to harmful conditions, with effects persisting even after environmental conditions improve.

**16 Long-term decline in pH could exceed the tolerance limits of some marine species that live in coastal waters.** Even species that can cope with fluctuating pH on short timescales typical of coastal environments (where the daily and seasonal changes in seawater pH are much greater than in the open ocean) may be unable to tolerate consistently low pH conditions. Although scope for evolutionary adaptation to OA is known to exist, species differ in their adaptive capacity. Marine organisms could be further challenged by multiple stressors that act simultaneously (for example, OA with warmer seawater temperatures).

**17 The current rate of acidification may be unprecedented in Earth's history.** The rate of acidification is estimated to be 10 to 100 times faster than any time in the past 50 million years. An acidification event that occurred 55 million years ago (at the Paleocene-Eocene Thermal Maximum) was associated with a mass extinction of some marine species, especially deep-sea shelled invertebrates.

**18 Contemporary ocean acidification could threaten the flow of goods and services to marine-dependent communities.** A new study has shown that the fishing industry in Southeast and Southwest Alaska will be vulnerable to declines in both commercial and subsistence harvests due to ocean acidification in coming decades. Disruptions in Alaska fisheries could have significant economic impacts throughout the Pacific Northwest due to the economic linkages between the two regions.

NANOOS
nanoos.org

NOAA, Ocean Acidification Program
oceanacidification.noaa.gov

Ocean Carbon and Biogeochemistry Project–Ocean Acidification
whoi.edu/OCB-OA

University of Washington
Washington Ocean Acidification Center
coenv.washington.edu/research/major-initiatives/ocean-acidification/

Washington Sea Grant
wsg.washington.edu

The West Coast Ocean Acidification and Hypoxia Science Panel
westcoastoah.org

WSG AS-14-04
5/14

*Photo opposite page: Pacific Oysters, credit Pacific Coast Shellfish Growers Association*

# Appendix 27

# Hawai'i Dairy Farms' Draft Environmental Impact Statement

Comments by Deirdre Encarnación, M.A.

July 25, 2016

The following serves as documentation of my response to and commentary on Hawai'i Dairy Farms Volume 1: Draft Environmental Impact Statement (EIS) regarding Sections 4.7 (Archaeological and Historic Resources) and 4.8 (Cultural Practices and Resources), submitted during the Public Comment Period to end on July 25, 2016. I have been employed in the disciplines of archaeology and anthropology continuously since 2001, earning my M.A. in Anthropology with an emphasis in archaeology in 2003, and a B.A. in Anthropology with a minor in Biology in 2000.

Beginning in 2004 through the present, I began authoring and co-authoring historical/ archaeological impact assessments according to federal, state, and local statutes, contributing to hundreds of Environmental Impact Statements. In 2016, I began editing impact assessments written by other archaeologists as well. In the summer of 2015, I volunteered in the office of the Kaua'i Lead Archaeologist for the State Historic Preservation Division (SHPD). From September 2001 through May 2003, I was a lecturer at San Diego State University, teaching cultural anthropology.

In order to complete this document, many hours were spent at information repositories including the Kaua'i Historical Society, the collections at the Kōloa, Lihu'e, and Kapa'a branch libraries, and the library at the Kaua'i office of the State Historic Preservation Division. Historic-era maps consulted for this document include Emerson's 1833 map of Kaua'i (Palapala'āina v. 1: The Early Mapping of Hawai'i), an 1840 map of the south side of Kaua'i (*ibid.*), a map of Kōloa showing titles and government leases from 1835-1848 (Kōloa Plantation 1835-1935), and a government survey of Kaua'i from 1878 (The Kaua'i Album).

The purpose of this document is to discuss elements of archaeological and cultural importance that are at potential risk to damage by the proposed project. The project area is located within the Māhā'ulepū *ahupua'a*, more specifically within an area of the Māhā'ulepū Valley designated as important agricultural land. The area and its watershed are "among the most interesting areas in the State both geologically and biologically" (NPS 1981). The archaeology of the area represents the changing sequential landscape from early Hawaiian settlement and development to Western contact to sugar cane plantations (NPS 2008).

The project area has been used extensively for sugar cane cultivation, however these prior disturbances do not preclude the presence of significant subsurface archaeological deposits. Trench excavations performed as part of the AIS study routinely reached the water table at relatively shallow depths (Putzi et al. 2016). Of 17 stratigraphic trenches, all but four bottomed out at exposed ground water between 0.9 and 1.9 meters deep, revealing shallow soils and a high water table (*ibid.*). These shallow soils have been impacting agriculture for generations, and are credited in part for the development of the "sophisticated irrigation systems" of the greater Kōloa area during pre-Contact times (Donohugh 2001).

According to the AIS, "sugar cane cultivation required plowing operations that could reach depths of up to one meter below ground surface" (Putzi et al. 2016). Stratigraphic trench excavations within the project area consistently revealed soils of "grey brown loam with fine grass roots," described as the disturbed plow zone (*ibid*.). These disturbed soils ranged in depth from 0.2 to 0.8 meters below ground surface, which would allow for archaeological remains at depth below the plow zone. With the presence of the water table at between 0.9 and 1.9 meters below the surface, this allows for a previously undisturbed subsurface strata of up to 1.1 meters deep.

The likelihood of intact archaeological deposits in these previously disturbed soils increases when one considers that indigenous agricultural practices and sugar cane cultivation were not mutually exclusive. Although not grown in the same fields concurrently, the practices had a temporal parallel. During the nineteenth century, native populations were observed growing their own traditional foods in gardens and *lo'i* near their homes. William Hooper, the plantation manager at the Kōloa Plantation in 1835, describes the day to day workings of the native labor force. According to Hooper, "Friday is allotted them to take care of their Tarrow (*sic*.) patches" (Alexander 1985).

As stated within the AIS, no remnants of house or village sites remain within the project area, gone also are any ground surface markers signifying burial remains (Putzi et al. 2016). Within the State of Hawai'i, and indeed within the vicinity of the project area, inadvertent discoveries of human burial sites are common (SHPD n.d). Although the ground surface may reveal no indications of burial remains, human burials are known to occur in every geographical zone (*ibid*.). The AIS offers no mention of the rather high likelihood that burial remains are present within the project area, nor does it stress the importance of archaeological monitoring in the somewhat likely event that human burials are encountered (Putzi et al. 2016). Further, the EIS offers no recommendation of archaeological monitoring for the proposed project. In the event that the project proceeds in this location as planned, archaeological monitoring must be implemented.

The majority of burials reported from the surrounding area are located from coastal sand dunes and caves (Ching et al. 1974; Walker and Goodfellow 1991). However, once again the relatively low occurrence of recorded burials in the inland valley areas does not preclude the presence of undiscovered burials at depth below the plow zone. The southcentral portion of the project area, where a high density of Land Commission Awards (LCAs) are situated, would be a likely location for burials to occur. The current AIS did in fact place their stratigraphic trench excavations in this area, utilizing backhoes and producing no cultural remains (Putzi et al. 2016). However, considering the relative density of the documented post-Contact population of the



Māhā'ulepū Valley, and the use of the area for taro cultivation at that time, the likelihood remains high that burial remains are present within the project area.

An 1824 sketch of the lower Māhā'ulepū Valley by Hiram Bingham shows at least 34 human-made structures below the ridgeline of Hā'upu, demonstrating the presence of a significant population prior to the LCA residences (Burney 2010). Based on this long-term documentation of occupation and the known practice of family burials within *lo'i* as well as within the immediate vicinity of family homesites (SHPD n.d.; Kalanikumai Cultural Statement 2015; Dega 2016), the project area can be assessed as having a fairly high potential to contain subsurface burial remains.

The surrounding Māhā'ulepū area and watershed has been subject to previous archaeological assessment reports documenting numerous potentially significant sites (Bennett 1931; Ching et al. 1974; Walker and Goodfellow 1991), although considerably fewer studies have been performed than in the neighboring Po'ipu and Kōloa areas. The reason for this is likely due to the limited development in the project vicinity, yet these few studies have identified house sites, sand dune burials, cave burials in coffins, agricultural platforms, burial platforms, the Waiopili *heiau*, the Keolewa *heiau* at the top of Mt. Hā'upu, the agricultural *heiau* at Site 50-30-10-2250 in the project area, and the petroglyph boulders at Site 50-30-10-3094, also located within the project area (*ibid*.; Putzi et al. 2016).

Recorded during the current EIS process, Site 50-30-10-2250 (-2250) represents an agricultural *heiau* located in proximity to Māhā'ulepū Stream, oriented to the cardinal points and featuring a formal entrance/exit (Putzi et al. 2016). The site is situated in the project area on the ridge below Mt. Hā'upu, in an extended survey area requested by SHPD as a result of concerns over impact to sites on this ridge adjacent to the northern project boundary (*ibid*). Although the site is described as being outside of the project area, it was initially described as being located in "Paddock P-163" (Lebo 2015). It is not clear whether the site has been re-plotted or if project boundaries have changed, but it is particularly concerning that the animal cemetery is proposed to be located within approximately 800 feet of this agricultural *heiau*. Project plans should be revised to move the animal cemetery further away, as the construction of and continued use of an animal cemetery in such close proximity to a sacred and potentially significant site would undoubtedly have a negative impact, on the site itself and on the setting.

Previously recorded Site 50-30-10-3094 originally consisted of a large petroglyph boulder (subsequently designated Feature 1), with pecked basins or cupules, a pecked groove, and numerous human figure petroglyphs. Archaeological testing revealed that the ground between the southern side of the boulder and Māhā'ulepū Stream had not been previously disturbed, despite evidence of sugar cane cultivation on all other sides of the boulder (*ibid*.). There was

also no sign of damage from farming equipment, further evidence that the petroglyph boulder was of great importance to the local population.

At Site -3094, two additional boulders were identified during the EIS process (Putzi et al. 2016). The field personnel recorded an additional boulder, designated Feature 2, and the SHPD representative archaeologist identified a third petroglyph boulder, designated Feature 3. Feature 3 is located roughly 70 meters from the other boulders, yet it is included in the site. At that distance, Feature 3 should be considered a site in its own right, as noted in SHPD's 2015 comments on the AIS (Lebo 2015). At that time, it was stated that a site number request should be submitted for Feature 3 (*ibid*).

Rather than categorizing these sites as separate points on a map, they should be recognized as part of a larger complex utilizing the entire area and watershed from the heights of Mt. Hā'upu to the ocean shore and beyond to the reefs. While discussing the preservation of significant sites within the Māhā'ulepū *ahupua'a*, Ching et al. (1974:9) writes, "the original setting which surrounds a site is just as important as the site itself…temples did not exist in isolation, but were rather one of the focal points in the Hawaiian community."

When observed from this perspective, as contributing to a series of archaeological remains representing generation after generation of aboriginal life within the Māhā'ulepū area, the significance of the individual sites and features increases. The loss of potential subsurface archaeological deposits, as well as damage to the significant sites located within and in close proximity to the project area, would indeed be a substantial adverse effect caused directly by the proposed project.

An *ahupua'a* is a self-sustaining land division within a larger *moku* that begins at a point in the mountains and follows natural contours and ridgelines to the ocean, panning out into a somewhat triangular wedge at the sea (State of Hawai'i n.d.). By definition, the people living at Māhā'ulepū in pre-Contact time would have held all the resources they needed within their *ahupua'a*. The mechanism for survival was reciprocity and trade. Those living at the coast would trade marine resources through to the uplands for medicinal and culinary plants and herbs, and vice versa. Taro, sweet potato, and other crops historically grown in the project area might also have been traded, as well as raw materials for tools, weapons, shelter, and clothing.

Within the *ahupua'a*, watercourses would have been valuable as a source of freshwater fish, crustaceans, and mollusks, and of course the clean water had life-sustaining value within itself. According to the biological surveys within the EIS, surface waters within the project area will drain into Waiopili Ditch, and continue on to Māhā'ulepū Beach and the ocean. Along the way, this water will pass through the site of some of the most important archaeological and



paleoecological finds in Kaua'i, the Makauwahi Cave. With its neutral pH, the cave is uniquely conditioned to preserve archaeological and paleontological remains. Findings there have been used to recreate the paleo environment prior to and during early human occupation, documenting changes to the flora and fauna in conjunction with the increase of the human population through to Western contact (Burney and Kikuchi 2006).

Among the unique archaeological finds within the cave that would not preserve well in most environments include pieces of canoes and canoe paddles, tattoo needles, adze handles, and braided segments of rope and string (Burney and Kikuchi 2006). Other notable findings include fish hooks, awls, ornaments, and a polished stone mirror (*ibid*.). The introduction of effluent waste through run-off will alter the neutral pH of the Makauwahi Cave and destroy as-yet undocumented and potentially significant archaeological finds. The damage to this site alone is worthy of considering an alternate location for the proposed project.

The presence of a marked trail network would have been vital and necessary to survival, yet cartographical evidence of such a trail network within the Māhā'ulepū *ahupua'a* is somewhat minimal. Hiram Bingham's sketch of the valley does appear to show trails or waterways leading from the village site to the Hā'upu ridgeline (Burney 2010). An 1833 map of Kaua'i, including the Māhā'ulepū area, is dominated by natural features such as watercourses, ridges, and mountains, and does not detail specific trails (Fitzpatrick 1986). The 1896 "Registered Survey Map" referenced in the AIS does show a path within the project area, which the field personnel were unable to relocate during the ground survey (Putzi et al. 2016). A 1901 government survey map shows a trail or road to the south of the project area, while a USGS 1912 map shows a linear feature within project boundaries-the forerunner of today's Māhā'ulepū Road.

It should be noted that, when field-checking the area labeled "Path" on the historic map, the field personnel utilized GPS and identified an irrigation ditch, fence line, and path utilized for maintenance of the fence in the immediate vicinity (Putzi et al. 2016). It could be reasoned that the placement of the ditch was based on indigenous land use, such as a prior irrigation feature or a trail. Despite the past agricultural disturbances, the field survey did find a path in the vicinity of the path noted on the 1896 map. The positioning of the ditch, fence line, and maintenance trail is in no means an indication that the area is not part of a historic trail network.

The northern project boundary is located below Mount Hā'upu, designated a sacred place, or *wahi kapu*, by the Office of Hawaiian Affairs (OHA) in 1998 (NPS 2008). Given its sacred status, documented consultation with OHA has been thus far absolutely minimal throughout the EIS process. OHA commentary and recommendations must be taken into account for project planning purposes, given the proximity of the project area to the slopes of Hā'upu.

Hā'upu, also known as Ke Kualono O Hā'upu, is an important religious and cultural site that figures in many ancient Hawaiian chants and stories. Among these are the "The Maile" (Fornander 1985), the numerous versions of "Pele and Hi'iaka" (Emerson 1915), "Lohiau, the Lover of a Goddess" (Kalakaua 1888/1990), and "Kawelo of Kauai" (Pukui and Curtis 1951/1994). Hā'upu is also named in many Hawaiian proverbs, a rare feat for an unoccupied place. One such saying is "*Hā'upu mauna kīlohana i ka la'i*," translated as "Hā'upu, mountain standing in the calm," a reference honoring the mountain itself but also describing someone who has many noteworthy accomplishments (NPS 2008).

In the early twentieth century, a small *heiau* by the name of Keolewa was recorded at the top of Hā'upu (Bennett 1931: Site 90). According to Thrum (1907), the Keolewa *heiau* was dedicated to the goddess Laka. Laka might be best known as the goddess of hula, however Laka is also a goddess of the forest and plant growth, including agriculture (Emerson 1909). In this particular setting, it is most likely that offerings put forth to Laka here pertained to the gathering of forest plants and/or for agricultural blessings. The *heiau* identified at Site -2250, adjacent to the northern project border, has also been interpreted as an agricultural *heiau* (Putzi et al. 2016), and the cupules and groove in Feature 1 of Site -3094 have been interpreted as possibly being sacrificial in nature.

The positioning of agricultural *heiau* above and below the ridgeline at Hā'upu demonstrates the use of the area for spiritual and subsistence practices in pre-Contact time, and it is a known plant-gathering location for cultural practitioners today (Kalanikumai Cultural Statement 2015; Kaohelauli'i Cultural Statement 2015; Dega 2016). Besides providing nesting areas for endangered birds, the Hā'upu ridge is also home to critical habitat for some of the last remaining examples of endemic Hawaiian plants (NPS 2008). The proposed project has the potential to directly impact the setting of Hā'upu, and will limit access to cultural practitioners seeking to visit *heiau* and gather natural resources.

The archaeological record within the Māhā'ulepū *ahupua'a* reveals that the area was populated from the coast to the mountains, utilizing reciprocity between ecological zones for their subsistence. After the landscape within the project area shifted to large-scale agriculture, generations of the local population continued to return for gathering purposes. According to the Cultural Impact Assessment, the forested areas on the ridge between the project area and Hā'upu are known sources for gathering plant resources, calcite minerals, and, most importantly, water (Kalanikumai Cultural Statement 2015; Kaohelauli'i Cultural Statement 2015; Dega 2016). The proposed project would not only block the Māhā'ulepū Valley access points, but also have indirect negative impacts on the setting by introducing odor and flies, among other potential polluting factors such as effluent waste.



The appointed Hawaiian representative for the Moku of Kona has stated concerns over the proposed project, primarily regarding the natural resources, especially water (Kaohelauli'i Cultural Statement 2015). Mr. Kaohelauli'i has hunted in the mountains above Māhā'ulepū, gathered plants and water in the valley, and continues to provide for his table by fishing and gathering marine resources such as *limu*, *opihi, wana, loli, uhu, manini, kala, menui, weke, moi,* and *aholehole* (*ibid*.). Having ancestral ties to the land and memories of his parents gathering in the immediate area of the *heiau*, Mr. Kaohelauli'i was recently denied access to the *heiau* at Site -2250 because of the lease with HDF, a right guaranteed to native cultural practitioners by the state constitution (Kalanikumai Cultural Statement 2015; Kaohelauli'i Cultural Statement 2015).

As an elected representative, Mr. Kaohelauli'i feels responsible for maintaining the sustainability of the natural resources in the *ahupua'a*. The most important of these is water, and his great concern is the pollution of the drinking water and ocean reefs from runoff of cattle effluent (Kaohelauli'i Cultural Statement 2015). As mentioned above, thirteen of the seventeen stratigraphic trenches excavated during archaeological testing bottomed out when the trench reached the water table at depths ranging from .9 to 1.9 meters. These trenches reveal shallow soils above the ground water, creating a dangerously high potential for the ground water to become polluted from effluent ponds and runoff. Mr. Kaohelauli'i is further concerned that effluent waste runoff can damage the reefs, a factor not addressed in the greater EIS.

To reiterate in closing, the Māhā'ulepū *ahupua'a* is rich in cultural and archaeological history, from the heights of sacred Hā'upu to the Waiopili *heiau*, the Makauwahi Cave, and beyond. The project area, in the Māhā'ulepū Valley, contains significant archaeological remains, including an agricultural *heiau* and unique petroglyph boulders. The density of the documented post-Contact population raises the likelihood that burial sites may lie within project borders as well. These cultural resources are potentially at risk of damage, both from direct and indirect effects. In order to protect these sites, the setting, and access for cultural practitioners, it is recommended that an alternate location be considered for this proposed project.

Written by Deirdre Encarnación, July 23, 2016. Contact: obbookworms@yahoo.com

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**Deirdre Encarnación, M.A.**

**Professional Experience**

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|---|---|
| 2004-present | Report Writer/Project Archaeologist, CRM TECH, Riverside/Colton, CA. Author and co-author of numerous historical/archaeological assessment reports according to federal, state, and local ordinances. |
| 2015 | Volunteer, State Historic Preservation Department/ Mary Jane Naone, Kaua'i, Hawai'i. |
| 2015 | Volunteer, Society for Hawaiian Archaeology Annual Conference, Kaua'i. |
| 2001-2003 | Part-time Instructor, San Diego State University, California. |
| 2001 | Research Assistant for Dr. Lynn Gamble, San Diego State University. |
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| 2003 | M.A., Anthropology, San Diego State University, California. 4.0 GPA. |
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May 11, 2015

*Via e-mail to:*
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**RE: FRIENDS OF MAHA'ULEPU'S INITIAL COMMENTS ON HAWAI'I DAIRY FARM'S "ARCHAEOLOGICAL INVENTORY SURVEY OF 580-ACRES IN MAHA'ULEPU AHUPUA'A"**

Dear Mr. Downer & Ms. Naone:

This firm represents the Friends of Māhā'ulepu (hereinafter abbreviated as "FOM"). FOM is a grassroots, not-for-profit corporation dedicated to protecting and preserving the Māhā'ulepu Valley and Kaua'i. In furtherance of its mission, FOM hereby submits these initial comments concerning Hawai'i Dairy Farm's ("HDF") *Archaeological Inventory Survey of 580-Acres in Māhā'ulepu Ahupua'a, Koloa District, Kaua'i Island, Hawai'i* ("AIS") dated February 2015, in connection with its proposed dairy in Māhā'ulepu ("Proposed Dairy"). FOM is aware that on April 13, 2015, the State Historic Preservation District ("SHPD") asked HDF to revise its AIS for the second time. *Letter from S. Lebo, SHPD, to HDF*, Exhibit 1, attached hereto. Accordingly, FOM expressly reserves the right to submit further comments on any revised or "final" version of the AIS once published. These initial comments are submitted today out of an abundance of caution and in light of the SHPD's intake listing date of April 10 for the AIS; these comments may be modified or supplemented when any subsequent versions of the AIS are published for public review. FOM appreciates the SHPD's evaluation of HDF's AIS, and believes that after considering the historical and cultural significance of sites in and features of the Māhā'ulepu Valley, SHPD will agree that HDF's Proposed Dairy does not belong in this special, sacred place. The potential for harm to the many archaeological, historical, and culturally significant places within or near the Proposed



Dairy site far outweighs any of the alleged benefits of locating a 2,000-head dairy farm on Kaua'i.

FOM expressly adopts and incorporates by reference the comments on the AIS submitted to SHPD by other concerned citizens and entities, including, but not limited to, those by: Llewelyn (Billy) Kaohelauli'I, Moku for Kona District; Kalanikumai Ka Maka' uli' uli ' O Na Ali' i Hanohano (Branch Harmony), representative for the Aapuaa of Māhā'ulepu; Terrie Hayes; and Kawailoa Development, LLP. FOM adds or emphasizes certain issues, below:

1. Size and Scope of HDF's Proposed Dairy

In order to fully understand the impacts that HDF's Proposed Dairy likely will have on archaeological, cultural, and historic sites, the AIS must describe the Proposed Dairy's operations using the actual planned herd size of 2,000 dairy cows. The SHPD's April 13 letter indicates that the Proposed Dairy will house approximately 499 head of cattle. Exhibit 1 at p.1. In fact, the initial number that HDF claims it will house at the beginning of operations is actually 699, but it is clear from public statements[1] that HDF plans to house up to 2,000 dairy cows at full-scale operations. *See* EISPN at Section 2.3. While FOM believes that even 699 cows will cause significant damage at the site of the Proposed Dairy, the degree of difference in effects stemming from housing 699 dairy cows in a common area vs. 2,000 cows is substantial. More cows will generate more manure, which in turn contributes to a greater risk of surface runoff or groundwater contamination occurring to Māhā'ulepu's water, itself a significant cultural feature (see *infra*, at Section 4). The AIS should therefore ensure that the true size and scope of HDF's Proposed Dairy at its full operational capacity is used in evaluating the impacts to archaeological, historical, and cultural features.

2. Historic Use of Site as Burial Ground

The spiritual significance of nā iwi kūpuna to the Hawaiian people is well known; indeed, the SHPD maintains a website discussing the reverence and respect that Hawaiians have for the *iwi* of their ancestors. *See* www.state.hi.us/dlnr/hpd/naiwikupuna.htm (hereafter cited as "SHPD Nā iwi kūpuna page"). As SHPD explains, "[n]ative Hawaiians believe that the *mana* or spiritual essence and power of a person resided in their bones, their *iwi*. For native Hawaiians, it was important for the bones of a deceased person to complete their journey and return to the ground to impart their *mana*." Native Hawaiians feel a sense of responsibility for the *malama* of their deceased ancestors, and the cultural connection between Hawaiians and the land containing their ancestors' *iwi* remains especially meaningful.

[1] Environmental Impact Statement Preparation Notice ("EISPN,"), available at http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Kauai/2010s/2015-01-23-KA-5E-EISPN-Hawaii-Dairy-Farms.pdf, last accessed May 11, 2015

It is practically certain that the area within or adjacent to (and thus likely to be affected by) the Proposed Dairy historically was used as a burial ground and contains *iwi* of island residents' ancestors. Taro, or *kalo*, was cultivated on the Proposed Dairy site before the sugar plantations operated there. Traditionally, Hawaiians would bury the remains of their loved ones near their home (SHPD Nā iwi kūpuna page) and in the Māhā'ulepu Valley, this likely meant in or near the kalo fields. Hawaiians believe that the *mana* of their deceased family member gets taken up by the plants and provides continued protection and guidance. Thus, the spirits of their ancestors would live on in the kalo plants. The connection between the kalo plant and the identity of Hawaiian people is so strong that the word *'ohana*, or family, is derived from the Hawaiian word used to refer to the shoot of the kalo plant. Every part of the process of kalo cultivation—planting, tending, preparing, and ingesting—can therefore be considered a spiritual act, honoring ancestors and "Haloa," a cultural deity, and these spiritual values would have been held and practiced by ancient and historic Hawaiians who lived in and near the Proposed Dairy site.

The AIS notes at least six Land Commission Awards ("LCAs," discussed at AIS pp. 25-27), which signify historic habitation in the Proposed Dairy site and, relatedly, iwi kūpuna. This conclusion is supported by the depiction of a "house" in the middle of map in Figure 7, and the fact that petroglyphs and other significant historic areas have been found on and near the Proposed Dairy site. Even without evidence of habitation and likely presence of iwi kūpuna at the site, the prevalence of unidentified burial sites throughout Hawai'i is very high. SHPD acknowledges that "[u]nmarked Hawaiian burial sites can be encountered almost anywhere," and that the locations of burial sites marked with stones were sometimes "lost as surface areas were graded and cleared for agricultural activities." SHPD Nā iwi kūpuna page. Further, burial locations were frequently a secretive cultural tradition and not easily revealed to outsiders. *Id*. Therefore, the locations of iwi kūpuna within the Proposed Dairy site are likely not obvious and will require some effort to discover.

The current AIS does not indicate whether any effort already has been undertaken to identify individuals or 'ohana of ancient Hawaiians who may be buried in the area within or adjacent to the Proposed Dairy site, nor does it indicate whether any effort was made to identify any persons who may have connections to the LCAs. The revised AIS should describe the good-faith efforts made to identify and contact any descendants of the LCA recipients and possible iwi kūpuna at the Proposed Dairy site, in addition to discussing the affects and disturbance that the operation of the Proposed Dairy would cause.

3. <u>Presence of Historical Trails</u>

Given the fact that the Māhā'ulepu Valley was home to an estimated 108 to 138 persons in the mid-19th century (AIS at p. 25), the existence of historical valley trails should be accepted as a near certainty. Such a trail system would have been essential for valley residents to access important resources, such as water, medicinal plants, and salt ponds, and available evidence supports the existence of historical trails in the Valley.



The presence of Keolewa Heiau, on Ha'upu Ridge, and a former heiau, Hanakalauea Heiau, within the valley, suggest that historical trails may have connected the site for the Proposed Dairy and the upper ridgeline. Figure 7 in the AIS refers to a "path." The discussion of LCA 6667, on page 28 of the AIS, notes that Mika's testimony discussing cultivation of food crops, raising fish, and growth of *wauke* for *kapa* cloth production was a "classic example of Traditional Hawaiian life." AIS at p. 28. A village whose residents were actively engaged in these classic examples of "traditional" life would have utilized some type of trail system to support these activities.

While the AIS acknowledges that the present-day trails commonly regarded as animal and hunting trails may have, at one time, been traditional pre-Contact/Historic era trails (AIS at p. 135), it also concludes that "there was no evidence on the ground for any trails." This conclusion seems to contradict the acknowledgement that trail usage may have changed over time. The final AIS should describe attempts to consult with community members who may possess knowledge of historical trails and describe the impacts that HDF's Proposed Dairy operations would have on those trails. Due to the surficial nature of trails, it is possible that some of HDF's site work has already disturbed the traditional paths. This fact should be considered when interviewing community members and examining their descriptions of the locations of traditional trail systems in the Valley.

Finally, FOM learned, just today, of the existence of a map dating to approximately 1835 and depicting historical trails through the Māhā'ulepu Valley. FOM anticipates receiving a copy of this map soon and plans to review and discuss the map in connection with its supplemental or subsequent comments on the revised AIS. FOM will provide a copy of the map to SHPD to ensure that impacts to any trails depicted in the map are considered in the adequately evaluated in the revised AIS.

4. <u>Need to Consider Water as Independent, Culturally-Significant Feature</u>

In traditional Hawaiian culture, natural resources and cultural resources are considered one and the same. A spiritual connection exists between people and their surroundings, including the land, water, and sky. Elements of the natural environment, such as mountains, coastlines and ocean, or groves of trees, are often considered to be the embodiment of deities and regarded as collective cultural properties of the Hawaiian people. Kāne, the highest of the major Hawaiian deities, is associated with natural forces such as sunlight and fresh water. It is Kāne's relationship with other gods that brings for life. For example, together with Lono, god of agriculture, Kāne ensures healthy and abundant crops, and with Kanaloa, god of the sea, Kāne provides plentiful fish and sea creatures. Kāne's most important *kinolau*, or form, is fresh, life-sustaining water.

The National Park Service has recognized the hydrologic connection that exists between the various waters within the Māhā'ulepu Valley, noting that the Wai'opili

stream[2] "emerges in more natural form near Makauwahi Cave at the south end of the study area, where it joins forces with a natural spring and a remnant of the once much larger Kapunakea Pond." *Māhā'ulepu, Island of Kaua'i, Reconnaissance Survey*, National Park Service, U.S. Dept. of the Interior (February 2008), available at http://www.nps.gov/pwr/upload/mahaulepu_final.pdf (last accessed May 11, 2015). Therefore, surface runoff or manure contamination that impacts even one waterbody threatens to reach the entire system within the Māhā'ulepu Valley watershed, up to and including the coastline and ocean. Aside from the obvious risks to public and environmental health, any contamination to ground and surface waters caused by the dairy also constitutes harm to their shared cultural property. In particular, local community members recall hiking trails to collect water in the Māhā'ulepu Valley because it is considered especially healthy and pure; this will not be the case if HDF's Proposed Dairy operates and dramatically alters the area. Secondary cultural harms may also result from water pollution at the Proposed Dairy site; for example, the ability of individuals to grow or gather traditional plants or access historical trails or other significant sites may be impaired. The availability of water in Waita reservoir will decrease greatly if HDF uses reservoir water for Proposed Dairy operations. The AIS should therefore recognize the archaeological and cultural significance attached to the subsurface and surface water and carefully identify and evaluate the negative impacts to area water that likely will result from HDF's Proposed Dairy.

5. Recognition of the Public's Stated Concern for the Preservation of Māhā'ulepu

Besides the National Park Service Survey, discussed *supra*, other public entities have recognized and memorialized the public's concern for the protection and preservation of Māhā'ulepu. Kaua'i County includes an entire chapter entitled "Caring for Land, Water, and Culture" in its General Plan ("Plan"). County of Kaua'i General Plan, available at http://www.kauai.gov/Portals/0/planning/Ch3.PDF (last accessed May 11, 2015). Section 3.6, "Native Hawaiian Rights," includes a policy statement that "[t]he County recognizes the rights of native Hawaiians...[and] [n]o County ordinance or rule shall modify or diminish these rights[.]" The Plan then identifies certain water, fishing, access, and burial rights, and rights to preservation of certain historic and archaeological resources. Plan, Section 3.6.1.

In 2001, the Kauai County Council adopted Resolution No. 2001-25, entitled "Resolution Supporting Future Preservation of Māhā'ulepu." Resolution No. 2001-25 (hereafter "Resolution") attached hereto as Exhibit 2. The Resolution provides that "Māhā'ulepu is a heritage landscape where it is possible to preserve and restore diverse significant natural, scenic, cultural, archaeological, historic, scientific, and recreational resources," and that "Māhā'ulepu is a living cultural landscape and a place sacred to many Native Hawaiians, particularly those of the Kōloa area whose ancestral remains are buried at Māhā'ulepu." Exhibit 2. That same year, the Hawaii House and Senate similarly supported the preservation of Māhā'ulepu by passing similar resolutions. S.R.

[2] The Wai'opili stream is already contaminated, and FOM has taken action to try to protect this vulnerable waterbody.



No. 97, S.D. 1, Supporting the Future Preservation of Māhā'ulepu, Twenty-First Legislature, 2001; H.R. No. 91, H.D. 1, Supporting the Future Preservation of Māhā'ulepu, Twenty-First Legislature, 2001. More recently, in February of 2015, many community members attended a meeting with HDF representatives where the public interest in protecting and preserving the Māhā'ulepu area was expressed and emphasized.

These resolutions, comments, and concerns from the community reflect a strong public interest in the cultural significance of the Māhā'ulepu Valley and Proposed Dairy site, and such interest should properly be considered in the final AIS.

6. Process and Mitigation

Finally, the AIS should be completed according to applicable statutes and regulations, and ensure that any necessary mitigation is thoroughly explained. Where a proposed project may affect "historic property…or a burial site," the approving agency must advise the SHPD and allow the SHPD an opportunity for review and comment on the effect of the proposed project on those sites. Hawai'i Rev. Stat. § 6E-42. Here, however, it appears that HDF has already received certain approvals from the State and County of Kaua'i, and has undertaken ground disturbing activities even though a final AIS remains to be completed. HDF should comply with all mandated processes, and the final AIS should include an explanation of its compliance. As part of this process, clarification as to the Proposed Dairy site title and ownership (and supporting documentation) should be reviewed and confirmed. Additionally, the AIS should include a commitment to and explanation of any mitigation measures that HDF would implement or has implemented in connection with its Proposed Dairy. Such a commitment enables the public to meaningfully evaluate the AIS and determine its accuracy.

**CONCLUSION**

As stated above, FOM explicitly reserves the right to supplement these comments upon publication of HDF's revised, final AIS. After SHPD has an opportunity to review HDF's revised AIS and fully consider the number and degree of negative consequences of the Proposed Dairy on archaeological, historic, and cultural sites, FOM believes it will agree that the threatened harm to these sites is significant. In keeping with stated public interest, the lands and waters within the Māhā'ulepu Valley should be preserved and protected, and not irreparably harmed by an industrial dairy.

Please notify FOM when the revised AIS has been made available for public review and comment.

Sincerely,

/s/ Charles M. Tebbutt

Charles M. Tebbutt
Law Offices of Charles M. Tebbutt, P.C.
charlie@tebbuttlaw.com

DAVID Y. IGE
GOVERNOR OF HAWAII

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

**CARTY S. CHANG**
INTERIM CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

**KEKOA KALUHIWA**
FIRST DEPUTY

**W. ROY HARDY**
ACTING 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

April 13, 2015

Hawaii Dairy Farms, LLC
737 Bishop Street, Suite 2360
Honolulu, HI 96813

LOG NO: 2015.01404
DOC NO: 1504MN05
Archaeology

Dear Mr. or Ms.:

SUBJECT: **Chapter 6E-42 Historic Preservation Review -**
**Revised Archaeological Inventory Survey of 580 Acres in Māhāʻulepū Ahupuaʻa**
**Māhāʻulepū Ahupuaʻa, Koloa District, Island of Kauaʻi**
**TMK: (4) 2-9-003:001 por. and 006 por.; 2-9-001:001 por.**

Thank you for submitting the revised subject draft plan entitled *Archaeological Inventory Survey of 580-Acres in Māhāʻulepū Ahupuaʻa, Koloa District, Kauaʻi Island, Hawaiʻi [TMK: (4) 2-9-003:001 por. and 006 por; 2-9-001:001 por.]* J. Putsi., M. Ching, J. Powell, M. Dega, Ph.D. We received the initial draft on September 25, 2014, which was received on December 3, 2014 (*Log No. 2014.04405, Doc. No. 1410MN02*). We received the revised copy February 20, 2015, and apologize for the delay in review.

The archaeological inventory survey (AIS) of the 580 acre subject property was conducted at the request of the landowner, Hawaii Dairy Farms, LLC. The project area defined by the landowner includes the valley floor of Māhāʻulepū Valley, a relatively level plain framed by Mt. Haʻūpu Ridge and Mountain to the north, and two ridges on the east and west, forming a large, natural amphitheater. The east and west ridges also serve as ahupuaʻa dividing lines, with Kipu Kai to the east, and Paʻa on the west. Based on the geological formation of the ridgeline framing the project area, the State Historic Preservation Division (SHPD) Kauaʻi section initially recommended that the project area be defined as the entire area from the ridgeline down. After subsequent negotiations, Scientific Consultant Services (SCS) and the landowner agreed to expand the project area approximately 100 meters upslope in all directions. SHPD continues to have concerns that the project area does not include indirect effects of the proposed dairy on historic properties upslope.

The commercial dairy will require the modification of existing dirt roads, grading of ground surfaces for the construction of buildings, the excavation of effluent ponds, and the excavation of pipelines for the watering of cattle. According to conversations with SCS staff, we understand about 499 head of cattle will be retained in the project area.

The AIS newly identified 16 historic properties within the project area, and relocated State Site 50-30-10-3094, a large boulder with at least 20 anthropomorphic characters represented, as well as two pecked "cups" or basins. The report states that SCS located a second petroglyph rock associated with Site 3094, which is identified in the report as Feature B. A third petroglyph boulder, referenced in the report as Feature C, is approximately 70 meters from Site 3094. Sites 2251 through 2262 are associated with plantation-era infrastructure and include irrigation ditches, two bridges, a reservoir, retaining wall, and sluice gates. Site 2250 is located on the slopes below Mt. Haʻupu and included in the revised, expanded project area. The site is an enclosure which the report concludes is an agricultural *heiau* due to the absence of artifacts during subsurface testing, and proximity to LCAs associated with agricultural





encampments. Seventeen backhoe trenches were excavated within various portions of the property and partly informed by consultation with SHPD; these included subsurface testing within previous known LCA encampments, and near Site 2250 and Site 3094. A single artifact was recovered, a chopper tool within Site 2250.

The plantation-era sites are assessed for significance under Criteria "d" of HAR §13-284-6, with potential to yield data important for research on prehistory or history, and Sites 2250 (a ceremonial enclosure) and 3094 (petroglyph boulders) are recommended as significant under Criteria "d" and "e," which states the Site (s) "has an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to association with traditional beliefs, events or oral accounts – these associations being important to the group's history and cultural identity." Sites 2250 (Enclosure) and 3094 are recommended for preservation, with preparation of a preservation plan, and Sites 2251-2262 are recommended for "no further work." In addition, the report states that "no archaeological monitoring is recommended" during any ground altering work in the project area.

**Additional revisions are necessary to meet the requirements of HAR§13-276 prior to approval of the AIS.** Māhāʻulepu ahupuaʻa remains culturally significant and contains unusual pre-Contact sites (the petroglyph boulders) as well as several *heiau*, although most have been destroyed. The Office of Hawaiian Affairs has produced documentation referring to Mt. Haʻupu as a traditional cultural property (TCP), and numerous individuals have provided consultation to the cultural importance of this area. Please expand on this in the discussion and conclusion. In addition to the recommendations for preservation, please provide potential mitigations for indirect effects of the proposed dairy on these sites. Attached please find a list of revisions or requests for clarification prior to the acceptance of the AIS. An electronic revised copy may be submitted to the Kauaʻi section. Please contact Kauaʻi archaeologist Mary Jane Naone at (808) 271-4940 or Maryjane.naone@hawaii.gov if you have any questions regarding this letter.

Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Oahu Lead Archaeologist
Acting Archaeology Branch Chief

cc. Mike Dega, Scientific Consultant Services (mike@scshawaii.com)

**ATTACHMENT**

Comments and Questions: Revised *Archaeological Inventory Survey of 580-Acres in Māhāʻulepū Ahupuaʻa, Koloa District, Kauaʻi Island, Hawaiʻi [TMK: (4) 2-9-003:001 por. and 006 por; 2-9-001:001 por.]*
J. Putsi., M. Ching, J. Powell, M. Dega, Ph.D.

**Introduction**

1. Starting with cover, revise throughout to present TMK in numerical order to facilitate filing which is by TMK; TMK: (4) 2-9-001:001 por., 2-9-003:001 por., 2-9-003:006 por.
2. The landowner must be identified, pursuant to HAR§13-276-5(a)(2). The last copy stated that Hawaii Dairy Farms, LLC (HDF) was leasing the property; this copy refers to HDF as the landowner. Please verify in the final copy.

**Traditional and Historic Setting**

3. Were any historic photographs located for the project area?
4. The assertion that "pre-Contact sites have been most commonly identified in coastal or near coastal areas, locations removed from intensive sugar cane production" is misleading. As stated in our previous request for revisions, Kauaʻi contains a multitude of inland pre-Contact sites that defy this assertion: including extensive agricultural complexes inland in areas such as Waimea Canyon and Makaweli, inland habitation sites, Heiau at significant locales on the interior of the islands, and numerous loko wai and loko iʻa-kala, inland fishponds. In fact, sugar cane cultivation often followed cultivation of previous crops dating back to pre-Contact times. There is not sufficient data to analyze archaeology within areas of intensive sugar cane cultivation, particularly in Kauaʻi, where previously cultivated fields have been largely un-surveyed, based on the assumption that there's nothing there. In addition, if coastal sites have been more commonly identified, it's likely a result of modern land use (coastal areas being more desirable for development) rather than an indication that pre-Contact peoples did not use the interior or the island. The text illustrates this later – in the section "Site distribution and chronology" (pg 41).

**Previous Archaeology**

5. The description of Site 3094 within this section refers to a large boulder sitting "isolated" in a pasture. Actually, two additional boulders containing petroglyphs are within the immediate area.
6. Please provide a graphic within this section to show the relationship of the sites identified within the project area to the larger landscape.
7. Please provide a graphic or table showing the location of previous studies nearby the project area.

**Consultation**

8. Please list the several people that Milton Ching conducted consultation with.
9. Is Kalani Pike the correct name? I've seen Kalanikumai, Branch Harmony, or Zachariah Harmony. All of the individuals that have provided insight on the AIS should be included within the consultation section.

**Archaeological Inventory Survey Results**

10. On page 45, the text notes that Site 3094 and Site 2250 occur "off-site", but the Site description for Site 2250 says that the site occurs in Paddock P-163.
11. Please include Sites 2250 and 3094 within the maps showing the locations of historic properties.
12. When consulted over the placement of test units within the structure, believed originally to be a kauhale, SHPD Kauaʻi Lead Archaeologist agreed that 2-3 shovel test pits were appropriate for assessing subsurface stratigraphy and the presence or absence of cultural deposits. An increase in the number of test units should have been informed by SHPD; a 1x1 test unit can be perceived as "data recovery" and is not appropriate for an archaeological inventory survey, unless explicitly agreed upon.
13. Please provide some context for the interrelation of the irrigation ditches. Are historic maps or photographs showing the ditches available? How would the ditch configuration provide irrigation to the project area, and if the ditch segments connected continuously over time, or were used differently during various periods of cultivation. A map of the project area, overlaid with the actual course of the irrigation ditches, would provide context for their historical use.
14. Please provide plan view drawings for the features within Site 2252, in accordance with HAR13-276-5 (4) f.
15. As previously noted, there is no photograph or site map for Site 2253.
16. Please describe the size of the rocks within the dry set features, and the number of courses.





17. There is no attempt to specifically provide context for either the reservoir, the bridges or the irrigation ditches. One of the bridges has been altered from its original construction in 1908, and the bridges contain hand rails made from iron, narrow gauge rails from the previous cane railroad. When were these constructed, and by whom? Who constructed the reservoir, and why?
18. The site description for Site 2258 (the reservoir) lacks a description of the construction and other basic information stipulated in §HAR13-276-5(4).
19. Site 2262 has no photograph or map, and features an irrigation flume, as well as two sluice gates, one which has incorporated part of a former railroad rail. Please provide photographs and maps for the features.
20. Feature 3 of Site 3094 is 70 meters away and no rationale is provided justifying it's inclusion in Site 3094. Please prepare a site number request, GIS coordinates, and site description for Feature 3 and include the new site number in the revised copy, as a separate site.
21. Site 3094 Feature 2 was not included in the site requests that SCS made for this project. Please prepare documentation and provide GIS coordinates for Feature 2 and submit to SHPD. Please provide sufficient rationale for why Feature 2 is associated with Feature 1 and belongs to the same site.

**Discussion and Conclusions**

22. During consultation throughout this project, the Kauaʻi archaeologist emphasized the need to consider potential trails to the ridgeline, as well as discuss the cultural importance of the ridgeline, which was deemed a traditional cultural property (TCP) in an Office of Hawaiian Affairs (OHA) letter report included in the National Park Service survey of the Māhāʻulepu coast (2008). We recommended contacting OHA to get more information about the report, as well as sources for this information. We understand SCS will be preparing a cultural impact assessment, but please provide additional discussion of these aspects of the project area and what your findings were in the conclusion.
23. These statement is incorrect "Most *heiau*… consist of multiple courses of rocks piled many meters high, and which stand out in complexity and breadth". While it's true many Heiau have those characteristics, there are also many examples of Heiau throughout Hawaii that do not fit these criteria (reference "The Significance of Heiau Diversity in Site Evaluations", C. Cachola-Abad, *Cultural Resource Management* Volume 19, No 8, 1996).
24. Please include a brief description of the sole artifact and its relationship to Site 2250.

**Recommendations**

23. The recommendations section states that Sites 2250 and 3094 should be preserved via a preservation plan. Please provide information on what is being proposed for the remainder of the sites. Will these be "passively preserved", or are they slated for alteration, modification or destruction? What affect will the proposed dairy have on these sites? Please indicate if the reservoir and traditional irrigation systems will be used by the dairy, and how.

COUNTY COUNCIL
COUNTY OF KAUAI

# Resolution

No. 2001-25, Draft 1

## RESOLUTION SUPPORTING THE FUTURE PRESERVATION OF MĀHĀ'ULEPŪ

WHEREAS, Māhā'ulepū is a heritage landscape where it is possible to preserve and restore diverse significant natural, scenic, cultural, archaeological, historic, scientific and recreational resources; and

WHEREAS, Māhā'ulepū is a living cultural landscape and a place sacred to many Native Hawaiians, particularly to those of the Kōloa area whose ancestral remains are buried at Māhā'ulepū; and

WHEREAS, it is in the economic and social interest of the County of Kaua'i to conserve its valuable natural and cultural resources and to create parks and preserves for the future; and

WHEREAS, the ahupua'a of Māhā'ulepū is also directly adjacent to Kīpū Kai, an entire ahupua'a which is a future State land preserve; and

WHEREAS, the unique opportunity to apply the ahupua'a framework of care-taking and management of watersheds from mountain peak to the ocean exists at both Kīpū Kai and Māhā'ulepū; and

WHEREAS, landowners should receive fair value for land dedicated or sold for public purposes; and

WHEREAS, the Kaua'i General Plan states that Māhā'ulepū needs a community-based planning effort that engages the landowner and local community interests, drawing upon the County government, the State Department of Land and Natural Resources (DLNR), and various professional experts, as needed; NOW, THEREFORE:

BE IT RESOLVED, that the Council of the County of Kaua'i supports and is willing to participate in collaborative planning efforts to explore options for the preservation of Māhā'ulepū that would make it possible to preserve the irreplaceable natural and cultural resources of Māhā'ulepū, and to sustain the experience of this place as an undeveloped area with compatible uses.

BE IT FURTHER RESOLVED, that the Council of the County of Kaua'i extends its mahalo to the Grove Farm Company, Inc., for continuing to keep Māhā'ulepū open to the public, both residents and visitors.

BE IT FURTHER RESOLVED, that the Council of the County of Kaua'i thanks Governor Benjamin J. Cayetano for his declaration of support for preservation of Māhā'ulepū and asks the Governor to continue his leadership towards preservation of Māhā'ulepū.



BE IT FURTHER RESOLVED, that copies of this resolution be forwarded to the Honorable Benjamin J. Cayetano, Governor of the State of Hawai'i; the Honorable Mazie K. Hirono, Lieutenant Governor of the State of Hawai'i; the Honorable Maryanne W. Kusaka, Mayor of the County of Kaua'i; State Senator Jonathan Chun; State Senator Avery B. Chumbley; State Representative Ezra R. Kanoho; State Representative Bertha C. Kawakami; State Representative Hermina M. Morita; Ms. Lynn P. McCrory, State Board of Land and Natural Resources Kaua'i Member; and Mr. David W. Pratt, President and Chief Executive Officer, Grove Farm Company, Inc.

INTRODUCED BY:

/s/ RON KOUCHI
/s/ BILL "KAIPO" ASING
/s/ BRYAN BAPTISTE
/s/ GARY HOOSER
/s/ DARYL KANESHIRO
/s/ JAMES KUNANE TOKIOKA
/s/ RANDAL VALENCIANO

| | Aye | Nay | Exc. |
|---|---|---|---|
| Asing | X | | |
| Baptiste | X | | |
| Hooser | X | | |
| Kaneshiro | X | | |
| Kouchi | X | | |
| Tokioka | X | | |
| Valenciano | X | | |
| TOTAL | 7 | 0 | 0 |

### CERTIFICATE OF ADOPTION

*We hereby certify that Resolution No 2001-25, Draft 1, adopted by the Council of the County of Kauai, State of Hawaii, Lihue, Kauai, Hawaii, on April 11, 2001.*

*County Clerk*

*Chairman & Presiding Officer*

*Dated 4/12/2001*

**Law Offices of Charles M. Tebbutt, P.C.**
**941 Lawrence Street**
**Eugene, OR 97401**
**Ph: 541-344-3505 Fax: 541-344-3516**

February 20, 2015

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*Via Certified Mail, Return Receipt Requested:*

Laura McIntyre
State of Hawai'i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Jeff Overton
Hawai'i Dairy Farms, LLC
PO Box 1690
Koloa, HI 96756-1690

*Also via e-mail to:* *HDF@Group70int.com*
*laura.mcintyre@doh.hawaii.gov*

**RE: FRIENDS OF MAHA'ULEPU'S COMMENTS ON HAWAI'I DAIRY FARM'S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE, DATED JANUARY, 2015.**

Dear Ms. McIntyre,

This firm represents the Friends of Māhā'ulepu (hereinafter abbreviated as "FOM"). FOM is a grassroots, not-for-profit corporation dedicated to protecting and preserving the Māhā'ulepu Valley and Kaua'i. In furtherance of its mission, FOM hereby submits its scoping comments concerning Hawai'i Dairy Farm's ("HDF") January, 2015 "Environmental Impact Statement Preparation Notice" or "EISPN." After reviewing and responding to these comments, FOM believes that the State, the Department of Health, and HDF will recognize that the construction and operation of a 2,000-head dairy farm on Kaua'i's south shore will cause irreparable environmental, economic, and social harm. These harms far outweigh any of the alleged benefits of a dairy of this size being operated within the State of Hawai'i – especially considering that HDF will need to ship all of the milk produced by its herd off the island of Kaua'i for processing and bottling.



As an initial matter, FOM is very concerned that HDF is using the HEPA process merely to justify its already decided position that it *will* build a dairy at this location. The EIS process, of course, is designed to determine *whether* an action should occur given the environmental, social, economic, and cultural impacts. HDF has put the cart before the horse, assuming that approval for an already decided project will occur. The EIS process is not intended to be used as a justification for a decision already made. This is not the way HEPA works, and FOM anticipates that HDF will reconsider its position once the full gamut of negative consequences of a large dairy being placed in the Māhā'ulepu Valley come to light.

In addition to a proper HEPA process, HDF must research the various local, state, and federal ordinances, statutes, and regulations that may impose additional requirements on its proposed dairy operations. HDF identified some of these in its EISPN, including the Hawai'i Constitution, Clean Air Act, and Clean Water Act. EISPN at 5-1. The EISPN did not list the Endangered Species Act, 16 U.S.C. § 1531 *et seq*., even though HDF is aware of at least four native bird species that are listed by both federal and state statutes as endangered. EISPN at 3-2. Moreover, all levels of government involved in decisions about this proposal must ensure that Hawaii's public trust obligations are protected.

FOM's scoping comments below focus on both the EISPN and HDF's "Waste Management Plan," dated July 23, 2015. Both of these documents should be considered in the EIS process. FOM also hereby fully incorporates into its scoping comments the critique and review of HDF's Waste Management Plan by Mr. Mark Madison, dated August 21, 2014 and those by Dr. Deanne Meyer, dated August 11, 2014. These documents were submitted to the Wastewater Branch of the Department of Health by Goodsill Anderson Quinn & Stifel, on behalf Kawailoa Development LLP.

## I. HDF's Proposed Dairy Would Contaminate the Environment.

Despite touting that the dairy will originally house only 699 animals,[1] HDF's Waste Management Plan ("WMP") clearly indicates that this facility is being designed from the ground-up to handle 2,000 head. A November 25, 2014 press release from HDF confirms that the dairy intends to expand its herd within months of beginning operation. As such, 2,000 head should be the number that is evaluated throughout this EIS process, not the deceptively low 699 figure used by HDF in its paperwork.

Even at 699 animals, however, there can be little doubt that this facility will cause and contribute to the contamination of the environment in and around the Māhā'ulepu Valley and Kaua'i's sensitive marine ecosystem. Dairies such as that proposed by HDF have been found across the country to contaminate surface water, groundwater, soil, and air. These negative environmental consequences primarily stem from the fact that a

[1] 699 animals is no arbitrary number. HDF picked it as a staring point to avoid being labeled as a "large" dairy animal feeding operation under federal law. That threshold is reached when, *inter alia*, a dairy has 700 mature dairy cows housed on site.

mature dairy cow produces significantly more waste than other animals. In fact, the U.S. Environmental Protection Agency estimates that a facility with 2500 dairy cattle creates a similar waste load as a city of 411,000 people. This means that HDF's 2,000 dairy cows will produce, on average, the same amount of waste generated by a human population of 328,800. By way of comparison, the entire population of Kaua'i is 65,689 as of 2008. Stated differently, HDF's proposed dairy would create five times more waste than the *entire human population* of Kaua'i. Unlike human waste, however, which is required to be treated, HDF will dump the waste created by its herd directly onto the 517 acres of land it has secured for grazing.

The pollution that originates from HDF's proposed facility will impact a variety of environmental media. Each is discussed in turn below, and each must be fully addressed by HDF in its EIS.

*A. The Proposed Dairy Would Contaminate Surface Waters, Detrimentally Impacting the Environment.*

HDF's proposed 2,000 head dairy will cause contamination of surface waters – waters that eventually discharge into the ocean near Gillin's beach. Figure 5 of the WMP show both natural watercourses and man-made ditches traversing the proposed HDF site. These watercourses can properly be construed as "Waters of the State," as well as "Waters of the United States," protected by water quality standards. All of these ditches eventually lead to a stream that discharges into the ocean just a short distance away. Importantly, the area where the discharges will occur has been designated as Class 1 critical habitat by the State. Critical Plant Habitat and Critical Cave Habitat designations also crisscross this coastline. In addition to these waters, there are two identified wetlands on the site, each of which receive runoff and likely groundwater originating from the pastures.

HDF offers absolutely no analysis of how manure-contaminated water will impact the coastline, the critical habitat designations, or the Class 2 inland water that leads to the Class A marine waters along the Māhā'ulepu coastline. HDF also offers no analysis or explanation for how it will prevent such surface water discharges. It suggests that it will conduct surface water monitoring at various points, but not whether it will take steps to eliminate discharge if manure-related pollutants are detected in the samples.

This is not surprising. Dairies across the United States have been subject to Clean Water Act lawsuits for manure-related discharges into surface waters, which cause a laundry list of negative environmental and health effects. This is especially true when soils contain clay, or are classified as "poorly drained" or unsuitable for receiving large amounts of animal waste by the Natural Resources Conservation Service ("NRCS"). Sloped locations, such as exist on the site, present a high likelihood of irrigation water and/or manure water runoff.

Here, the HDF site is composed of soils identified as "poorly drained" by NRCS, including Ka'ena Clay and Kalihi Clay soils, which comprise approximately 60% of the



total soil.[2] In fact, according to a NRCS custom soil resource report for the project area, virtually all of the soils underlying the site have "very limited" capacity for disposal of manure through irrigation. "Very limited" soils have "limitations [that] generally cannot be overcome without major soil reclamation, special design, or expensive installation measures…[p]oor performance and high maintenance can be expected." HDF ignores this point, insisting that the soils in the facility area are conducive to manure applications, *which is simply not true*. HDF should be required to conduct a detailed soil survey of the site to evaluate whether manure can be applied to its fields in a manner that is environmentally protective. Based on the NRCS soil survey, this does not appear likely.

Additional soil complications can be traced to the soil's high susceptibility to surface water runoff. Again, the NRCS states that the various soil types in the project area have anywhere from a "medium" to "very high" likelihood of surface runoff. This means that any excess water left on a field from manure applications and/or irrigation water applications can transport water – and the manure constituents contained therein, including those deposited by the herd within each pen – into surface waters and, from there, into the ocean.

Finally, the topography of the site also presents risks to surface water. Water naturally flows downhill. HDF's WMP contains a topographical map and narrative explaining how the project site slopes downhill from 150 feet elevation, to 60 feet in elevation, and finally to sea level. Manure-contaminated water will therefore flow naturally to the low points – the ditches and canals – where it will then follow the predominant surface water flow into the ocean.

Besides runoff from fields to which manure is applied, there is also a distinct concern that precipitation will also convey nutrients from the fields and into surface waters – including the various wetlands located on and around the site. While HDF claims that it will apply manure with an eye toward the weather, as any resident of the area knows, storms can be unpredictable and deposit substantial amounts of rainwater over a very short period. This also applies to HDF's proposed storage lagoons, divided into a solids settling basin and a storage pond. The settling basin will be full nearly 100% of the time, as it fills up before overflowing into the adjacent liquid storage pond. HDF should be required to explain, in detail, how its lagoons were sized to deal with a 25-year, 24-hour precipitation event in addition to average monthly precipitation depths. For instance, in September 1996, there were six days of continuous rainfall, followed by a week of intermittent rainfall, bookended with another seven days of continuous rainfall. If the dairy were approved and constructed, such a significant rainfall event could cause the lagoons to fail and almost certainly to overflow, releasing substantial amounts of manure that will eventually flow and runoff into surface waters. The EIS should anticipate the environmental and economic impacts of a catastrophic weather event, lagoon breach, or other severe emergency constituting a "worst-case" scenario at the proposed dairy. An extreme storm or earthquake resulting in a major waste discharge or

[2] HDF's characterization of the soils is incomplete and, in many instances, conflicts with the actual NRCS soil survey data.

failed lagoon would likely cause irreparable harm to the environment, even if an emergency response is executed. HDF must also address how the expected impacts from climate change will affect precipitation frequency and quantity, including the aforementioned extreme weather events.

HDF must analyze all of these points in its EIS, as well as a careful examination of what problems each manure constituent can create. For instance, excess phosphorus in surface waters can lead to eutrophication; bacterial contaminants such as E-coli and fecal coliform can render surface waters unsuitable for consumption, recreation, and other uses; and nitrogen (in nitrate form) can move into surface waters and, from there, percolate into the underlying aquifer, rendering the groundwater unfit for human use.

*B. The Proposed Dairy Would Contaminate Groundwater, Detrimentally Impacting the Environment.*

Similar to surface water contamination, large dairies in the United States have also been found responsible for contamination of groundwater. Groundwater contamination is especially concerning for this project, as the aquifer in the area provides potable drinking water for the County of Kaua'i Department of Water Supply. In fact, HDF's WMP does not even identify all of the wells in the project area and provides a skewed picture of how far away those wells are; for instance, while HDF claims that one county well (Koala F) is over a half-mile away, in reality it is only 750 feet from the paddock in which sludge from the settling basin is proposed to be deposited. HDF should be required to undertake an intensive groundwater study to determine the fate and transport of nitrate to the underlying aquifer. Additionally, multiple groundwater monitoring wells should be required to be installed both upgradient and downgradient of the facility to monitor whether the dairy, if approved, is impacting the groundwater. If it is, then the dairy must be required to take remedial action, including possible cessation of operation.

HDF should also be required to evaluate whether it can apply all of the manure generated by its herd on its land at agronomic rates– that is, at the rate in which manure nutrients will be removed by the crop-- that will not result in excess nutrients escaping from the property. HDF bills itself as a zero discharge operation but must prove before it starts operation, including an construction activities, that it can live up to that promise. Excess nutrients are likely to be transported deeper into the soil profile with subsequent irrigation, manure application, and precipitation, where they will eventually discharge to groundwater. Along these lines, FOM is very concerned with the estimated nutrient requirements identified by HDF in the WMP. The dairy seems to believe that its grass crop requires in the neighborhood of 750 lbs./ac nitrogen yearly to be sufficiently fertilized. This is an excessively high number, and one that does not appear to be reflected in the literature for Kikuyu grass. If the grass does not use all of the nitrogen supplied by manure applications, then it will lead to contamination of the groundwater.

Additionally, the liner proposed by HDF for its lagoons is inadequate for this area, considering the numerous vital environmental and cultural resources nearby. HDF



indicates it will line its lagoons with a 1.5 mm HDPE lining with 5 mm bidim. FOM does not believe that the liner proposed by HDF will sufficiently stop seepage from the lagoons into groundwater given the concerns with the liner welds and potential punctures from installation and lagoon cleaning. Indeed, after conducting an intensive groundwater monitoring and modeling study, HDF may determine that is simply not feasible to put *any* type of manure storage lagoon in this area.

Finally, HDF needs to analyze how manure storage and applications will interact with the wetlands on and nearby the project site. It appears that the wetlands and, indeed, much of the project site itself, comprise a large portion of the watershed that feeds the aquifer – an aquifer relied upon for clean, safe drinking water. If manure is not agronomically applied, then excess manure nutrients, including nitrate and phosphorus, will runoff into surface waters and leach through the soil and into groundwater. But even if agronomically applied, some manure constituents will wind up in the aquifer. Nitrate, for instance, will move through the soil almost at the speed of water, such that any excess or residual nitrate after manure is applied is likely to leach deeper into the soil and eventually into the aquifer. Once it moves past a crop's root zones – for Kikuyu grass, this is a very shallow area – the excess nitrate will reach groundwater. It is only a matter of time. The concentration of nitrate in the aquifer may be further impacted by HDF's proposal to draw 3 million gallons of water per day from Grove Farm wells; as water is drawn for use in the dairy's daily operations, the concentration of nitrate in the aquifer will increase. An investigation into whether the aquifer can support the proposed use of groundwater for daily operations should be conducted and included in the EIS.

Additionally, the withdrawal of 3 million gallons of water per day from an already-sensitive aquifer presents its own concerns. HDF must analyze whether the significant water drain its proposed dairy will have is sustainable in light of limited supply of fresh water provided by this aquifer.

*C. The Proposed Dairy Would Contaminate the Air, Detrimentally Impacting the Environment.*

The host of environmental concerns presented by dairies as large as the one proposed by HDF does not end with water resources. Large dairies generate significant amounts of hazardous airborne contaminants that can impact air quality, such as ammonia, hydrogen sulfide, mercaptans, particulate matter, and airborne pathogens, to name just a few of the more than 20 hazardous air pollutants (HAPs) emitted by animal feeding operations of the size proposed.[3] Ammonia is one of the primary contributors to the degradation of air quality around large dairies. Ammonia is known to cause a variety of health impairments, discussed in greater detail below, which is why it has been

[3] EPA has identified at least 168 chemical compounds in manure and in the air around livestock operations. In addition to the 20 HAPs, EPA also identified over 160 Volatile Organic Compounds (VOCs). *Emissions From Animal Feeding Operations, Draft*, U.S. Environmental Protection Agency, Emission Standard Division, Office of Air Quality Planning and Standards, EPA Contract No. 68-D6-0011, August 15, 2001.

designated an extremely hazardous substance by the United States Environmental Protection Agency. Hydrogen sulfide is a similarly designated hazardous substance released by dairies, and can also cause serious health risks, especially for the very young and very old. Recent literature also suggests that dairy-related pathogens have the capability of binding to particulate matter and then moving off-site with wind, where it can cause major health problems in nearby populations. And, of course, nobody enjoys the noxious odors that are created by large dairies. The horrendous smell of HDF's proposed dairy would leave downwind residents gasping for fresh air.

Air contamination from the dairy will also contribute to climate change. Fossil-fuel consumption and emissions by and from dairy-utilized vehicles, and emissions of greenhouse gases (GHGs) such as methane and nitrous oxide that result from the high number of cows and quantities of stored manure will exacerbate the already-urgent problem of the warming of the planet. The EIS should consider the degree of contribution that HDF's proposed dairy would have on GHG levels in the atmosphere and climate change.

Because of these (and potentially other) air quality issues, HDF should conduct an extensive air modeling survey to evaluate the impacts its facility will have on nearby residents and tourists. Each contaminant must be carefully analyzed to determine its potential impacts on residents and the environment.

*D. The Proposed Dairy Would Harm Threatened, Endangered, and Culturally Significant Species.*

Besides degrading various environmental media – the South Shore's land, air, and water – HDF's dairy will also result in harm to threatened, endangered, and culturally significant species. Pollution from large dairies like that proposed by HDF has been shown to change and degrade habitat and result in the destruction of other species, through both direct (e.g., contaminated water) and indirect (e.g., species die-off as a result of eutrophication) effects.

Kikuyu grass, slated to be the "primary" food source for the dairy cows, is known to be an extremely aggressive crop, and may crowd out other species. It is considered a weed pest in some areas. *See, e.g.*, http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7458.html. There is a risk that, if not properly managed and contained, the kikuyu grass could spread to neighboring parcels and crowd out native plant species. The EIS should explain how HDF plans to contain this aggressive plant. And although the Kikuyu and Kikuyu-Guinea grasses are slated be the cows' primary food source, the importation of any other crops for food sources present a risk that diseases and other invasive species will be introduced to the island. HDF should analyze the degree of risk posed to native plant and animal species by its proposed use of Kikuyu grass and other feed material.

Further, the entire coastline where discharges from the proposed dairy will enter the ocean is protected critical habitat. This habitat is home to a variety of native



Hawaiian species. HDF must present a detailed analysis evaluating how its dairy could potentially impact all of the species that live in this protected corridor. Special attention should be paid to *Sesbania tomentosa*, commonly referred to as 'ohai, a type of endemic coast vegetation that is a listed federally endangered species and a State of Hawai'i Species of Greatest Conservation Need. The critical habitat designation along the Māhā'ulepu coastal corridor is meant, at least in part, to provide assurance for the continued existence of this species – a continuation that is seriously threated by the presence of a 2,000 dairy farm upstream. Other federally endangered species that require investigation in the EIS include *Anas wyvilliana* (Hawaiian Duck, Hanama'ulu); *Branta sandvicensis* (Hawaiian Goose, Nene); *Fulica alai* (Hawaiian Coot); *Gallinula chloropus sandvicensis* (Common Moorhen); and *Himantopus mexicanus knudseni* (Hawaiian Stilt, Ae'o). This list is not meant to be all-inclusive; it is incumbent upon HDF to conduct a thorough analysis of how its dairy could potentially impact all surrounding species, not just those that are federally endangered.

Similarly, animal waste has been shown to cause localized impacts on ocean acidification, and resulting impacts on wildlife of the broadest spectrum. These impacts must be addressed on their own as well as from cumulative impacts from climate change.

Finally, although the dairy cows themselves are not a protected species, a risk to the health of the herd exists due to the number of cows occupying a small area. As discussed above, it is clear that HDF plans to house up to 2,000 dairy cows in relatively short order. The EIS should include a discussion of potential risks to the health of dairy cows including risks for rapid spread of illness and disease based on the size of the herd and physical confinement or housing.

**II. HDF's Proposed Dairy Would Substantially Affect Economic and Social Welfare.**

*A. The Proposed Dairy Would Significantly Impact Important Cultural and Historic Sites and Resources.*

In traditional Hawaiian culture, natural resources and cultural resources are considered one and the same. A spiritual connection exists between people and their surroundings, including the land, water, and sky. Māhā'ulepu is a traditional Hawaiian ahupua'a, or socioeconomic/geologic/climatic subdivision of land, running from the Ha'upu mountain range to the shoreline on Kaua'i's southeast coast. In 2006, the National Parks Service identified certain natural and cultural resources in this area, which hold historical significance for the native Hawaiian population and provide recreational and other enjoyment opportunities for visitors. Those resources include: the undeveloped shoreline corridor from Makawehi northeastward through Māhā'ulepu and Kipu Hai to Nawiliwi Bay; the Hule'ia National Wildlife Refuge and historic Alekoko Fishpond along Hule'ia Stream; and parts of the Ha'upu mountain range overlooking these areas. NPS Study at 1. Hawaiian burials have been found along coastal sand dunes, and historic petroglyphs occur on Māhā'ulepu beach and on Grove Farm agricultural lands in Māhā'ulepu Valley. NPS Study at 38.

An industrial dairy like that proposed by HDF has the potential to significantly disrupt and damage the ability of the Hawaiian population to appreciate and enjoy their traditional cultural resources. Damage due to construction and increased industrial development and traffic, air and water pollution, and potential loss of species in these culturally-significant areas could lead to profound spiritual and emotional harm to those who value these areas for their cultural and historical significance. The EIS should investigate the presence of historical and cultural sites in and around the proposed dairy operation and conduct an intensive evaluation of how those sites may be affected; for example, whether and to what extent the ability of individuals to grow or gather traditional plants such as taro would be impaired.

*B. The Proposed Dairy Would Have Significant Social Impacts.*

HDF's industrial-sized dairy may cause additional social impacts to the population at large. Increased noise and traffic during the construction phase and during the dairy's daily operations will negatively affect quality of life for people living near the dairy and in areas receiving increased dairy-related vehicle traffic. The aesthetic and recreational value of areas in and around Māhā'ulepu would be diminished by the presence of an industrial dairy, especially from pollution of surface water and coastal waters traditionally used for recreation. The EISPN identifies certain traditional activities which take place along the Māhā'ulepu coast, including hiking, hunting, fishing, and gathering. EISPN at 3-3. A comprehensive evaluation of potentially-affected recreational activities would also include bird and animal watching, nature walking, wildlife photography and beachfront activities such as surfing, snorkeling, stand-up paddleboarding, and scuba, among others. For example, when water with elevated levels of nitrate and phosphorus reaches the coastal shoreline it will alter the pH, temperature, and chemical makeup of the existing marine water. In turn, coastal marine plant and animal life will suffer. A loss of wildlife and drastic alteration of the makeup of the marine nearshore ecosystems would diminish the enjoyment of individuals who recreate in the Māhā'ulepu Valley area and along Kaua'i's southern coastline, and may cause some of those individuals to cease those activities altogether. The EIS should consider the effects that HDF's proposal would have on noise levels and visual and recreational interests in and around the proposed project area.

Finally, the need for employees (both short and long term) to construct and operate the CAFO would have impacts on the regional demographics and related social support services. The EIS should consider the impacts that HDF's proposed dairy would have on the local population, demographic trends and needs.

*C. The Proposed Dairy Would Have Significant Negative Economic Impacts.*

HDF's proposed project would significantly affect the local economy. As the EISPN recognizes, Māhā'ulepu is located in the Po'ipū area, which is one of two major tourist and luxury home destinations on Kaua'i. EISPN at 3-3. Concerns about water and air quality, increased noise, health risks, impacts on native plant and animal species



(both in the proposed project area and in the affected coastal areas), discussed elsewhere in these comments, in the Māhā'ulepu Valley and Po'ipū area would reduce the desirability of the area as a place to live, work, and visit.

The resident population of Kaua'i is presently in the range of 63,000-70,000.[4] The approximately 2500 people (EISPN at 3-3) who reside within the Koloa- Po'ipū Census tract are likely to see their home and property values diminish significantly if a large dairy is operating just a few miles away; property values elsewhere throughout the Māhā'ulepu Valley and around Kaua'i may similarly decline. The EIS should conduct a thorough evaluation of the effects that a 2,000-cow dairy operation will have on land and home values in the area.

The tourism industry on Kaua'i will also be greatly affected by the presence of a large dairy. Area resorts, hotels, and independent vacation rentals, as well as the recreational facilities, shops, and restaurants that cater to visiting tourists, are all likely to experience a decline in visitors—and consequently, income—if the desirability of the Po'ipu area and Māhā'ulepu Valley as a vacation and recreation destination is diminished. The 2008 NPS Study estimated that, at that time, Kaua'i experienced a daily visitor population of about 21,000 tourists. NPS Study at 6. Those visitors infuse money into the local economy by renting hotel rooms and vacation properties, buying meals and souvenirs, and purchasing recreational experiences, such as a sightseeing tour or surf or paddleboard class. Visitors to Kaua'i also frequently arrive by boat, with both local and international cruise lines including the port of Nawiliwi, among others, as a sailing destination. Itineraries including ports of call on Kaua'i would likely lose some of their attractiveness when it becomes known, through sites, smells and other impacts, that an industrial dairy is operating mere miles from one of the island's major resort areas.

Regardless of the method of travel, some tourists will be reluctant to visit a destination—presently known for being the lush and verdant "Garden Island"—on which a large, industrial dairy operates, and the EIS should thoroughly evaluate the ways in which the HDF project would affect the thriving tourism industry.

*D. The Proposed Dairy Raises Infrastructure Concerns.*

HDF's proposed dairy will require substantial energy consumption, both during construction and daily operations. The EISPN indicates that some electrical power will be generated through the use of rooftop photovoltaic panels, but provides no information about the estimated number of panels or what the expected kilowatt output of those panels will be. The EIS should include a detailed analysis of the proposed dairy's electricity demands and a realistic estimate of any on-site electricity generation. Because on-site power generation will not be available until the photovoltaic panels are installed and functional—or in the event that HDF determines that on-site power generation will

[4] The EISPN notes that the 70,000 figure is "slightly above the total population," while a 2008 National Parks Service Report on Māhā'ulepu estimates that the island has about 63,000 residents. NPS Study at 6.

be insufficient to meet the dairy's demand—an evaluation of impacts on Kaua'i's utility resources must be undertaken and included in the EIS.

The EIS also should include a thorough characterization of the site and evaluate whether any historic uses (legal/formally recognized or otherwise) render the site inappropriate for a dairy operation. For example, the EIS should investigate whether and to what extent the site may have been used as a landfill or for waste disposal, and whether any hazardous or solid wastes remain on the property. If HDF determines that solid or hazardous wastes are present, it may reconsider the suitability of this location for milk production.

## III. HDF's Proposed Dairy Would Substantially Affect Public Health.

HDF's proposed project raises multiple public health concerns that must be thoroughly researched and carefully considered. While the examples below are not meant to be an exhaustive list, at minimum, the EIS should include an in-depth investigation of the risks posed to public health by virtue of the proposed dairy's potential contamination of water and air, and the potential that the dairy will serve as a source of vectors for disease transmission.

### *A. Groundwater and Surface Water Contamination Resulting from HDF's Proposed Dairy Would Threaten Public Health.*

Nitrate found in drinking water sources presents risks to human health. In recognition of these risks, the EPA has established the Maximum Contaminant Level (MCL) of nitrate at 10 mg/L. *See* http://water.epa.gov/drink/contaminants/basicinformation/nitrate.cfm. Infants, pregnant women, the elderly, and persons with compromised immune systems are particularly vulnerable to harmful health consequences of consuming water with elevated levels of nitrate. Infants below the age of six months who consume water with elevated levels of nitrate may experience shortness of breath and become seriously ill, and if untreated, may die. *Id*. Maternal exposure to environmental nitrate may increase the risk of pregnancy complications, such as anemia and preeclampsia. *See, e.g.*, U.S. Department of Health & Human Services, Agency for Toxic Substances and Disease Registry, "ATSDR Case Studies in Environmental Medicine Nitrate/Nitrite Toxicity," at 53 (Dec. 5, 2013). Epidemiologic studies of adverse health outcomes and high nitrate levels in drinking water have reported an increased risk of hyperthyroidism from long-term exposure to nitrate levels above the MCL, specifically between 11 mg/L and 61 mg/L. Burkholder, J. et al. "Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality." Environ. Health Persp. Vol. 115, No. 2 pp. 308-312 (Feb. 2007).

Further, even nitrate levels **below** the MCL of 10 mg/L may be cause for concern; nitrate at levels less than 10 mg/L has been associated with insulin-dependent diabetes, and increased risk for adverse reproductive outcomes, including central nervous system malformations and neural tube defects, have been reported for drinking water nitrate levels less than 10 mg/L. Accordingly, some public health experts believe that the MCL



for nitrate is set too high to effectively protect human health from known or anticipated adverse health effects. As discussed above, the potential for land-applied and stored manure to result in elevated levels of nitrate in groundwater is high. Potential mitigation through the use of reverse osmosis systems or other filtration may ameliorate the risk to a certain degree, but even those systems are not necessarily effective: they must be maintained properly to provide protection to the residents of the home, and there is evidence that high levels of nitrates may not be fully removed by reverse osmosis systems. *See, e.g.*, J. Schoeman, "Nitrate-nitrogen removal with small-scale reverse osmosis, electrodialysis and ion-exchange units in rural areas," Water SA, Vol. 35 No. 5 (Oct. 2009). Furthermore, reverse osmosis systems deplete natural minerals from water that can cause the filtered water to damage existing plumbing systems and strip important micronutrients from the human body.

Industrial dairies like that proposed by HDF also present public health concerns due to the risk of surface water contamination to river and stream ecosystems. Increased amounts of phosphorus and nitrogen in surface waters--resulting from agricultural runoff--may lead to large algal blooms, which cause a variety of illnesses in humans. *See, e.g.*, http://www.cdph.ca.gov/healthinfo/environhealth/water/pages/bluegreenalgae.aspx. Risks to the public may occur when individuals are recreating in water in which an algal bloom is present, or from drinking water sourced from surface water in which an algal bloom is present. *Id*. Certain strains of algae, such as blue-green algae, produce neurotoxins, which are highly dangerous to humans and other species. Microorganisms in animal waste, such as E.coli and enterococcus, are also frequently present in dairy-derived agricultural runoff to surface waters and pose a threat to human health when ingested. Any veterinary pharmaceuticals or antibiotics used by the dairy will likely wind up in downstream and downgradient water sources. These pharmaceuticals and antibiotics, on their own, may present a health risk to humans and other species, but may also contribute to increased numbers of antibiotic-resistant bacteria, which are of particular concern to humans.

### *B. Air Contamination Resulting from HDF's Proposed Dairy Threatens Public Health.*

Second, industrial dairies like HDF's proposed dairy also present multiple air quality concerns. As discussed above, stored manure emits major pollutants, including hydrogen sulfide, ammonia, airborne pathogens, and particulate matter. Exposure to ammonia can irritate the eyes, skin, and respiratory system, causing bronchiolar swelling or even tracheal/nasopharyngeal burns. The threat posed by exposure to ammonia is not taken lightly; in fact, if a dairy releases more than 100 lbs. of ammonia into the air on a daily basis, then it is required to report its releases under the federal Emergency Planning and Community-Right-to-Know Act ("EPCRA"), 42 U.S.C. § 11001 *et seq.* Exposure to hydrogen sulfide causes skin and eye irritation, and exposure in high levels may lead to even more severe health effects such as seizures, comas, and death. Releases of hydrogen sulfide are thus also required under EPRCA.

In addition to harmful air pollutants, the handling and disposal of manure and production of animal feed at industrial dairies creates airborne particles and dust, which may cause or exacerbate respiratory conditions such as asthma and bronchitis. While the airborne particles themselves pose a problem when they lodge in people's lungs and respiratory tracts, they may also serve as a mechanism for the transfer of airborne pathogens. Employees and individuals who reside near or frequently visit areas near the dairy are especially susceptible to harmful health impacts from chronic exposure to air with high concentrations pollutants and particulate matter.

Harmful air pollution may also result from the carbon emissions generated by HDF's operational vehicles. The transportation of thousands of gallons of milk (either to other Hawaiian islands or to the contiguous United States) for processing on a regular basis is certain to contribute to an increase in emissions of volatile organic compounds (VOCs) and other toxic pollutants resulting from frequent truck and tanker trips to and from the dairy. In addition to the health risks posed by the inhalation of polluted air, toxic air pollutants can be deposited onto soil and water, where they may bioaccumulate in plants or animals that are later consumed by humans as food.

*C. HDF's Proposed Dairy Threatens Public Health Because it Increases the Risk of Disease Transmission.*

Third, HDF's proposed dairy poses a public health risk as a means of disease transmission. The dense concentration of livestock would result in proliferating populations of rats, mosquitos, flies, and other pests. A surge in rodent an insect populations presents at least two major problems: first, swarming and biting flies and insects create a nuisance for swimmers, beachgoers, and other residents and tourists who wish to spend time in outdoor areas. Second, and more troubling, rats, flies, and mosquitos are vectors for disease transmission, and an increase in the populations of these animals increases the risk of transmission to humans. For example, the bacteria leptospirosis, already a recognized problem in freshwater streams and rivers on Kaua'i, is transmitted in the urine of infected animals; rodents and livestock are typical vectors. http://health.hawaii.gov/about/files/2013/06/leptobrochure.pdf. The livestock crowding at HDF's dairy, combined with the siting of the industrial dairy in a location with freshwater streams present increases the risk of transmission of leptospirosis and other diseases.

The potential public health threats identified above are just some examples of the types of public health risks that should be thoroughly discussed in the EIS and seriously considered by the approving agencies. To the extent that state waste management guidelines or other state laws or regulations require a plan for pest management, HDF should complete such a plan and include it in its EIS.

**CONCLUSION**

After HDF has an opportunity to take a hard look at all of the negative consequences of its proposed dairy, FOM believes it should abandon this ill-advised



project. Kaua'i in general, and the Māhā'ulepu Valley in particular, are extremely poor locations for intensive, industrial dairy farming. These lands should be preserved and protected, not turned irretrievably harmed.

Sincerely,

Charles M. Tebbutt
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July 3, 2015

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*Via US Mail and E-mail:*

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**RE: COMMENTS FROM FRIENDS OF MAHA'ULEPU REGARDING RESCISSION OF APPROVAL OF HAWAI'I DAIRY FARMS' SOIL CONSERVATION PLAN – HISTORIC PROPERTIES**

Dear Mr. Tausend & Mr. Petersen,

On behalf of Friends of Māhā'ulepu (hereinafter abbreviated as "FOM"), our office submits the following comments concerning requested rescission of your approval of Hawai'i Dairy Farms' ("HDF") Soil Conservation Plan.

FOM is a grassroots, not-for-profit corporation dedicated to protecting and preserving the natural beauty, land, and water of the Māhā'ulepu Valley and Island of Kaua'i, and to ensuring the health and safety of individuals and families who reside, work, or visit spaces in the Māhā'ulepu Valley and Island of Kaua'i.

In furtherance of its mission, FOM hereby joins the request for rescission of approval submitted to you on June 4, 2015 by Kawailoa Development, LLP ("Kawailoa") concerning Hawai'i Dairy Farms' ("HDF") Soil Conservation Plan. FOM shares Kawailoa's concern about the potential impacts—both identified and unidentified—to



historic properties and cultural resources on and near the site of HDF's proposed dairy. Kawailoa's Letter and Exhibits A–C are attached hereto as Attachment 1.[1]

In addition to its concerns about the proposed dairy's potential pollution of area waters and soil, and threatened harm to imperiled animal and plant species, FOM is troubled by the harm that the proposed dairy poses to historic properties and cultural resources. Accordingly, FOM joins Kawailoa in recommending that the West Kaua'i Soil & Water Conservation District ("WKSWCD") and Natural Resources Conservation Service rescind their approval of HDF's soil conservation plan (the "Plan").

The WKSWCD approved HDF's Plan via letter of December 17, 2013. HDF submitted its revised Archaeological Inventory Survey ("AIS") to the State Historic Preservation District ("SHPD") in February, 2015[2], and noted that "a total of 15 historic properties were newly identified and documented." *See* Attachment 1, Exhibit B. FOM is extremely concerned about the potential for harm to the integrity of many archaeological, historical, and culturally significant places within or near HDF's proposed dairy site. As explained in greater detail in FOM's comments on HDF's February, 2015 AIS, attached hereto as Attachment 2, FOM is concerned by, *inter alia*, the following impacts to historic properties and cultural resources:

- The size and scope of HDF's proposed dairy—at least 699 but eventually 2,000 dairy cows—contributes to a significant risk of surface and groundwater contamination; water itself is a significant cultural feature which must be protected;
- There is evidence of ancient habitation and *iwi*, or ancestral remains, in and around the proposed dairy site, which would be greatly disturbed by the operations of an industrial dairy;
- Given the prior habitation in the Māhā'ulepu Valley, it is very likely that some historical valley trails traverse the proposed dairy site and would be disturbed by the presence of a large dairy; and
- Rights of Native Hawaiians, including water, fishing, access, and ceremonial/burial rights, are recognized and memorialized in a Kaua'i County policy statement and resolution, reflecting a strong public interest in protecting and preserving rights of Native Hawaiians in Māhā'ulepu. HDF's proposed dairy is likely to harm these recognized rights.

Following WKSWCD's approval of the Plan—and without proper Clean Water Act permitting—HDF began ground-disturbing construction activities at the proposed dairy site, including, but not limited to, the installation of irrigation systems and watering troughs throughout the proposed dairy site and grading and grubbing of many acres of

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[1] Due to the length of the attachments to Kawailoa's Letter, Exhibits A-C are included only in the electronic copy of this correspondence.

[2] FOM is aware that on April 13, 2015, the SHPD asked HDF to revise its AIS for the second time.

native vegetation in order to begin field trials of non-native Kikuyu and Kikuyu-guinea grass. HDF should not have undertaken any construction activities or engaged in any activities resulting in impacts to historic properties and cultural resources prior to completion of an accurate AIS.

By beginning extensive construction-related activities without first determining the extent to which those activities may damage historic properties and cultural sites, HDF failed to ensure that no harm would occur to those sites. FOM shares Kawailoa's concerns about the negative impacts that the proposed dairy may have on both discovered and unknown historic properties and cultural sites, and agrees that the information relied upon by WKSWCD in its approval of HDF's soil conservation plan was, at a minimum, incomplete. The WKSWCD should ensure that any future action undertaken in connection with the proposed dairy project will not harm historic properties or cultural resources, and should determine whether the proposed dairy project can continue in a manner that is adequately protective of the these sites given the significant threats it has already presented and threatens to impose with further activities.

Sincerely,

/s/ Charles M. Tebbutt
Charles M. Tebbutt
Law Offices of Charles M. Tebbutt, P.C.

*On behalf of Friends of Maha'ulepu*

*Attachments:*

1) *6/4/15 Letter from L. Bail to B. Petersen and P. Tausend (electronic copy incl. Exhibits A-C; U.S. Mail copy is letter only)*
2) *Friends of Māhā'ulepu's Initial Comments on Hawai'i Dairy Farm's "Archaeological Inventory Survey of 580-Acres in Māhā'ulepu Ahupua'a, Koloa District, Kaua'i Island, Hawai'i," dated February, 2015.*

**Law Offices of Charles M. Tebbutt, P.C.**
**941 Lawrence Street**
**Eugene, OR 97401**
**Ph: 541-344-3505 Fax: 541-344-3516**

July 9, 2015

*Via Certified Mail, Return Receipt Requested and E-mail to:*

Virginia Pressler, M.D.
Director, State of Hawaii Department of Health
1250 Punchbowl St.
Honolulu, Hawaii 96813
virginia.pressler@doh.hi.gov

Keith Kawaoka
Deputy Director, Environmental Health Administration
1250 Punchbowl St.
Honolulu, Hawaii 96813
keith.kawaoka@doh.hi.gov

*Via E-mail to:*

Sara Roser (roser.sara@epa.gov)
Standards and TMDL Office
U.S. EPA Region IX, Hawaii

Hudson Slay (slay.hudson@epa.gov)
Nonpoint Source Pollution Program Contact, Hawaii
U.S. EPA Region IX

Janet Hashimoto (hashimoto.janet@epa.gov)
Monitoring, 305(b) and Integrated Reporting for Region IX States
U.S. EPA Region IX

**SUPPLEMENTAL LETTER RE: PETITION FOR § 303(d) LISTING OF WAIOPILI STREAM AS IMPAIRED WATER OF THE STATE AND FOR IMMEDIATE POSTING OF HEALTH RISKS POSED FROM HUMAN CONTACT WITH WATER**

Dear Director Pressler and Deputy Director Kawaoka:

This firm represents the Friends of Māhā'ulepu ("Friends") and the Kaua'i Chapter of the Surfrider Foundation ("Surfrider") (hereinafter collectively referred to as "Petitioners"). Pursuant to Hawaii Revised Statute § 91-6 and Department of Health Administrative Rule ("HAR") § 11-1-51, Petitioners formally petitioned the Hawaii Department of Health ("DOH") on May 7, 2015 to identify and list the Waiopili Stream on the Island of Kaua'i as a § 303(d) impaired waterway under the Federal Water



Pollution Control Act (Clean Water Act), 33 U.S.C. 1313(d). Petitioners also requested that DOH **immediately** post warning signs at the Waiopili Stream cautioning the public about the risks posed from human contact with the impaired water.

Per HAR §11-1-51(e), DOH was required to respond to the Petition within thirty days of its receipt. No formal response to the Petition has been received by this firm as of the date of this letter. Accordingly, DOH is in violation of its own regulations by failing to timely respond to the Petition. Please provide a prompt, thorough response to the Petition. If a response is not received by July 31, 2015, Petitioners will consider their legal options against DOH.

Furthermore, please consider the following supplemental information in responding to the Petition. The most recent sampling by Surfrider's Blue Water Task Force shows that the trend of very high enterococci results continues for the Waiopili Stream. The most recent data obtained by Surfrider is summarized in the chart below:

| Surfrider Kauai Blue Water Task Force | | | | |
|---|---|---|---|---|
| June 13, 2015 | | | | |
| Enterococcus bacterial concentration per 100 ml | | | | |
| Site | | | Single day | 2015 |
| | | | results | geomean |
| The Bowl | | | nt | 7.7 |
| PK's | | | <10 | 2.9 |
| Kaha Lani | | | <10 | 3.3 |
| Waikoko | | | <10 | 4.1 |
| Anahola Bay | | | <10 | 4.2 |
| Salt Pond | | | <10 | 5.3 |
| Middles | | | <10 | 6.1 |
| Pinetrees | | | <10 | 10.7 |
| Rock Quarry | | | <10 | 11.5 |
| Kalapaki Bay | | | <10 | 16.4 |
| Waimea | | | <10 | 180.3 |
| Waiohai | | | 10 | 3.1 |
| Kealia | | | 10 | 3.3 |
| Moloaa | | | 10 | 8.2 |
| Wainiha Stream | | | 10 | 142.3 |
| Pakalas | | | 20 | 126.8 |
| Kalihiwai | | | 31 | 8.3 |
| Kapa'a Beach Park | | | 128 | 5.7 |
| Waikomo Stream | | | 160 | 687.1 |
| Nawiliwili Str | | | 213 | 535.8 |
| Moikeha Canal | | | 288 | 666.6 |
| Waia'kea Canal | | | 617 | 545.0 |
| Hanamaulu Stream | | | 717 | 1387.8 |
| Uhelekawawa Canal | | | 855 | 938.1 |
| Gillins | | | 1421 | 535.1 |
| Niumalu Beach Park | | | 1500 | 1974.4 |
| Waiopili Stream | | | 7701 | 13414.5 |
| Single sample value should be <130 | | | | |
| Geometric mean should be <35 | | | | |

As the chart indicates, the Waiopili Stream is more contaminated than any other stream tested on the Island – *by an order of magnitude*. In fact, based on the BWTF sampling, the Waiopili Stream sampling point has exceeded the Statistical Threshold Value (STV) for enterococci 100% of the time (per DOH's water quality regulations, that threshold is not to be surpassed more than 10% of the time). Similar results were obtained from the Gillin's beach sampling point.[1] Petitioners also understand that DOH conducted its own sampling and found that testing sites 11-12 in Waiopili Stream exceeded the maximum STV 100% of the time, but because of the testing methods DOH used, values only registered >2005 /100 ml so that geometric means could not be calculated.

These data further confirm there is a continuous, *significant* water quality problem in Waiopili Stream. DOH cannot ignore such results, as part of its mission is to ensure that state waters satisfy applicable water quality limitations; here, the standard is a geometric mean of 35 cfu/100 ml over a thirty day period. HAR 11-54-8. The geometric mean of all 25 samples from the Waiopili Stream, starting last April 12, 2014, is 9600 /100ml, or about 274 times higher than the State's geometric mean STV of 35/100ml. Indeed, this is the type of emergency water quality problem that should have triggered investigation and action by DOH's enforcement division. It is also the type that requires immediate posting to warn the public of the dangers of coming into contact with this polluted stream, which is exactly what Petitioners had requested. Petitioners understand that enterococci results many times lower than those observed in the Waiopili Stream (in some instances, less than 100 times those observed in the Stream) prompted DOH to post warning signs at the Hanalei and Kahalu'u water courses. There is no rational reason why such signs should not similarly be posted at Waiopili. To assist in this effort, Petitioners have created warning signs that mirror those posted at Hanalei and Kahalu'u Lagoon, and have secured metal posts upon which the signs can be affixed. Upon DOH approval, Petitioners will post these signs at Waiopili so that the many visitors who approach the Stream are aware of its pollution and the risks thereto.

Based on publicly available agency records, we believe that DOH may take the position that enterococci is "ubiquitous" in Hawaii and, therefore, the excessively high levels found in the Waiopili Stream are somehow not a water quality concern. Such a position would directly conflict with DOH's own water quality regulations, which set the enterococci standards; here, the enterococci results from Waiopili are orders of magnitude higher than those standards. The stream water also fails to meet DOH guidance levels for Clostridium perfringens, with concentrations indicative of human sewage. Ubiquitous or not, such high results demand a swift response from the agency tasked with protecting Hawaii's water resources.

Furthermore, recent scientific literature shows that high enterococci results present an immediate public health threat. A study from the University of Hawaii found

[1] The 23 most recent samples had a geometric mean of 562 mpn/100 ml and exceeded the 130/100 ml STV 82.6% of the time.



that in Oahu streams enterococci was positively associated with a number of dangerous bacterial pathogens, and was the best surrogate for evaluating the presence and quantity of bacterial pathogens in tropical waters. *See* Viau, Emily *et al.*, "Bacteria pathogens in Hawaiian coastal streams – Associations with fecal indicators, land cover, and water quality," Water Research 45 (2011), 3279-3290. This study provides ample justification for the immediate posting of warning signs at the Waiopili Stream, as the very high enterococci and C. perfringens results obtained thus far likely correlate to the presence of other, dangerous bacterial pathogens.

The failure to address the problems at the Waiopili Stream contradicts DOH's mission to protect Hawaii's water resources and promote health and well-being. Please consider the above information in addition to that contained with the Petition, as well as all water quality monitoring data possessed by DOH. We look forward to your response.

Sincerely,

/s/ Charles M. Tebbutt
Charles M. Tebbutt
Attorney for Petitioners

**Law Offices of Charles M. Tebbutt, P.C.**
**941 Lawrence Street**
**Eugene, OR 97401**
**Ph: 541-344-3505 Fax: 541-344-3516**

June 26, 2015

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*Via US Mail and E-mail:*

Peter Tausend, Chairman
West Kaua'i Soil & Water Conservation District
4334 Rice Street, Room 104
Lihue, HI 96766-1801
e-mail: peter.tausend@pioneer.com

Jenna Dunn
District Conservationist
NRCS Service Center
4334 Rice Street, Room 104
Lihue, HI 96766-1801
e-mail: jenna.dunn@hi.usda.gov

**RE: COMMENTS FROM FRIENDS OF MAHA'ULEPU AND CENTER FOR BIOLOGICAL DIVERSITY REGARDING RESCISSION OF APPROVAL OF HAWAI'I DAIRY FARMS' SOIL CONSERVATION PLAN – ENDANGERED SPECIES**

Dear Mr. Tausend & Ms. Dunn,

On behalf of Friends of Māhā'ulepu (hereinafter abbreviated as "FOM") and Center for Biological Diversity (hereinafter abbreviated as "CBD" or "the Center"), our office submits the following comments concerning requested rescission of your approval of Hawai'i Dairy Farms' ("HDF") Soil Conservation Plan.

FOM is a grassroots, not-for-profit corporation dedicated to protecting and preserving the natural beauty, land, and water of the Māhā'ulepu Valley, its coastline, and their environments, and to ensuring the health and safety of individuals and families who reside, work, or visit spaces in and around the Māhā'ulepu Valley. Center for Biological Diversity is a non-profit corporation that is incorporated in California and headquartered in Tucson, Arizona, with field offices throughout the United States, including Arizona, New Mexico, California, Nevada, Oregon, Washington, Alaska, Minnesota, Vermont, Florida, and Washington, D.C. The Center works through science, law, and creative media to secure a future for all species, great or small, hovering on the brink of extinction. The Center has over 50,000 members. FOM, the Center, and their members are concerned about the conservation of imperiled species, including Kaua'i's birds (the endangered Hawaiian black-necked stilt, Hawaiian moorhen, Hawaiian coot,



Hawaii duck, the endangered Hawaiian goose, the endangered Hawaiian petrel, the threatened Newell's shearwater, and the band-rumped storm petrel), mammals (the endangered Hawaiian hoary bat and the Hawaiian Monk Seal), arthropods (the Kaua'i cave wolf spider and the Kaua'i cave amphipod), and plants (*Sesbania tomentosa*, or 'ohai).

In furtherance of their respective missions, FOM and the Center hereby join the request for "Rescission of Approval of Hawai'i Dairy Farms' Soil Conservation Plan," submitted to you on May 22, 2015 by Kawailoa Development, LLP ("Kawailoa"). FOM & CBD share Kawailoa's concern about the potential impacts—both identified and unidentified—to endangered species on and near the site of HDF's proposed dairy. Kawailoa's letter and Exhibits A & B are attached hereto as Attachment 1.

FOM & CBD are concerned about the proposed dairy's likely pollution of area waters and soil and damage to historic and culturally significant sites. FOM & CBD are equally troubled by the harm that the proposed dairy poses to federally-protected endangered species and critical habitats, which includes the two arthropod species found nowhere in the world except for a few caves along the South Shore of Kaua'i. Accordingly, FOM & CBD join Kawailoa in recommending that the West Kaua'i Soil & Water Conservation District ("WKSWCD") and Natural Resources Conservation Service rescind their approval of HDF's soil conservation plan (the "Plan").

The WKSWCD approved HDF's Plan via letter of December 17, 2013—over a year-and-a-half ago. It appears that HDF did not seek guidance on the proposed dairy from USFWS until January 26, 2015, well over a year after WKSWCD approved the Plan. In the interim months—and without proper Clean Water Act permitting—HDF began ground-disturbing construction activities at the proposed dairy site, including, but not limited to, the installation of irrigation systems and watering troughs throughout the proposed dairy site and grading and grubbing of many acres of native vegetation in order to begin field trials of non-native Kikuyu and Kikuyu-guinea grass. By the time USFWS submitted its comments on HDF's Environmental Impact Statement Preparation Notice ("EISPN"), which advised HDF to contact USFWS "early in the planning process," these construction activities had been ongoing for at least a year. HDF's construction activities were presumably performed without input from USFWS and without implementation of the many recommended mitigation measures (discussed below). HDF should not have undertaken any construction activities or engaged in any activities resulting in impacts to protected species without at least consulting with USFWS.

In its comments on HDF's EISPN, USFWS identified the following species which are known to live or transit through the proposed area: the endangered Hawaiian black-necked stilt, Hawaiian moorhen, Hawaiian coot, Hawaii duck, the endangered Hawaiian goose, the endangered Hawaiian hoary bat, the endangered Hawaiian petrel, and threatened Newell's shearwater, and the band-rumped storm petrel (a candidate for listing). USFWS also noted that the proposed dairy project will likely affect the designated critical habitat of the Kaua'i cave wolf spider and the Kaua'i cave amphipod,

and an endangered plant, ‘ohai. USFWS provided detailed recommendations to avoid and minimize project impacts, including:

- Implementing measures to minimize the waterbirds’ attraction to ponds, such as installing covers or enclosures over waste lagoons;
- Implementing a predator control program to minimize the predation and/or reduced breeding success of waterbirds using pastures;
- Providing additional information about fencing choices so that USFWS may assess whether entanglement or collision risks exist, and disallowing the installation of electric or barbed-wire fencing;
- Installing signage near roadways warning drivers of the presence of birds in the area;
- Working with USFWS to develop measures to avoid fostering conditions that would promote avian botulism, including a monitoring plan for early detection and response;
- Working with a biological monitor to avoid and mitigate potential displacement and loss of nests during construction or operation;
- Avoiding site-clearing or other plant-disturbing activities during the Hawaiian hoary bat birthing and pup rearing season;
- Engaging in construction activities only during daylight hours so as to avoid use of artificial lighting, which may disorient seabirds;
- To the extent exterior lights cannot be eliminated, positioning exterior facility lights low to the ground with motion-triggers and other safety measures;
- Configuring and installing utility lines in such a way as to avoid posing a collision hazard;
- Minimizing disturbance to the sensitive cave habitat—which is hydrologically linked to the proposed HDF site—that houses the two arthropod species (which disturbance includes contamination from surface sources of chemicals, pesticides, and waste disposal which enters caves via streams or groundwater seepage);
- Minimizing disturbance to the critical habitat of the ‘ohai (which disturbance includes habitat degradation caused by introduction of non-native plants, lack of adequate pollination, fire, destruction by off-road vehicles, storms, and human disturbances);
- Working with USFWS early in the planning process in order to ensure that ESA compliance is achieved, including any required consultation by any funding, authorizing, or approving Federal agency or any necessary application for an incidental take permit;
- Incorporating best management practices to avoid and minimize impacts to water resources.

By beginning extensive construction-related activities without any guidance from USFWS, HDF failed to ensure that the numerous protected species in and near the project area would incur no harm. FOM & CBD share Kawailoa’s & USFWS’s concerns about the negative impacts that the proposed dairy may have on area plants and wildlife, and agree that NRCS and WKSWCD should have consulted with USFWS prior to issuing



their approval of HDF’s soil conservation plan. It is FOM’s and CBD’s desire that the Māhā’ulepu Valley remain an idyllic, lush environment for **all** of its inhabitants, not just humans. In light of the concerns and recommendations raised by USFWS, the earlier approval of HDF’s soil conservation plan should be rescinded by NRCS and WKSWCD. Together with USFWS, the WKSWCD and NRCS should ensure that any future action undertaken in connection with the proposed dairy project complies with the Endangered Species Act (in particular, with the consultation requirements of Section 7 and the incidental take permitting requirements of Section 10), and determine whether the proposed dairy project can continue in a manner that is adequately protective of the identified endangered and threatened species given the significant threats it has already presented and threatens to impose with further activities.

Sincerely,

/s/ Charles M. Tebbutt
Charles M. Tebbutt
Law Offices of Charles M. Tebbutt, P.C.

*On behalf of Friends of Māhā’ulepu and Center for Biological Diversity*

*Attachment: 5/22/15 Letter from L. Bail to P. Tausend (incl. Exhibits A & B)*

GOODSILL ANDERSON QUINN & STIFEL
A LIMITED LIABILITY LAW PARTNERSHIP LLP

LISA A. BAIL

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May 22, 2015

**VIA CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

Peter Tausend, Chairman
West Kaua'i Soil & Water Conservation District
4334 Rice Street, Room 104
Lihue, HI 96766-1801

Jenna Dunn
District Conservationist
NRCS Service Center
4334 Rice Street, Room 104
Lihue, HI 96766-1801

Re: Rescission of Approval of Hawai'i Dairy Farms' Soil Conservation Plan – Endangered Species

Dear Mr. Tausend and Ms. Dunn:

This office represents Kawailoa Development LLP ("Kawailoa Development"). Kawailoa Development is the owner of the Grand Hyatt Kaua'i and the Poipu Bay Golf Course, which are located close to Hawai'i Dairy Farms' proposed dairy. The purpose of this letter is to request that the West Kaua'i Soil & Water Conservation District ("West Kaua'i SWCD") and the U.S. Department of Agriculture Natural Resources Conservation Service ("NRCS") rescind their approval of the Dairy's soil conservation plan ("Plan") due to impacts identified by the U.S. Fish & Wildlife Service ("USFWS") to endangered species on the subject property.

Hawai'i Dairy Farms began its ground-disturbing activity last year, is conducting field trials (including mowing activities), and has already installed its irrigation systems. *See* photographs enclosed as Exhibit A. Hawai'i Dairy Farms' activities have endangered the following species identified by the USFWS: endangered Hawaiian black-necked stilt, endangered Hawaiian moorhen, endangered Hawaiian coot, endangered Hawaiian duck, endangered Hawaiian goose, endangered Hawaiian hoary bat, endangered Hawaiian petrel, threatened Newell's shearwater, and the band-rumped storm-petrel, which is a candidate for listing. Additionally, the proposed project area is in the vicinity of designated critical habitat for two endangered arthropods, the Kaua'i cave wolf spider and the Kaua'i cave amphipod, as well as the endangered plant, ohai.







Upon review of the Dairy's Environmental Impact Statement Preparation Notice ("EISPN"), U.S. FWS sent a comment letter to Hawai'i Dairy Farms on February 23, 2015, a copy of which is attached as Exhibit B. The comment letter requires the following actions to avoid and minimize project impacts to listed species, candidate species, and critical habitat:

- The effluent ponds should be covered or enclosed to minimize the attraction of waterbirds and geese.
- Electric fencing should not be used as part of the dairy.
- Clostridium botulinum, a bacteria commonly occurring in nutrient-rich substrate, may result in paralysis and most often in mortality when ingested by Hawaiian waterbirds or Hawaiian geese. The spraying of pastures with decaying animal materials will increase the risk for avian botulism.
- A biological monitor should conduct Hawaiian waterbird and Hawaiian goose nest surveys prior to project initiation, and a biological monitor should be present "during all construction activities, earth moving activities, land clearing/disking activities, and mowing of pastures to ensure that waterbirds or geese nests are not adversely impacted."
- Barbed wire should not be used for fencing because Hawaiian hoary bats can become entangled.

Based on the fact that the Dairy undertook its ground-disturbing activities prior to receipt of the USFWS letter, Kawailoa Development believes that the Dairy failed to have a biological monitor conduct nest surveys, and failed to have a biological monitor present "during all construction activities, earth moving activities, land clearing/disking activities, and mowing of pastures to ensure that waterbirds or geese nests are not adversely impacted."

It is therefore apparent that there are a multitude of issues related to endangered species that have yet to be resolved between Hawai'i Dairy Farms, U.S. FWS and the public. It is also clear that the Dairy failed to implement any of the measures required by USFWS before undertaking its onsite activities, including grading and grubbing work, subsurface construction of its irrigation system and implementation of its field trials. The issues related to endangered species constitute new information and resource concerns that merit the immediate halt of any and all construction activities.

Approval of the conservation plan by NRCS and West Kauai SWCD triggered consultation requirements under Section 7 of the Endangered Species Act ("ESA"). Pursuant to Section 7(a)(2) of the ESA, if the proposed project is funded, authorized, or permitted by a Federal agency, then that agency must consult with U.S. FWS. That is, each federal agency shall

insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical. 16 USC § 1536(a)(2). The approval by NRCS and West Kauai SWCD of the Dairy's conservation plan authorized the action. "Action," pursuant to 50 CFR § 402.02, refers to all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States. Examples include, but are not limited to actions directly or indirectly causing modifications to the land, water, or air. 50 CFR § 402.02.

Additionally, according to the NRCS website, NRCS is an agency that provides technical and financial assistance to private land users on a voluntary basis and as such is considered an "action agency" with regard to compliance under ESA. NRCS is required by the ESA to protect and conserve federally listed species and species proposed for listing. This responsibility includes, but is not limited to research, protection, habitat acquisition, restoration, enhancement and maintenance.[1] NRCS and West Kaua'i SWCD failed to fulfill ESA requirements when they approved the Dairy's conservation plan.

The December 17, 2013 West Kauai SWCD soil conservation plan approval letter states,

> In issuing this conservation plan, the West Kauai Soil & Water Conservation District relies on the information and data which you provided to us. If, subsequent to the issuance of this approved conservation plan, such information and data prove to be false, incomplete or inaccurate, this approval may be modified, suspended or revoked.

The NRCS planning process also requires that the planner must "[r]evisit earlier steps if new objectives or resource concerns are identified." USDA, NRCS National Planning Procedures Handbook ("NPPH") at 600-C.16, 600-C.24 (Jan. 2013). We are copying Department of Land and Natural Resources Chair Suzanne Case on this letter because West Kaua'i SWCD is part of the Department of Land and Natural Resources, as constituted under Hawaii Revised Statues Chapter 180.

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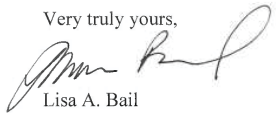
1 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/fishwildlife/?cid=stelprdb1042231





The information related to endangered species constitutes new information and resource concerns that require rescission by NRCS and West Kaua'i SWCD of the December 2013 Plan approval.

Very truly yours,



Lisa A. Bail

LAB

Enclosures: Exhibit A, Photographs of the Dairy site taken by the Hawai'i Department of Health, dated November 2014

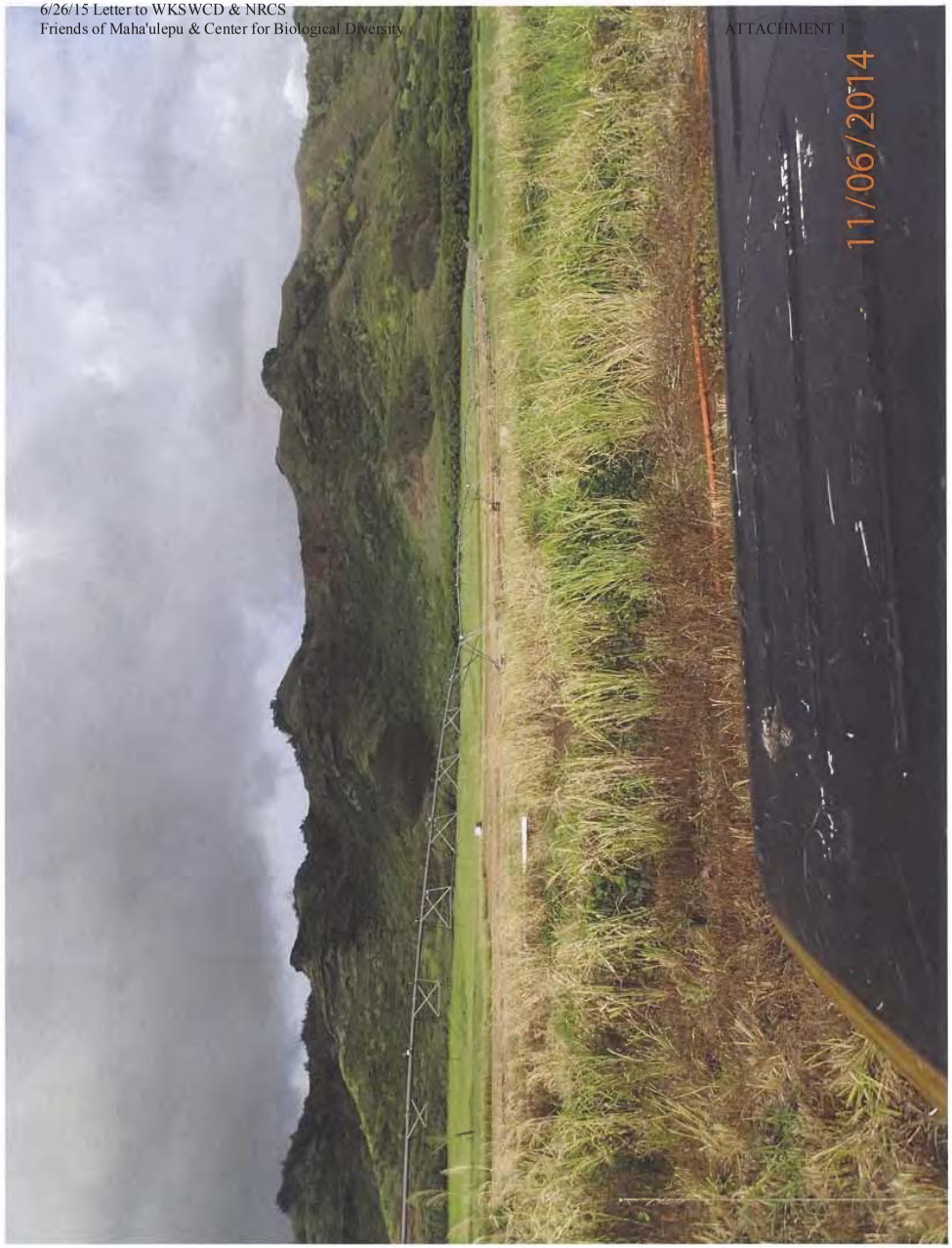
Exhibit B, Comment letter from U.S. Fish and Wildlife Service dated February 23, 2015

cc (w/encls.): Aaron Nadig, Biologist, U.S. Fish & Wildlife Service
Michael Moule, P.E., Chief, Engineering Division, County of Kaua'i
Suzanne Case, Esq., Chairperson, Hawai'i Department of Land and Natural Resources
Patricia McHenry, Esq.
Kendall J. Moser, Esq.

6/26/15 Letter to WKSWCD & NRCS
Friends of Maha'ulepu & Center for Biological Diversity
ATTACHMENT 1
11/06/2014


6/26/15 Letter to WKSWCD & NRCS
Friends of Maha'ulepu & Center for Biological Diversity
ATTACHMENT 1
11/05/2014

Exhibit A




6/26/15 Letter to WKSWCD & NRCS
Friends of Maha'ulepu & Center for Biological Diversity
ATTACHMENT 1

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai`i 96850

In Reply Refer To:
2015-TA-0138

FEB 23 2015

Jeffrey H. Overton
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813

Subject: Technical Assistance for the Proposed Hawaii Dairy Farms, Kauai

Dear Mr. Overton:

The U.S. Fish and Wildlife Service (Service) received your letter, dated January 26, 2015, requesting our comments on the Notice of Preparation of Environmental Impact Statement (EISPN) for the proposed Hawaii Dairy Farms (HDF) on the island of Kauai. Hawaii Dairy Farms, LLC proposes to establish and operate a grass-fed diary, capable of supporting 2,000 dairy cows, including commercial dairy facilities and pastures managed for Kikuyu and Kikuyu-Guinea grasses. The proposed dairy facilities consist of barn and milking parlor, cow walkways, farm roads, effluent settling and storage ponds, water distribution system and tanks, operations buildings, and associated infrastructure (electrical power, wastewater, and communications). The pasture design will include approximately 118 fenced paddocks (~4.5 to 5.0 acres each). The development will be located on approximately 578 acres consisting of portions of three larger parcels (TMK (4) 2-9-003:001 and 006 portion; TMK (4) 2-9-001:001) adjacent to Mahaulepu Road, east of Koloa town. We offer the following comments to assist you in the preparation of the draft Environmental Impact Statement (EIS). Our comments are provided under the authorities of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 *et seq.*), and the Fish and Wildlife Coordination Act of 1934 (FWCA), as amended (16 U.S.C. 661 *et seq.*; 48 Stat. 401).

We reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, as it pertains to federally listed species and designated critical habitat. The following species are known to occur or transit through the proposed project area: the endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), Hawaiian duck (*Anas wyvilliana*) (hereafter collectively referred to as Hawaiian waterbirds);the endangered Hawaiian goose (*Branta sandvicensis*); the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*); and the endangered Hawaiian petrel (*Pterodroma sandwichensis*), the threatened Newell's shearwater (*Puffinus auricularis newelli*), and a candidate for listing the band-rumped storm-petrel (*Oceanodroma castro*) (hereafter collectively referred to as seabirds). The proposed project area is in the vicinity of designated critical habitat

**Exhibit B**





for the following species: two endangered arthropods, the Kauai cave wolf spider (*Adelocosa anops*) and the Kauai cave amphipod (*Spelaeorchestia koloana*) (hereafter collectively referred to as arthropods); and an endangered plant, ohai (*Sesbania tomentosa*). We provide the following comments which include recommendations to avoid and minimize project impacts to listed species, candidate species, and critical habitat.

*Hawaiian Waterbirds and Hawaiian Goose*
The EISPN states that Hawaiian waterbirds and Hawaiian geese are known to utilize water features around the HDF parcel. Our information suggests that considerable numbers of Hawaiian waterbirds frequent the project area. The Service recommends you incorporate the following measures into your project description to avoid and minimize impacts to Hawaiian waterbirds and Hawaiian geese.

Waterbirds and geese may be attracted to the effluent settling and storage ponds as well as managed pastures. Waterbirds and geese attracted to sub-optimal habitat may suffer adverse impacts, such as predation and/or reduced reproductive success, and thus the project may create an attractive nuisance. Measures to minimize their attraction to ponds, such as covering or enclosing the ponds, should be considered. To minimize predation and/or reduced breeding success of waterbirds and geese using pastures, a predator control program should be implemented to control non-native predators, such as feral cats and rats.

Injury or mortality of adults and juveniles may potentially occur due to entanglement or collision with fencing and/or collision with vehicles on farm roads. Additional details on fencing are necessary to assess potential impacts to Hawaiian waterbirds and Hawaiian geese. Electric fencing (commonly used to control movement of cows in pastures) should not be used for fencing as part of the proposed project. To minimize potential collision with vehicles, the Service recommends you install signage near roadways to warn drivers (e.g., farm workers and visitors) to be wary of birds in the areas.

Under certain environmental conditions, *Clostridium botulinum*, a bacteria commonly occurring in nutrient-rich substrate, may produce toxins that when ingested by Hawaiian waterbirds or Hawaiian geese results in paralysis and most often mortality (referred to as avian botulism). The EISPN states that 100% of manure from up to 2,000 dairy cows will be treated and applied to fertilize pasture grasses. The spraying of pastures with decaying animal materials will promote a nutrient-rich bacterial substrate. We recommend you work with our office so that we may assist you in developing measures to avoid fostering conditions that promote avian botulism and a monitoring plan for early detection and response.

Displacement and/or loss of nests may potentially occur during project construction and operation (e.g., clearing areas, disking, and/or mowing of pastures). To minimize and avoid impacts due to displacement and/or loss of nests, we recommend the following measures:

- A biological monitor should conduct Hawaiian waterbird and Hawaiian goose nest surveys at the proposed project site prior to project initiation.
- Any documented nests or broods within the project vicinity should be reported to the Service within 48 hours.

- A 100-foot buffer should be established and maintained around all active nests and/or broods until the chicks have fledged. No potentially disruptive activities or habitat alteration should occur within this buffer.
- The Service should be notified immediately prior to project initiation and provided with the results of pre-construction Hawaiian waterbird and Hawaiian goose surveys.
- A biological monitor(s) should be present on the project site during all construction activities, earth moving activities, land clearing/disking activities, and mowing of pastures to ensure that waterbirds or geese nests are not adversely impacted.
- If a Hawaiian waterbird or Hawaiian goose is observed within the project site, or flies into the site while activities are occurring, the biological monitor should halt all activities within 100 feet of the individual(s). Work should not resume until the Hawaiian waterbird(s) or goose leave the area on their own accord.
- A post-construction report should be submitted to the Service with 30 days of the completion of the project. The report should include the results of surveys, the location and outcome of documented nests, and any other relevant information.

We suggest the draft EIS provide additional information on effluent ponds (e.g., number, location, and sizes), fencing materials and site layout, fertilization practices (e.g., effluent treatment, application amounts, frequency), outline measures to avoid and minimize the various potential impacts described above, and examine potential impacts that may occur as a result of establishment and operation of the HDF project.

*Hawaiian Hoary Bat*
The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Additionally, Hawaiian Hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground. When barbed wire is used for fencing, Hawaiian hoary bats can become entangled. Barbed wire should not be used for fencing as part of the proposed project.

*Seabirds*
Seabirds, including the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. We recommend the following minimization measures be incorporated into your project description:

- Construction activities should only occur during daylight hours. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.



- If exterior facility lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded and/or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

The draft EIS should examine potential impacts to the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel that may occur as a result of construction and the operational use exterior lights associated with the proposed project.

Utility poles and overhead lines may constitute a collision hazard for seabirds as they traverse between the ocean and their breeding colonies. Additional information on the design of the proposed utility system for the development, including the number of utility poles, length of powerline, configuration of powerlines, and height of utility poles and overhead powerlines, in the area is necessary to assess the potential impacts to seabirds. We suggest the draft EIS provide this additional informational as well as determine whether undergrounding power lines in the proposed development area is feasible to avoid impacts to seabirds. If it is not feasible to underground power lines or install power lines at or the below the vegetation layer, other measures to minimize the potential for seabird collision should be analyzed in the draft EIS (e.g., vertical versus horizontal arrays, etc.).

*Arthropods*
The Kauai cave wolf spider and the Kauai cave amphipod are found only on the island of Kauai in the Koloa area from four to six caves respectively. They occur in small, subterranean spaces, voids, and cracks, requiring a woody debris food source. Cave ecosystems are threatened by contamination from surface sources of toxic chemicals from spills, pesticides, and waste disposal which enter caves via streams and/or ground-water seepage. The proposed HDF site is hydrologically linked to the sensitive cave habitats. We recommend the draft EIS address any project components that have the potential to impact the critical habitat (e.g., wastewater and pasture fertilization practices) and minimize potential disturbance.

*Sesbania tomentosa*
*Sesbania tomentosa* occurs on the coast located southeast of the HDF site. The primary threat to the species on the island of Kauai is habitat degradation caused by competition with various introduced plant species, including but not limited to buffelgrass (*Cenchrus ciliaris*), swollen fingergrass (*Chloris barbarta*), sourgrass (*Digitaria insularis*), and haole koa (*Leucaena leucocephala*). Other threats include lack of adequate pollination, fire, destruction by off-road vehicles, other human disturbances, and storms. The Service recommends that your draft EIS address any project components that have the potential to impact the critical habitat and minimize potential disturbance.

Under the ESA, take is defined to mean "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct." Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the

Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering.

When additional information on the proposed project description becomes available, we recommend you contact our office early in the planning process so that we may further assist you with ESA compliance. If it is determined that the proposed project may affect federally listed species or critical habitat, the project proponent(s) should coordinate with us under section 10 of the ESA or consult with us pursuant to section 7 of the ESA as follows. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats, and defines measures to minimize and mitigate those adverse effects.

Additionally, we recommend you incorporate the attached best management practices into your project description to avoid and minimize impacts to water resources that have the potential to occur during establishment and construction of the proposed project.

We appreciate your efforts to conserve protected species. If you have questions regarding this letter, please contact Adam Griesemer, Endangered Species Biologist (phone: 808-285-8261).

Sincerely,

Aaron Nadig
Island Team Manager
Oahu, Kauai, North Western Hawaiian Islands, and American Samoa

cc: Laura McIntyre, HDOH



**U.S. Fish and Wildlife Service**
**Recommended Standard Best Management Practices**

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see *http://www.haccp-nrm.org/Wizard/default.asp*) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

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July 7, 2016

*Via e-mail only to:*

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Laura McIntyre
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**RE: FOLLOW UP TO JUNE 21 LETTER AND RESPONSE TO JULY 6, 2016 LETTER FROM PATRICIA MCHENRY**

Dear Dr. Pressler, Dr. Kawaoka, and Ms. McIntyre,

While Ms. McHenry and I obviously disagree as to whether an extension of time on the DEIS comment period is appropriate or permissible, I write here to respond specifically to her claim that I offered "intentional misstatements" and "false characterizations" in my June 21 letter. Also, as promised in my letter of June 21, attached please find a copy of the deposition transcript of Mr. James Garmatz, Hawaii Dairy Farms' (HDF) Farm Manager, taken on June 13 and 14 in *Friends of Maha'uelpu v. Hawaii Dairy Farms, et al.*, 1:15-cv-00205-LMK-KJM. HDF's July 6 response to my letter of June 21 claims that Friends of Maha'ulepu has mischaracterized the facts surrounding HDF's multiple applications for NPDES permit coverage for discharges from HDF's construction activity, and that HDF's May 7, 2015 permit application is not for past activities. Tellingly, HDF offers no support for this assertion.

The attached transcript reveals that many of the *exact* construction activities for which HDF seeks NPDES coverage have already taken place. Department of Health queries about coverage for past activities were ignored until at least the August 2015 submission. Testimony describing the timing and extent of HDF's construction activities appears, *inter alia*, at pp. 43-45, 53, 56-57, 75-77, 84-90, 92-93, 96, 104-06, 110-11, 118-19, 123-24, 128, 140-41, 149-51, 157, and 165. For example, on pages 56-57, Mr. Garmatz describes the irrigation piping that was installed:



> Q. Okay. When was the pipeline installed?
> MR. PALOUTZIAN: Well, I think the question is vague as posed. Go ahead. And it may call for speculation, lack of foundation. Go ahead.
> THE WITNESS: Late March of 2014.
> BY MR. TEBBUTT:
> Q. Okay. And who installed it?
> A. Effluent Irrigation Company.
> Q. Effluent?
> A. Effluent.
> Q. E-f-f?
> A. (Moves head up and down.)
> Q. Okay. And was it all installed in March of 2014?
> A. To the best of my knowledge.
> Q. Do you know how many feet of irrigation pipe was installed in March of 2014?
> A. Exact number, no.
> Q. Approximate?
> A. A thousand to 1,500 feet.
> Q. And was that one line or multiple lines?
> A. One line.
> Q. And did you oversee the installation of that pipe?
> A. Yes.
> Q. And how was that installed?
> A. Excavator, dug the line, pipe was placed in the hole, glued together and back filled.
> Q. How deep was the pipe laid?
> A. Varied, but the deepest point would probably have been four feet.
> Q. Was any of the excavated material moved off site?
> A. No.

Tr. 56:5-57:13. But, in his letter of August 14 (which was included in the August 17 NPDES submission to the Department of Health), Mr. Garmatz represented that "land disturbance associated with this project as listed in the NOI has not commenced, including, but not limited to, preliminary site construction such as **installation of fencing and irrigation systems**." (emphasis added). In deposition, he admitted that his letter was incorrect:

> Q. Under the query 2, it says, Land disturbance associated with this project as listed in the NOI has not at [sic] commenced?
> A. Uh-huh.

> Q. Including, but not limited to, preliminary site construction such as installation of fencing and irrigation systems.
> Irrigation systems had already been -- some of the irrigation systems had already been put in place prior to that letter, correct?
> A. That's correct.
> Q. So this letter is incorrect, again, isn't it?
> A. Yes.

This is just one example of the multiple misrepresentations that have been made to the Department of Health in connection with HDF's NPDES permit applications. Other construction activities that HDF has performed and also lists in its scope of work in the NOI include: (1) clearing and grubbing of dairy facility site (Tr. 75:12-17); (2) grading for and installation of waste settling and storage ponds (Tr. 105:23-106:6); (3) trenching for and installation of new potable water distribution systems for livestock consumption through watering facilities and concrete troughs (Tr. 84:8-89:8); and (4) grading and maintenance for existing agricultural ditches on site (as needed) (Tr. 165:19-23).

The transcripts also establish that, contrary to HDF's assertions, construction on the site has continued. I note that the date construction allegedly ceased continues to evolve; in pleadings to the District Court, HDF stated that construction ceased on June 24, 2014, yet in Ms. McHenry's July 6 letter, she claims that construction stopped in May 2014. Mr. Garmatz testified that site work involving the use of a backhoe has been performed multiple times, in many cases after construction purportedly ceased. Tr. 118:3-119:6, 123:6-17; 123:23-124:6; and 128:9-19. HDF also admits, in its Motion for Summary Judgment before the District Court, that groundwater wells were constructed between February and June 2015.

When the Department reviews the attached transcript in connection with HDF's various NPDES permit applications, the veracity of Friends' position is clear. We hope that the Department will sincerely consider the additional justifications for an extended comment period, and look forward to providing our input on the DEIS.

Sincerely,

/s/ Charles M. Tebbutt
Charles M. Tebbutt
Law Offices of Charles M. Tebbutt, P.C.
*Counsel for Friends of Māhā'ulepu*



*cc via e-mail to:*

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# ATTACHMENT



IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

---------- )

FRIENDS OF MAHAULEPU, INC., ) CIVIL NO.

Hawaii non-profit corporation, ) 1:15-cv-00205-

Plaintiff, ) LMK-KJM

vs. )

HAWAII DAIRY FARMS, LLC, a )

Delaware Limited Liability )

Company; ULUPONO INITIATIVE, LLC; )

a Delaware Limited Liability )

Company; MAHAULEPU FARMS, LLC; a )

Delaware Limited Liability )

Company, )

Defendants. )

---------- )

DEPOSITION OF JAMES J. GARMATZ,

VOLUME 1,

Taken on behalf of Plaintiff at Koloa Public Library, 3451 Poipu Road and Sheraton Kauai Resort, 2440 Hoonani Road, Koloa, Hawaii 96756, commencing at 9:02 a.m. on June 13, 2016, pursuant to Notice.

REPORTED BY:

TERRI R. HANSON, CSR 482

Registered Professional Reporter

APPEARANCES

For Plaintiff:

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SARAH A. MATSUMOTO, ESQ.
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For Defendants:

DIRK B. PALOUTZIAN, ESQ.
Baker, Manock & Jensen, PC
Suite 421
5260 North Palm Avenue
Fresno, California 93704-2209

Also Present:

Bridget Hammerquist



I N D E X


| EXAMINATION BY | PAGE |
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| Mr. Tebbutt | 5 |

EXHIBITS FOR IDENTIFICATION

| | |
|---|---|
| Deposition Exhibit No. 1 | |
| Invoices, HDF 000481 - 000555 | 59 |
| Deposition Exhibit No. 2 | |
| Amended Notice of 30(b)(6) Deposition of | |
| Hawaii Dairy Farms, LLC. | 71 |
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| Amended Notice of Deposition of | |
| Mr. James Garmatz. | 71 |
| Deposition Exhibit No. 4 | |
| Figure 7B, Farm Post Construction Conditions. | |
| FOM_002495 | 80 |
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| Aerial photograph. FOM_000231 | 104 |

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Deposition Exhibit No. 6
Photograph. 112

Deposition Exhibit No. 22
Declaration of James Garmatz in Support of
Defendants' Motion for Summary Judgment. 113



WHEREUPON, the following proceedings were duly had:

JAMES J. GARMATZ,
after having been first duly sworn,
was examined and testified as follows:

EXAMINATION

BY MR. TEBBUTT:

Q. Good morning, Mr. Garmatz.

A. Good morning.

Q. Please state your full name and residence address for the record.

A. James John Garmatz, 3755 Omao Road, Koloa, Hawaii.

Q. And, sir, what is your present employment?

A. I'm a farm manager, Hawaii Dairy Farms.

Q. And how long have you been in that position?

A. Since October of 2013.

Q. And who hired you?

A. Mr. Kyle Datta.

Q. How did you find out about the job opportunity?

A. They had been in a long association with Kyle and some of the earlier investors.

Q. You have? You have?

A. I had been in a relationship with Kyle and some of the earlier investors in the project.

Q. In what form? In what relationship?

A. We looked at purchasing a dairy on the Big Island in 2011, and the sale didn't go through. And when that purchase was originated, I was going to be the farm manager.

Q. Okay. Had you meet Mr. Datta -- Dotta or Datta?

A. Datta.

Q. Had you met Mr. Datta prior to 2011?

A. Yes, I met Mr. Datta in 2010.

Q. In what situation did you meet him? How did you meet him?

A. I came to the Big Island to look at the dairy that they were going to try to purchase and spent some time with him there, and we kept in communication past that.

Q. So were you asked to come to the Big Island by Mr. Datta?

A. Yes, sir.

Q. Where were you when you were asked to come to the Big Island?

A. Where was I located?

Q. Yes.



A. Friona, Texas.

Q. Okay. And how did Mr. Datta find out about you?

MR. PALOUTZIAN: May call for speculation, lack of foundation. Go ahead.

THE WITNESS: From some of the folks that he was partnering with in the new venture, Dr. Bob Fry, Arama Kukutai, who I'd had a long relationship with, goes back to the early 2000s. I've known Bob very long.

BY MR. TEBBUTT:

Q. Okay. Was that -- were those relationships in New Mexico?

A. No, primarily in southeast Missouri.

Q. Okay. All right. We'll get back to some of this, but I just want to go over some background before I start getting into substance. Have you ever been deposed before?

A. Yes, sir.

Q. How many times?

A. Twice.

Q. In what context?

A. Both of them were in issues concerning collections of monies that was owed.

Q. In what type of business?

A. Cattle feeding operations.

Q. Were you the plaintiff or the defendant in those cases?

A. We were the plaintiff, both cases.

Q. So you were seeking money?

A. Yes, sir.

Q. Okay. And these cattle feeding -- let me -- these cattle feeding operations, were they in New Mexico?

A. Texas.

Q. Where in Texas?

A. One was in Amarillo, Texas. No, I need to retract that statement. I was deposed in El Paso, Texas.

Q. Okay.

A. And the complaint, I believe, was heard in Parmer County, Texas.

Q. Okay. In both cases?

A. Yes.

Q. Both situations?

A. Yes.

Q. Okay. I'm just going to go over a little more background here first. The court reporter can only get one of us down at a time, and sometimes it's human nature to try to anticipate questions. But you and I are going to be in communication quite a bit today. So



I'm going to ask you to wait till I finish my question before you answer, okay?

And this is the next one, is you need to give an audible answer. Whenever I ask you a question --

A. Yes, sir.

Q. Yeah, there was the anticipation. You also need to give an audible answer. So yes, no, or something other than that if that's required. But nods of the heads and uh-huhs and un-uns don't work very well for the court reporter. So you need to give clear, audible answers. Do you understand that?

A. Yes, sir.

Q. Thank you. And your deposition today is taken under oath. Do you understand that?

A. Yes, sir.

Q. And for multiple purposes for a deposition like this. One is to gather facts. The other is if we were to go to trial, and you were to give different answers than you gave today, I could use this to impeach you at trial. Do you understand that?

A. Yes, sir.

Q. And so are you under any medications or under any influences today that would prohibit you from giving truthful testimony?

A. No, sir.

Q. Okay. So the depositions that you were in previously, when were they?
A. Late 1990s. I can't give you the exact time.
Q. Were they both around the same time?
A. Yes, sir.
Q. Were they separate actions against different defendants?
A. Yes, sir.
Q. Okay. Was it involving the same facility?
A. Yes, sir.
Q. What facility was that?
A. Boy. Henry Lawson, who was out of -- I can't give you the exact location, but he was located down in central Texas, north of San Angelo.
Q. Did you work for Mr. Lawson?
A. Yes, sir.
Q. Okay. And was that a beef feeding operation?
A. That's correct.
Q. A couple of other just background things. If you don't understand a question of mine, I'm going to ask that you tell me that. And if you don't tell me that, I'll assume that you understood my question, okay?
A. Okay. Let me backtrack just a second here.
Q. Sure.
A. At Mr. Lawson's we also fed dairy heifers.



Q. All right.
A. There's a distinct difference between beef heifers and dairy -- beef animals and dairy heifers.
Q. All right. So you did both, you fed beef animals and dairy heifers?
A. Primarily, yes. Primarily dairy heifers.
Q. Primarily dairy, okay. How many head did you have there?
A. We had 2,000 head there.
Q. Okay. And how many beef animals?
A. Six hundred beef animals, 1,400 dairy heifers.
Q. Did that facility have an NPDES permit?
A. No.
Q. NPDES is the acronym that we use. I might say nipdeez or something like that for your information.
Have you worked for any dairies in New Mexico?
A. Yes, sir.
Q. How many?
A. One.
Q. What was the name of that dairy?
A. Buena Vista Dairy.
Q. What years did you work there?
A. 2003 through 2009.
Q. And where is that located?
A. Mesquite, New Mexico.

Q. And how big a facility was Buena Vista Diary?

A. Buena Vista Diary was -- consisted of two facilities. Buena Vista 1 milked about 1,500 cows, Buena Vista No. 2 milked about 2,000 cows and raised heifers.

Q. How many heifers?

A. Four thousand.

Q. What was your capacity? What was your job for Buena Vista?

A. I was originally hired as the manager of both operations, overseeing the operations. And after a short time on the job, it was decided that I would go ahead and take control of Buena Vista No. 2 and the heifer operation but still oversee some of the work and the things that were being accomplished at Buena Vista No. 1. We had a man in place there that was the manager there also.

Q. So does that sum up your job responsibilities during the full time period of 2003 to 2009 at Buena Vista?

A. I believe so, yes.

Q. Why did you leave Buena Vista?

A. Michael Weatherly, who was the owner, decided to participant in the CWT cow program, which forced us to kill all of our milking stock to eliminate numbers



out of the cattle market. And so when I left there, there was no cattle there at all.

Q. What does this -- what's the CWT program?

A. Cooperatives Working Together. It was a program that was based in the early 2000s where the cooperatives -- the milk cooperatives across the United States would put money together via the customer's milk check -- the dairymen's milk check. And that they would on a quarterly basis they would bid to take some dairies out of the market. If you wanted to participate, you gave them a bid. And if the bid was warranted and was served correctly, they would pay you for that milk.

Q. And pay for the animals to be --

A. Yes, you got paid for the animals.

Q. Okay.

MR. PALOUTZIAN: Let him get his question out.

BY MR. TEBBUTT:

Q. Was that a cooperative payment or was it a government payment?

A. Cooperative payment.

Q. Okay. Did Buena Vista Diary have an NPDES permit?

A. Buena Vista Diary had a CAFO permit.

Q. Did it have a federal CAFO permit?

A. Correct.
Q. So that was -- was that an NPDES permit?
A. I don't consider the NPDES the same as the CAFO.
Q. I mean, what's the difference to you?
A. It's honestly --
MR. PALOUTZIAN: This may call for a legal opinion. Go ahead.
THE WITNESS: The difference is I've never seen the NPDES alongside of the CAFO, because we've always referred to it as the CAFO. Now, if the government says the two are the same or if they're defining that as an NPDES, that's fine. But I always referred to it as CAFO. We kept the records for CAFO. We kept everything that was necessary. We did our updates every five years and went through that process and dealt with that. Now, if the NPDES is the same as the CAFO, that's fine. But I just understood it to be a CAFO.
BY MR. TEBBUTT:
Q. What agency did you go through the process with every five years?
A. The EPA, Region 6, based out of Dallas.
Q. Was Buena Vista required to put in monitoring wells?



A. Yes. They were in place already.
Q. When you arrived in 2003?
A. Yes.
Q. How many?
A. They purchased the facility out of a bankruptcy in 2001, and those monitoring wells were already in place, basis the CAFO permit that was in place. They were required already.
Q. And was that required by the State of New Mexico or EPA, do you know?
A. EPA.
Q. And were you responsible for making sure those monitoring wells were sampled on a regular basis?
A. Yes, sir.
Q. How often were they sampled?
A. We sampled the wells ourself annually, and EPA would come on different occasions and sample the wells. 'Cause they'd come unannounced, and they would sample the wells, and we would let them do it. It was primarily done by the state.
Q. Did you sample for nitrate?
A. Yes, sir.
Q. And what were the highest levels you got?
A. Oh, I can't recall.
Q. More than 10 parts per million?

A. I can't recall.
Q. How deep were the wells, do you know?
A. I can't recall. It's been some time ago. I can't answer that correctly.
Q. Did you work for any other dairies in New Mexico?
A. No, sir.
Q. Did you work for any other dairies anywhere else?
A. Currently?
Q. Other than HDF, which, you know, doesn't -- isn't an operating dairy, but have you worked for any other operating dairies?
A. Yes, sir, I worked for Bos Bouma.
Q. Where was that?
A. Clint, Texas.
Q. And when did you do that?
A. From 1998 through 2003.
Q. And what was your role there?
A. Logistics manager and environmental.
Q. Okay. Tell me what the logistics manager did.
A. Procured all the feed, procured all the cattle, handled all incidents with permitting and just a general do everything that's possible.
Q. Were you the manager, the farm manager?



A. No.
Q. There was somebody above you as the farm manager?
A. Yeah, the owners.
Q. And who -- what were their names?
A. Tony Bos and Brad Bouma.
Q. Bos is that B-o-s?
A. B-o-s, yes.
Q. And Bouma, can you spell that?
A. B-o-u-m-a.
Q. How big a facility was that?
A. It incorporated three large dairies; Desert View Dairy milked 1,500 cows, Rio Grande Valley Dairy milked 2,100 cows, and then Bos Dairy milked 3,000 cows.
Q. And how many -- other than the milking cows, how many additional animals did they have?
A. Well, the heifers at Bos Dairy equivalent to about 4,000, and the heifers for Desert View Dairy and Rio Grande Valley Dairy were located at Tornillo -- at the Tornillo feedyard, which Bos Bouma owned, and we probably had 3,000, 3,500 heifers there.
Q. Okay. So the three facilities that you just talked about, one was separate from the other two?
A. Yes.
Q. And the other two were adjacent to one another?

A. Uh-huh (moves head up and down).
Q. So were they operated as one unit for regulatory purposes?
A. No, both separate entities for EPA reasons, yes. They both had their separate CAFOs.
Q. They had separate CAFO permits?
A. Uh-huh (moves head up and down).
Q. Okay. So all three of them had CAFO permits?
A. Uh-huh (moves head up and down).
Q. Were you charge of applying for those permits?
A. Renewing of the permits. Those permits were already in place when I went there. I managed all the ins and the outs of the record taking, the information needed to -- soil sampling, effluent sampling, and basically the management of the effluent ponds.
Q. Did any of the three that we're talking about now in Texas, did any of those three facilities that you worked for have discharges to surface waters while you were there?
A. Yes.
Q. Explain what kind of discharges they had.
A. We had a heavy rain one night, and one of the effluent pond's berms broke, and it leaked down into fields, down into the area down below of the dairy onto some houses and backyards of folks.



Q. How many gallons?
A. I can't recall that number.
Q. Hundreds of thousands?
A. No.
Q. Tens of thousands?
MR. PALOUTZIAN: Calls for speculation, lacks foundation. Go ahead.
THE WITNESS: I just don't know.
BY MR. TEBBUTT:
Q. How big was the lagoon that ruptured?
A. I wouldn't have the exact measurements.
Q. No, I understand that. But you would know a rough approximation of the size of the lagoon, wouldn't you?
A. Around 60 by a 100.
Q. How many feet deep?
A. Eight feet deep.
Q. So about a million gallons capacity?
A. It didn't all leak out.
Q. No, I know. But what was capacity of the lagoon? Was it about a million?
A. Yeah. Yes, sir.
Q. Okay. And about how much it -- so was it overfull when it leaked, when it -- when the berm breached?

A. No, it wasn't overfull. The breach was caused by rodents digging into the sides of the berm. And when we had the rain, the rain penetrated those holes that the rodents had put into it and caused the escape of the water.

Q. About how much of the water escaped from the lagoon?

A. Oh, I'd say 20 to 25 percent, because we found it right away.

Q. Good. At Buena Vista did you have any discharges of effluent from that facility while you were there?

A. While I was there?

Q. Yes.

A. No. But prior to, yes.

Q. What kind of discharge happened prior?

A. They had a heavy rain. When I say heavy, it probably rained three hours in less than -- excuse me -- three inches in less than an hour.

MR. PALOUTZIAN: Let me just insert an objection. I think it lacks foundation, calls for speculation. Go ahead. Go ahead.

THE WITNESS: And some of the water from the pens and the calf area breached the berm that protected the farm from water leaving the farm and went



onto another neighbor's property.

BY MR. TEBBUTT:

Q. Was that something that you had to account for when you reapplied for the CAFO permit?

A. Yes, sir.

Q. Is that how you know about it?

A. Yes, sir.

Q. Have you worked for any other dairies other than the ones you've testified about this morning so far?

A. Worked at Tiller-Cohen.

Q. At what?

A. Tiller-Cohen.

Q. Can you spell that, please?

A. T-i-l-l-l-e-r slash Cohen, C-o-h-e-n. It was a limited partnership. It was located in Matthews, Missouri, in southeastern Missouri. It was a pasture-based operation, and was there about two and a half years.

Q. Was that in the early '90s? The mid '90s?

A. That was 2010; that was between 2009, 2010.

Q. How big a facility was that? How many animals?

A. When I arrived there was about 2,500 milking cows.

Q. And how many support animals?

A. Support animals were all raised off farm at a lease facility, and we probably had a thousand support animals.

Q. Okay. That would be heifers?

A. Yes.

Q. And dry animals, dry cows?

A. Yes.

Q. And so you were there from 2010 till when?

A. 2012, late 2012.

Q. And what did you do after 2012?

A. I returned to Friona, Texas, and had a medical issue that I dealt with, and was getting ready to take a dairy operation over there in Friona, and found out about the medical issue and wasn't able to do that at that point because of the medical issue. And I took a part-time position at Hi-Pro Feeds in Friona, Texas, and managed their heads positions and bought corn and purchased ingredients.

Q. Okay. What was the facility you were intending to take over in Friona, Texas?

A. It was owned by Charlie Hauge, H-a-u-g-e. And Charlie was just starting that dairy operation there. It had been abandoned for -- or not used for two or three years, and he was bringing animals from the northwest. And my physical inabilities didn't allow me



to take the position after all.

Q. Okay. I don't want to get into your personal medical issues, but I assume you're okay today?

A. Uh-huh (moves head up and down).

Q. Took care of it?

A. Uh-huh (moves head up and down).

Q. That's good. Prior to -- or let's say the dairies that we've talked about thus far, are there other dairies you worked for in the '80s or '90s?

A. I was employed by Seven Rivers Cattle Company in Carlsbad, New Mexico. I went to Seven Rivers Cattle Company in 1980 and spent a long time there. We had raised dairy heifers for dairy clients. Roswell area is a large dairy operation area.

Q. Yes, it is.

A. And they would bring their heifers to us to raise their heifers from little ones all the way up to springers.

Q. Okay. So that was in the Roswell area?

A. That was in Carlsbad area.

Q. Okay. How far is that from Roswell?

A. It's about 50 miles south of Roswell.

Q. Describe your educational background, sir.

A. Attended high school.

Q. After high school.

A. Two years got an associate degree from Northeastern Junior College in Sterling, Colorado.

Q. In where?

A. Sterling, Colorado.

Q. Sterling, okay.

A. And then got a degree in animal science and nutrition from panhandle state -- Oklahoma Panhandle State University in Goodwell, Oklahoma.

Q. What year did you graduate?

A. '76.

Q. And what was your major?

A. Nutrition, animal nutrition.

Q. Did you take any courses in hydrogeology?

A. No.

Q. Did you take any courses in hydrology?

A. No.

Q. Any courses in soil management?

A. Yes.

Q. What type of soil management courses?

A. The required soil -- the required soils class. We call it the soils class that all animal science and all agricultural kids had to take. They had a division of the school that was soils management also, and it was their beginning class that they took there.

Q. Okay. Is that the only soils class that you



took?

A. Yeah, we took a biochemistry class that was related to agricultural. They called it ag biochemistry. And we took the normal organic chemistry and nonorganic -- I mean, organic history like chemistry and then the regular chemistry, and then I took all the biology classes also. You know, the microbiology.

Q. Okay. So microbes in the soil?

A. Yes.

Q. And how they interact with --

A. That's correct.

Q. Yeah. Let me finish my question. So microbes and how they interact with the nutrients in the soil?

A. Yes.

Q. Is that fair to say?

A. Yes, sir.

Q. You studied the nitrogen cycle?

A. Yes, sir.

Q. And you studied the impacts of phosphorus on vegetation?

A. Yes, sir.

Q. Did you take any regulatory classes?

A. No.

Q. How did you come to be -- I noted in your testimony that you've been in charge of the regulatory

side of a number of facilities. How did you come to be in charge of the regulatory facilities?

MR. PALOUTZIAN: The question is vague and ambiguous. Go ahead.

THE WITNESS: It's something that I always would -- had somewhat of an interest in, felt responsible enough that I could do it and just took the reins and went on with it.

BY MR. TEBBUTT:

Q. Okay. Did you have any formal education in the regulatory aspect --

A. No, no, just the guidance that the readings gave us.

Q. What readings?

A. Well, they would publish a -- Texas published a book and New Mexico published a book of rules and regulations that you had to live by, and then the interaction I had with the NRCS folks and the EPA folks and stuff like that. Made it a point to understand what they were doing.

Q. Okay.

A. I mean, they didn't go away without a question. If I didn't understand something, I asked.

Q. Okay. You didn't take any classes or seminars in permitting?



A. I took numerous seminars.

Q. What kind of seminars?

A. Just basically regulations, permitting regulations. And any time that there was a discussion group or any time that there was a get-together concerning regulations, primarily out of New Mexico State University took the biggest portions. And then later on we -- I attended a seminar at Texas A&M concerning the same situations.

Q. When did you do that?

A. That was in 2000, year 2000 that there was a seminar.

Q. Describe the seminar.

A. It was a two-day session with the EPA guys and the Texas people. Because EPA contracts the Texas water folks to do their regulatory work for them. They do all the inspections, state inspections. They do the inspections at the dairy by the state people.

And we would all get together and sit down and go over the new revisions and some of the issues that were facing the CAFO.

The CAFOs at that time were under a lot of scrutiny, and there was lots of answers to be added concerning that as too how they were going to be managed and what they were going to be doing and the changes

that they made in those. I wanted to be up to date with that.

Q. Do you know why the CAFOs were under scrutiny at that time?

MR. PALOUTZIAN: Calls for speculation, lacks foundation. Go ahead.

THE WITNESS: There were some points there within the CAFO regulations as far as the storage of effluence in ponds. There was a push for all CAFOs to have a lined lagoons. And they wanted all waters in the confined operations, all waters within the confined operations to be able -- to be able to be contained on the properties. Which essentially made everyone increase their pond capacities, put liners in them.

And there was a lot of changes within the record keeping. I can't recall what those are right now. If I looked them up, I probably could.

BY MR. TEBBUTT:

Q. And so what we're talking about, what you were just testifying about, is that in relation to New Mexico only?

A. No, Texas.

Q. Texas. Is it Texas only?

A. Texas A&M. Yeah, Texas only. But the CAFO is U.S. Government. It's EPA. So it would reflect into



New Mexico also.

Q. Okay. Between the time you graduated in 1976 and 1980 when you started in Carlsbad, did you have another job in the dairy industry?

A. Yeah, I was a consulting nutritionist for Farmers Marketing Association.

Q. Located where?

A. In Denver, Colorado.

Q. Okay. Sir, what did you do to prepare for your deposition today?

A. I looked at the invoices supplied.

Q. Supplied by whom?

A. The invoices that you folks had.

Q. Okay. That you provided, that your -- you and your counsel provided to us?

A. That's correct.

Q. Okay.

A. Went through all those invoices and just generally briefed myself, spent some time just thinking to myself what each of these invoices represented and how it was done.

Q. How much time did you spend doing that?

A. Say 10 hours.

Q. And when did you do that, those 10 hours?

A. I did it about six hours Saturday morning, and

I did another four hours yesterday.

Q. Did you meet with your counsel as part of your preparation?

A. Yes.

Q. And how much time did you spend with your counsel?

MR. PALOUTZIAN: I'm going to object. That's --

MR. TEBBUTT: I'm not asking for attorney-client privileged information. I'm just asking for the amount of time spent.

MR. PALOUTZIAN: Well, I'm going to object and instruct him not to answer. I don't know how that's at all relevant to any of the issues in the case, time spent with lawyers preparing.

MR. TEBBUTT: It's just background. It's very common to do that. Every case I've ever done in my life we've discussed that. And it's not attorney-client privilege because there is no specific information that we're giving out other than the amount of time spent.

MR. PALOUTZIAN: Well, I'm going to assert my objection. Go ahead. You can answer that question.

THE WITNESS: About four hours.

BY MR. TEBBUTT:

Q. Did you do about by telephone or in person?



A. In person.

Q. Okay. When did you do that?

A. Yesterday.

Q. Is that the only time you met with your lawyers in preparation for this deposition?

A. We had a casual dinner Saturday night.

Q. All right. So those two times, are those the only two times that you met with your lawyers in preparation for this deposition?

A. Yes, sir.

Q. Okay. Did you speak with anyone else with regard to the upcoming deposition?

A. Yes.

Q. Who?

A. Scott Bloemke.

Q. When did you speak with Mr. Bloemke?

A. Scott and I are -- we were close in our working relationship, and we spent a lot of time when work outside was being done. It would come up in conversation. And there was a question as to whether he was going to be deposed or not deposed. We would talk about that. And I would give him an opinion whether he was going to be deposed or not.

Q. What opinion did you give him?

A. I -- it changed from day to day, you know,

depending on --

Q. When did you start talking to Mr. Bloemke about this?

A. When I received notice that I'd been deposed.

Q. Are you aware that Mr. Bloemke has been subpoenaed to testify?

A. Yes, sir.

Q. Okay. And when did you become aware of that?

A. His boss, Adam Killerman, had spoke to me about some conversations that he had with Sarah, some emails that he had with Sarah concerning some questions that she had concerning the invoices. Adam didn't know how to answer those questions.

And I said, Well, you need to decide yourself how you're going to answer those questions, but I can't give you any feeling towards that.

And then he said, Oh, yeah, and by the way, Scott's going to get deposed.

Q. Okay. How long did you speak with Mr. Killerman?

A. Concerning that?

Q. Yes.

A. Oh. Adam called me three or four times concerning different questions. There was a train of emails and phone conversations that he had with Sarah.



Q. Okay. Do you -- were all your communications with Mr. -- is it Killerman?

A. Killerman, yes.

Q. K-i-l-l-e-r-m-a-n?

A. Yes.

Q. Were all your communications with Mr. Killerman by telephone?

A. Yes.

Q. Any emails?

A. No.

Q. Okay. And how long did you speak with Mr. Killerman the first time you spoke with him about the depositions?

A. Oh, we don't talk very long, two or three minutes.

Q. Okay. Is that true for each of the four conversations that you had?

A. Yes, yeah.

Q. Okay. What types of things did you talk about with regard to Mr. Bloemke?

A. Just No. 1, if he was going to be deposed, and who was going to represent him and different things like that. Mr. Killerman was going to be on vacation last week, and he was concerned that Scott was going to get taken care of, that he had a good attorney, you know, or

attorney ready for him. And they've never been in this situation before. This is all new to them. You know, they're just farmers.

Q. Now, did you tell Mr. Killerman that HDF would provide an attorney for them?

A. No, we never had that discussion because I think it was assumed that that was going to happen. I don't know. I don't think Adam ever questioned that.

Q. Okay. So that's what's going to happen? Have you told Mr. Bloemke that one of the HDF lawyers would represent him at the deposition?

A. Well, we knew that that wasn't going to be possible. We made that decision.

MR. PALOUTZIAN: Don't talk about attorney-client communications, all right?

BY MR. TEBBUTT:

Q. I'm just asking you about your communications with Mr. Killerman or Mr. Bloemke when there wasn't an attorney present. Did you discuss with Mr. Bloemke or Mr. Killerman what lawyer would represent him at the deposition?

A. Yes.

Q. And who's that lawyer?

A. I can't recall her name.

Q. Okay.



A. I'm sorry.

Q. Is she a Kauai lawyer, do you know?

A. Yes, sir.

Q. Okay. Just so you know, Mr. Garmatz, if you want to take a break at any time, feel free to do so. I just ask that if there's a question pending, that we answer the question before we take a break. But feel free to take a break at any time. I'm one of those people who just kind of keeps going and finds a natural break. But if you need to take a break, by all means, please do, okay?

A. Okay.

Q. Other than the invoices that you reviewed that you testified about, what other documents did you review in preparation for your deposition today?

A. The first stage of interrogatories.

Q. The HDF's answers to the plaintiff's first set of interrogatories?

A. Correct, yes.

Q. And did you read through them all?

A. Oh, yes.

Q. Okay. And did you read through HDF's responses?

A. Yes.

Q. Was there anything in the first set of

interrogatory responses from HDF that you thought was inaccurate?

MR. PALOUTZIAN: Objection, the question is overbroad. Go ahead.

THE WITNESS: No.

BY MR. TEBBUTT:

Q. What else did you review?

A. I went back and looked at some of the project plans that we have in place.

Q. Which project plans?

A. Various solutions, project plans for the facility.

Q. And are these documents, do you know that whether they've been produced --

A. Yes.

Q. -- by your counsel to --

A. Yes, yes.

Q. One moment please. Let me finish my question.

By your counsel to Friends of Mahaulepu in this case? Do you know if they've been provided?

A. I believe they're going to be provided today.

Q. Did you bring any documents with you today?

A. No, sir.

Q. What other documents did you review in preparation for the deposition?



A. That was about it. Nothing else.

Q. Did you review any of the NPDES applications?

A. No.

Q. Were you involved in drafting any permit applications, NPDES permit applications for the HDF proposed facility?

A. I didn't do any writing, but I had input.

Q. What kind of input?

A. General information concerning some of the questions that were required to be answered.

Q. Like what kind of questions?

A. Head count, number of cows. Just numerous questions, you know.

Q. Give me some other examples.

A. We talked about the percent grass compared to the percent grain that was going to be fed inside the parlor. We talked about the size of the cattle. We talked about how much water they were going to consume, how much feed that they were going to consume, how much fecal matter they would produce, how much -- I might have said this, but how large they were. We talked about their life cycle. We talked about their locations as to where everything was going to be handled at and how they were going to be cared for, and just basically general operating conditions, you know, things that

you'd come up with, that you'd think about as far as...

Q. As far as what?

A. The operation of the dairy.

Q. Okay.

A. And the questions per the permit.

Q. Okay. When you talk about a life cycle, what kind of life cycle are you talking about?

A. Cattle life cycle.

Q. Right. What's the life cycle of a dairy cow?

A. Well, the heifer is born, kept in a crate for 60 days, fed milk, grain, water, released to grass after 60 days. At a year old, depending on her size and her weight, if she's large enough, you go ahead and breed her, AI breed her, artificially insemination. And hopefully at 21, 22, 23 months old she has a calf, and she goes into the milking herd. And then after 45 days after she's given birth, 40 days -- 45 days in milk, we begin to cycle her for an exact estrous date when we can go ahead and breed her, and hopefully have them all bred again by the time she's 90 days old. And then --

Q. I'm sorry. Bred again after 90 days?

A. She's bred after -- she's bred by 90 days, and by 90 days in milk.

Q. Okay.

A. So she's been in the milking bed for 90 days



and she's bred. She's got a calf in her. And she continues to milk until she gets to about 200, 205, 206 days in milk and she's got a calf in her, and we go ahead and take her out and dry her out, keep her dry for 60 days where she's ready to have that calf again.

Q. And how long will that cow normally stay in the herd? Till what age?

A. Three or four lactations. So, you know, figure 14 months per lactation. So she's in there until she's six years old, seven years old. That's a good healthy cow.

Q. Okay. So that's the high end -- that's the high-end expectation?

A. No, that would be the expectation for a pasture-based operation.

Q. So that's the average then you would expect?

A. Yes, sir.

Q. And you talked about a percent feed versus percent pasture. What's the percent feed anticipated for the HDF operation versus percent pasture feed?

A. Thirty percent grain, 70 percent grass.

Q. And what's that projection based on?

A. Based on the amount of energy needed to produce the kind of milk that we want to produce, the pounds of milk that we want to produce.

Q. How many pounds of milk do you expect to produce per cow? Let's say --

A. On an average?

Q. Yeah.

A. On an average for a 305-day lactation, we're hoping for 38 to 40 pounds.

Q. A day?

A. Yeah.

Q. Okay. When you first came on to your employment, who hired you?

MR. PALOUTZIAN: Asked and answered. Go ahead.

THE WITNESS: With HDF?

BY MR. TEBBUTT:

Q. Yes.

A. Kyle Datta.

Q. Okay. And were you hired as an employee of HDF first off?

A. Originally I was hired as a consultant to the development of Hawaii dairy operations.

Q. Okay. So who did you work for at that time?

A. I worked for Ulupono Industries.

Q. So that was --

A. I was a consultant to Ulupono Industries.

Q. Okay. And is that when you started in October



of 2013?

A. No, that was prior to that. That -- I started that in February of '13. I maintained my residence on the mainland, did a lot of work on the mainland for them as far as the operations. But then I did not become an employee of Hawaii Dairy Farms until October because that's the first day that Hawaii Dairy Farms enacted for employment.

Q. Okay. So from February 2013 to October 2013, what things did you consult on?

A. Well, we had to -- we had the heifer herd that was located in southwest Missouri.

Q. Who's we?

A. Hawaii Dairy Farms.

Q. Hawaii Dairy Farms had a facility in Missouri?

A. No, they had heifers purchased there and that were located still on the dairy -- still on the facility that they had bought them from.

Q. Okay. What else did you do? What other consulting work?

A. Worked in the development of the design of the operation, handled all the mainland logistics that needed to be handled, monitored the quality and the feeding of the dairy heifers in Missouri. We had weekly calls and handled all to-do operations that needed to be

done by the mainland at that point.

Q. How many heifers does -- or in 2013 how many heifers did HDF own?

A. Eleven hundred.

Q. And where are those heifers today?

A. We sold them.

Q. When?

A. In 2014.

Q. Were they all sold the same month in 2014?

A. Uh-huh, sold to the same individual.

Q. When was that? When in 2014?

A. June or July of 2014.

Q. And who they sold to?

A. I couldn't tell you that. I can't remember that.

Q. Does HDF own any heifers presently?

A. No.

Q. Does it own any mature cows presently?

A. No.

Q. Does it own any animals presently?

A. No.

Q. And it hasn't since those animals were sold in 2014?

A. Correct, yes.

Q. When you came on to HDF as an employee in



October 2013, what did you -- what were your first functions?

A. Farm manager. We needed to grow grass.

Q. For what?

A. We needed to grow grass on the farm and establish grass so we could have grass when the cattle were going to start milking.

Q. Okay. So what did you do to establish grass on the facility?

A. Started with the nursery. The nursery was a four-acre patch. We planted that in November of 2013. Prior to the planting, we disked that ground with a harrow disk six times. We installed --

Q. Over what period time did you harrow the six times?

A. We probably started the first part of November, November of '13.

Q. Right. But over what period of time did you disk the six times? How many? Over days, weeks?

A. Thirty days.

Q. Okay.

A. We installed a drip system, drip irrigator system under the ground of the four acres, and then we sprayed the seed on via mulch.

Q. The drip irrigation system that you installed,

how was that installed?

A. With a drip irrigation plier. It's a two-row plier. It's an instrument that puts the tube in the level ground that you ask for. You pull it with a tractor. It's called an applicator.

Q. Okay. And how deep were the irrigation system --

A. We put them at 12 inches.

Q. Just a minute. How deep was the irrigation system prepared and installed?

A. Twelve inches deep.

Q. Okay. And how did you create the 12-inch deep rows?

A. The machine has got controls on it that measures that and allows you to plant at any depth that you wish.

Q. Okay. And so essentially those are rows, I assume?

A. Right.

Q. How long were the rows?

A. A hundred feet.

Q. Each row was a hundred feet?

A. I want to retract that 'cause I don't know that it is a hundred feet. I'm confused right now, and I can't tell you that for sure.



Q. Okay. I mean, you sounded rather emphatic that it was a hundred feet. Are the lengths of hose a hundred feet?

A. No, no. I wouldn't know the exact measurement without measuring it. I wouldn't want to be wrong.

Q. No, I understand that. And I am asking for -- you know, if you need to approximate something, that's okay. If you're telling me you don't know exactly, that's okay. But I do want an approximation or your approximate.

A. Between a hundred and 200 feet.

Q. Okay. And did you purchase the irrigation -- is it pipe?

A. Drip hose.

Q. Pardon?

A. Drip hose.

Q. Drip hose. Did you purchase the drip hose yourself?

A. No, Adam Killerman did, AJAR.

Q. Okay. So the invoices should tell us how many feet of drip hose was purchased?

MR. PALOUTZIAN: May call for speculation, lack of foundation. Go ahead.

THE WITNESS: I don't think it's on that invoice. I remember that invoice. I don't think it's

on there.
BY MR. TEBBUTT:
Q. Do you have any records that would tell us how many feet of drip hose you purchased?
A. I could go measure it.
Q. No, that's not my question. I mean, when you purchase something, usually you get a receipt for, you know, X number of feet. You're usually charged by probably the foot, right?
A. No.
Q. Or something like that?
MR. PALOUTZIAN: Objection, argumentative. Go ahead.
THE WITNESS: The project was to put a drip irrigation system in at the nursery. And Adam quoted me a flat figure for doing that.
BY MR. TEBBUTT:
Q. And so you relied on Mr. Killerman --
A. Yeah.
MR. PALOUTZIAN: I don't think he was done with his answer.
BY MR. TEBBUTT:
Q. Okay. Go ahead.
A. And we checked it against some other folks that were here on the island that do that kind of stuff, and



his price was the best, so we went ahead and did his.
Q. Do you know how many feet of irrigation drip hose you needed for the project?
A. No.
Q. Would Mr. Killerman know that?
MR. PALOUTZIAN: Calls for speculation. Go ahead.
THE WITNESS: Yeah, I'm sure he could figure it.
BY MR. TEBBUTT:
Q. Did Mr. Bloemke actually lay the hose?
A. He was there to -- he was there doing it. Adam had his whole crew there doing it.
Q. Okay. So there were multiple people?
A. (Moves head up and down.)
Q. Okay. Did you assist with that?
A. No.
Q. Did you oversee it?
A. No. I oversaw. I mean, I saw them doing it, but I didn't get to participate in it or anything like that.
Q. But you were present when it was laid?
A. Yeah, just towards the tail end when they were just finishing on the tail end. I had to go out and tell them how to use it.

Q. Okay. And so that was the initial four-acre nursery patch?

A. Uh-huh (moves head up and down).

Q. Okay. All right. So after that was done, what else was done on the site? What did you do next?

A. Well, we went to the far north pivot, and we established a 16-acre patch within that -- that could be irrigated under the pivot. And we set three different ways that we planted grass.

No. 1, we harvested the grass off the nursery, placed it into a bale, hand carried the bales via machine to a 5-acre patch within the 16-acre patch, and we used the stolons that we had harvested, which was as a source of planting the grass.

Q. When you said the stolons, what do you mean by the stolons?

A. Stolons is basically the length of the grass from the top to the bottom.

Q. Okay.

A. Kikuyu has numerous stolons in it that breaks every growth areas because kikuyu typically goes across the ground.

Q. Fans out and grows from those?

A. Yeah.

Q. From the stolons?



A. Uh-huh (moves head up and down).

Q. So the stolons becomes a source?

A. The stolons, once it hits soil, it starts to grow, develops the root base.

Q. Okay. Is stolen spelled the way we think it is?

A. Yes. S-t-o-l-o-n-s.

Q. Okay. And so that was used to essentially seed, if you will?

A. Correct.

Q. The next 5 acres within the 16 acres, you said?

A. That's correct. We had seen that method used different places in South Africa, in Australia, in Nicaragua, Mexico. They had done it that way.

Q. Had you traveled to any of those areas to see that?

A. No.

Q. When you prepared the four-acre patch at the nursery in addition to the harrowing, did you do anything else to that four-acre patch?

A. Fertilized it.

Q. Okay. Did you do anything before you harrowed it?

A. No. Yes, sir. Yes, sir. I'll retract that. We sprayed it.

Q. With?
A. Roundup.
Q. Okay.
A. One-percent solution.
Q. All right. And then the 16-acre patch that you talked about at the north pivot, what did you do to prepare that length?
A. We mowed it initially.
Q. What was there at the time?
A. A hundred percent guinea grass.
Q. Okay. And what did you do with the mowings?
A. Left the clippings on the ground.
Q. Okay.
A. 'Cause organic matter was in real bad condition, so we left them. Then we let it grow up a little bit, oh, 8 or 10 inches tall, and we sprayed it, one-percent solution. We sprayed it twice.
Q. With Roundup again?
A. Yes, sir.
Q. Okay. And then what?
A. We disked numerous times. Six times.
Q. Six times just like you did with the nursery patch?
A. Yep, yeah.
Q. And that was over a period of 30 days?



A. That's correct.
Q. And when did that start?
A. We started doing that in February of '14, February or March of '14, yeah.
Q. Okay. Then what?
A. Then we planted a grass that we call mallato.
Q. How do you spell that?
A. M-a-l-l-a-t-o.
Q. What kind of grass is that?
A. It's a broad-leafed grass that is grown primarily in the topics or in tropical conditions, year-round conditions. It's a quality grass as far as protein, and we wanted to try some of that. And we planted that on 3 acres of the 16.
Q. And when did you do that?
A. Just about the same time that we were preparing the soil for the -- we prepared the whole 16 acres at one time.
Q. And that was in February and March of 2014?
A. Right.
Q. Okay. And then you brought the stolons --
A. Right.
Q. -- over for five acres?
A. And then I planted the seed, the mallato seed.
Q. Okay.

A. And we finished the balance of the 16 acres with kikuyu seed, via kikuyu grass. Purchased the seed.

Q. All right. Purchased the seed for the kikuyu?

A. Uh-huh (moves head up and down).

Q. So you purchased more seed for the rest of the 16 acres 'cause you didn't have enough stolons from the nursery?

A. Yeah.

Q. Okay.

A. We wanted to try both ways.

Q. Okay.

A. Whichever way would work best.

Q. Did you determine which way worked better?

A. Yeah.

Q. Which way?

A. Seed.

Q. So after the first 4-acre patch and then the 16 acres, what did you do on the site?

A. We --

MR. PALOUTZIAN: I'm just going to object, calls for a narrative. Go ahead.

THE WITNESS: The 16 acres was all planted, and we watered it on a daily basis with at least 3/10s of an inch of rain on a daily basis. And if we received that much moisture within the last 24 hours, we wouldn't



water it that following day. So it was the management of the pivot system. And at that point we began to till the grounds on both sides of the 16-acre patch for some additional grass growing that we were going to -- seeding that we were going to do.

BY MR. TEBBUTT:

Q. With kikuyu?

A. Yes.

Q. Okay.

A. I had to move all the fencing material that was located on the farm.

Q. What fencing material is that?

A. The posts that were there, because the place where we were going to plant this additional kikuyu was right where that stuff was unloaded out of the containers initially. And I wanted to use that ground 'cause it was under the pivot so we could water it.

So I moved all the fencing material down along the main road that runs through the dairy. And then there were some culverts and stuff like that, pipe, white PVC pipe. We removed all that off of there. We cleaned that ground up, and we sprayed it twice again, and we used the disk harrow on it and prepared it to be planted in kikuyu. And that was finally done, I'd say, in July of 2014.

Q. Okay. And how many acres was in addition to the original that was planted at that point by July 2014?

A. Total acreage in the whole thing was 36 acres, so we planted an additional 20 acres.

MR. PALOUTZIAN: Counsel, when it's convenient, I'd like to take a 5- or 10-minute break.

MR. TEBBUTT: All right. Let me just ask a couple follow-ups here, and then we'll take a quick break.

MR. PALOUTZIAN: Thank you.

BY MR. TEBBUTT:

Q. Other than the planting that you're discussing, 36 acres, what other site activities did you undertake starting in October 2013?

MR. PALOUTZIAN: The question's overbroad and calls for a narrative. Go ahead.

THE WITNESS: Well, like I told you, we fertilized.

BY MR. TEBBUTT:

Q. Okay. The whole place? How much did you -- well, let me --

A. Fertilize the nursery and the 36-acre patch.

Q. Okay.

A. We sprayed for broad leafs one time. That's



all. And we watered it to maintain it, and that was -- and then we mowed it.

Q. Did you install any fences when you first got there?

A. No.

Q. None?

A. None, no. There's not been any fences installed at all.

Q. Okay. The staging material -- or the fence material, the PVC material, is now, when we went on our site inspection in March, in one general area. Was that where you moved everything?

A. That's correct.

Q. Or did you move it multiple times?

A. No, just one time. It was right there above that, north of that, in that field there over where it was. And then we moved it down there along the road.

MR. TEBBUTT: All right. Let's take a break.

(Break from 10:13 to 10:26.)

BY MR. TEBBUTT:

Q. Mr. Garmatz, we're back on the record. And you understand that every time we go off the record and come back you're still under oath, correct?

A. Correct.

Q. Okay. You had mentioned that you irrigated the 36 acres that we talked about just prior to the break. How did you get the water to the fields?

A. Pipeline from Waita Reservoir.

Q. Okay. When was the pipeline installed?

MR. PALOUTZIAN: Well, I think the question is vague as posed. Go ahead. And it may call for speculation, lack of foundation. Go ahead.

THE WITNESS: Late March of 2014.

BY MR. TEBBUTT:

Q. Okay. And who installed it?

A. Effluent Irrigation Company.

Q. Effluent?

A. Effluent.

Q. E-f-f?

A. (Moves head up and down.)

Q. Okay. And was it all installed in March of 2014?

A. To the best of my knowledge.

Q. Do you know how many feet of irrigation pipe was installed in March of 2014?

A. Exact number, no.

Q. Approximate?

A. A thousand to 1,500 feet.

Q. And was that one line or multiple lines?



A. One line.

Q. And did you oversee the installation of that pipe?

A. Yes.

Q. And how was that installed?

A. Excavator, dug the line, pipe was placed in the hole, glued together and back filled.

Q. How deep was the pipe laid?

A. Varied, but the deepest point would probably have been four feet.

Q. Was any of the excavated material moved off site?

A. No.

Q. Was it just laid back over the --

A. Backfilled.

Q. Backfilled. And what was done with the backfilled area? Anything? Was it just allowed to vegetate again normally?

A. Correct.

Q. How did you get water to the nursery area that was planted in November of 2013?

A. Existing waterline.

Q. Do you know when that waterline had been installed?

A. No.

Q. Did you inspect that waterline before you used it?
A. No.
Q. Did you have to do any maintenance to that waterline before you used it?
A. Hook up a riser.
Q. And is that the riser that's at the nursery?
A. Correct.
Q. What did that entail?
A. Kind of putting a T in the line.
Q. Did you have to dig into the ground to get there?
A. Yes, yes.
Q. How deep?
A. Twelve inches.
Q. Over what square foot or yard area?
A. Two by -- two-foot by two-foot.
Q. Were any roads installed or work done starting in October 2013 to, let's say, the March 2014 timeline?
A. Roads, no.
Q. Has there been any time when any roads have been installed or improved on the site since you've been there?
A. No.
Q. You said earlier that no fencing had been



installed, is that correct?
A. Yes.
(Garmatz Deposition Exhibit No. 1 was marked for identification.)
BY MR. TEBBUTT:
Q. Mr. Garmatz, you have in front of you what's been marked as Deposition Exhibit 1. This is a series of invoices with HDF Bates Nos. 000481 through HDF 000555.
I'm going to ask you questions throughout the day about various parts of these. But are these invoices that you recognize -- well, let me strike that.
Are these the invoices that you reviewed in preparation for your deposition today?
A. Yes.
Q. Do you know if this is a complete set of the invoices that you reviewed for your deposition today?
MR. PALOUTZIAN: The question is overbroad. Go ahead.
THE WITNESS: Say that again.
BY MR. TEBBUTT:
Q. Yes, is this a complete set of the invoices that you reviewed for your deposition today?
A. No.
Q. What additional invoices did you review?

A. All those that you supplied.
Q. That who supplied?
A. That you supplied to our attorney and my attorney sent to me.
Q. So you're saying that Friends of Mahaulepu supplied the invoices from HDF?
A. Yes.
Q. That's an interesting way to proceed.
Are you sure your attorneys didn't just provide you with a package of what they provided Friends of Mahaulepu.
A. Where they got them, I don't know. I just got the copies.
Q. All right. Let's take a look at -- and I'm going to refer to the Bates number, just the last three digits of the Bates numbers, okay?
A. Yes, sir.
Q. Down in the lower -- they're generally in the lower right portion of the page. If you turn to 484, please, which I believe is about the fourth page in. And these are front and back. So the fourth page in to Exhibit 1. Do you see that?
A. Uh-huh (moves head up and down).
Q. It says 10 -- 12/10/13, install hogwire fence in grass area dairy site.



A. Yes. That's a fence to prevent the pigs from eating the grass up.
MR. PALOUTZIAN: Let him ask the question.
BY MR. TEBBUTT:
Q. Where was that installed?
A. Huh?
Q. Where was that installed?
A. Around the perimeter of the nursery.
Q. Okay. 'Cause I asked you just a few minutes ago whether any fence had been installed and you said no. Is that -- that's not a correct statement, is it? The earlier statement.
A. You need to define for me fence.
Q. Well, this says, Install hogwire fence, doesn't it? Do you consider that a fence?
A. I assumed when you asked the question that you're talking about permanent fencing.
Q. Okay. What type of hogwire fence was installed on December 10, '13?
A. Placed steel posts in the ground, hung the wire to it.
Q. What kind of posts?
A. Steel posts.
Q. What's a steel post?
A. T posts.

Q. What do they look like?
A. Long and slender.
Q. Wood?
A. Metal.
Q. How long?
A. They're six-foot long.
Q. And how are they installed?
A. Pound them in.
Q. With what?
A. Post pounder.
Q. By hand?
A. Yes.
Q. Did you have a post pounder on any mechanical implement or did you install them all by hand, pound them by hand?
A. I can't tell you that.
MR. PALOUTZIAN: It assumes facts not in evidence. Go ahead.
THE WITNESS: I can't tell you that.
BY MR. TEBBUTT:
Q. Were you present when the fences were installed?
A. No, no.
Q. Who installed them?
A. AJAR.



Q. Is that Scott Bloemke?
A. I don't know that 'cause I wasn't there.
Q. So you're saying that the fence that was installed on December 10th, '13, was only around the nursery area, is that correct?
A. Correct.
Q. You can put that aside for right now. We'll get back to it.
What other irrigation pipe was installed after that first line from the Waita Reservoir?
A. A portion of the waterline to the lower pivot.
Q. When was that installed?
A. In April of '14.
Q. And how many feet of irrigation pipe was installed then?
A. About 1,100 feet.
Q. When were the pivots brought in?
A. They were delivered in January of '14.
Q. Both pivots?
A. Yes.
Q. Just the two pivots?
A. Yes.
Q. And today there's still just the two pivots?
A. Yes.
Q. Who installed the pivots?

A. Effluent Irrigation.
Q. And did you oversee that installation?
A. Yes.
Q. And was it done to your satisfaction?
A. Yes, sir.
Q. What other preparation -- well, let's start with the nursery area. You said the nursery area was sprayed with Roundup before it was harrowed, correct?
A. Yes.
Q. Okay. Was it sprayed with Roundup just one time?
A. Twice.
Q. Twice. And was it -- the second spraying after harrowing had begun?
A. Yes.
Q. So sometime in the middle of the harrowing process?
A. Yes.
Q. Were there any trees cleared in that nursery area?
A. No.
Q. Trees or shrubs. None?
A. None.
Q. What was there previously? Just --
A. Guinea grass.



Q. Okay. What trees or shrubs clearing took place on the site from the time you started there in October 2013 until June 2014?
A. Just any tree that was taller than what our pivot could go under or go over.
Q. So what height would that be?
A. Eight to 10 feet.
Q. So anything over 8 to 10 feet was cleared, was that on the whole over 500 acres?
A. Yes.
Q. And how many of those trees or shrubs were there, would you say?
A. Numerous.
Q. How many?
A. Fifty.
Q. What kind of trees were they?
A. Primarily -- you know, I can't identify that 'cause I just don't know.
Q. Okay. What were the tallest trees that were cleared?
A. The albizia trees.
Q. And how tall were they?
A. Some of them as high as 20 feet.
Q. How many of them would you say were 20 feet?
A. Six or seven of them.

Q. Were any over 20 feet?
A. Yes.
Q. What were the tallest ones?
A. Thirty footers, 30 to 35 feet.
Q. And how many were in the 30- to 35-foot range?
A. Just two.
Q. And you think about a total of 50 trees of approximately 20 feet?
MR. PALOUTZIAN: Objection, misstates testimony.
BY MR. TEBBUTT:
Q. Is that a fair statement?
A. Say that again.
Q. About 50 trees that were approximately 20 feet tall?
A. No. Most of -- the balance of the 50 would have been 10 foot at the max, but they were tall enough we couldn't get the pivot across.
Q. Okay. About how many would you say were 15 feet or more?
A. Ten to 15.
Q. And what did you do with those trees?
A. We ground them to the stump.
Q. Okay. And just left the material on site?
A. Uh-huh. Let me say that again. We ground them



to the stump, which means (indicating).
Q. Right. Had the stumps been removed since?
A. No.
Q. They're still -- are they still there?
A. Yes.
Q. So the nursery started out with four acres, correct, in 2014?
A. Yes, sir.
Q. Has that been expanded?
A. No.
Q. So it's still four acres?
A. No.
Q. How many acres is it now?
A. Three and a half.
Q. And what do you do with the cuttings from the nursery? Well, let me back up.
How often is the nursery area cut, mowed, whatever? What do you call it cut or mowed?
A. Mowed. Ten to 18 days.
Q. And what do you do with the cuttings?
A. Where?
Q. From the nursery.
A. They're left.
Q. Just right on the nursery property itself?
A. Yep. Except for the one time we baled them and

hauled them to plant in the 16 acres.

Q. How often do you mow the 16 acres?

A. Same. Ten to 18 days.

Q. And what do you do with the cuttings?

A. Most of the time they're left. Sometimes we bale some.

Q. And when you bale them, what do you do with them, with the bales?

A. Give them to the ranchers.

Q. How many bales do you give to the ranchers?

A. Oh, I wouldn't have the exact count. Two hundred, 250.

Q. Total? That's the total number of bales you've given to the ranchers since you started in 2013?

A. Yes, sir.

Q. And you don't charge the ranchers?

A. No.

Q. Okay. The term grubbing and grading has been used. Are you familiar with that term?

A. Yes, sir.

Q. And you've got a grubbing and grading permit from the County of Kauai, correct?

A. Correct.

Q. Describe for me what you mean by grubbing and grading.



A. Two separate terms.

Q. Okay. Let's go with grubbing first.

A. Grinding of a forage product or a tree product or a bush product to the ground.

Q. Okay. And you testified about that just a little while ago. Other than the approximately 50 trees that were grounds down to the stump, was there other grubbing practice that went on on the site?

A. Yes.

Q. And describe that for me, please.

A. We had a large accumulation of guinea grass and koa trees or koa bushes, I should say. I don't think they're a tree. I think they're a bush. And we had to grub those to get rid of them.

Q. Okay. And what did you could to grub them?

A. Used the grinder on the front of the excavator, hydraulic-driven grinder.

Q. Okay. So the koa trees you would classify as bushes?

A. Yes.

Q. And how tall were they?

A. Oh, some as high as 10-foot tall, and the others, you know, four or five foot tall.

Q. How many of the koa bushes or trees would you say --

A. About thousands.
Q. And was that material just left on site?
A. Yes.
Q. What other types of brush or small trees were grubbed, other than the ones you've just testified about?
A. I'm sure that there was other trees there, but I can't -- I couldn't name them for you.
Q. And was this all over the 500 and some acres?
A. Yes.
Q. What kind of grading was done on the property?
A. None.
Q. What type of work was done at the construction entrance?
A. Define construction entrance.
Q. Well, where the trailer is where I met you during the Rule 34 inspections, is that considered the entrance to the dairy site?
A. Yeah, I would consider that.
Q. Okay. What was done to prepare that area?
A. Nothing.
Q. Were there any fences installed?
A. No.
Q. No posts installed there?
A. Just the posts -- steel posts they put in the



ground to keep the trailer from blowing away.
Q. And what about the gate? Was the gate already there?
A. Gate's always there.
Q. What utility lines were installed on the property since you started there?
A. None.
(Garmatz Deposition Exhibit Nos. 2 and 3 were marked for identification.)
BY MR. TEBBUTT:
Q. Mr. Garmatz, I'd like you to take a look at Exhibit 2, please?
A. That's it right there -- here. Yes, right there.
Q. And I'm going to ask if you've seen this document before.
A. Yes, sir.
Q. And when did you first see it?
A. I think Dirk sent it to me.
Q. Do you know when that was?
A. About two weeks ago. I don't know which date.
Q. I'm sorry. About two weeks ago, did you say?
A. Yeah.
Q. Okay. And do you see Exhibit A to Exhibit 2?
A. Exhibit 2 for activities?

Q. The Exhibit A.

MR. PALOUTZIAN: It's on page 3.

BY MR. TEBBUTT:

Q. Right here, Exhibit A. Just flip it over. There you go. Do you see that list of --

A. Uh-huh.

Q. Okay. And you're designated here as the -- well, I use the word corporate for purposes of HDF today, okay?

A. Uh-huh (moves head up and down).

Q. The corporate representative with respect to all areas in No. 1 and No. 2, correct?

A. Correct.

Q. We've discussed the grubbing and grading that's depicted in 1A. Do you see that?

A. Uh-huh (moves head up and down).

Q. Is that the full extent -- what you testified about already, is that the full extent to the grading and grubbing of vegetation throughout the site or is there other?

MR. PALOUTZIAN: The question is overbroad, go ahead.

THE WITNESS: What do you mean here by native vegetation?

/



BY MR. TEBBUTT:

Q. Well, the vegetation that existed on the site at the time you came on.

A. Yes.

Q. Okay. So were there any other grubbing or grading activities that occurred that you haven't testified about yet?

MR. PALOUTZIAN: I'm going to object to the form of the question because it misstates the prior testimony with respect to grading, but go ahead.

BY MR. TEBBUTT:

Q. All right. Let's stick with grubbing, is there any other grubbing activity other than what you've described that occurred on the site?

A. Yes.

Q. What?

A. We grubbed the fence line.

Q. And when did you do that?

A. In August of '15. August or September of '15.

Q. Okay. And when you said you grubbed the fence line, what fence line are you referring to?

A. The perimeter fence line.

Q. So around the outside perimeter of the property?

A. Correct.

Q. And that's separate from what we talked about just a minute ago, correct?
A. Uh-huh (moves head up and down).
Q. Okay. So along the perimeter -- you said yes?
A. Yes.
Q. Okay. So along the fence line, did you determine how many feet around that was, around the perimeter?
A. Estimated length, about 2,200 feet.
Q. Around the perimeter of the entire property?
A. Yes, that we grubbed.
Q. That you grubbed, okay. And in that area that was grubbed, how many trees were over -- were 15 feet or more?
A. None.
Q. Any vegetation that was 15 feet or more?
A. No.
Q. What was the highest vegetation that you grubbed?
A. Ten feet.
Q. Okay. What kind of vegetation was that?
A. Mostly just dead trees and dead stock materials that had just accumulated.
Q. Were there any koa trees that you had grubbed?
A. Some.



Q. Along the fence line?
A. Some.
Q. Okay. And what did you do with that material?
A. Left it. It was ground.
Q. So other than what you've just discussed, we've discussed three general areas of grubbing, the one with the trees that we talked about, the taller trees, then the whole property, which you grubbed -- how -- of the 580 acres or so on the site, there's about 580 acres on site, correct?
A. Uh-huh (moves head up and down).
Q. How many of those acres did you grub?
A. The whole 580 acres was grubbed because if we could cover the ground with a mower, we mowed it down. I would consider that a portion of the grubbing. So regardless of how it was grubbed, all the acres were grubbed.
Q. Okay. SO describe for me the different grubbing practices that you did.
A. Well, 15-foot mower propelled by a John Deere tractor or a small excavator with a hydraulically-driven grinder on the front. And then we also utilized a large disk that was pulled by a D8 Cat.
Q. Okay. Did you harrow -- how much of the property did you harrow?

A. Approximately 480 acres.
Q. The whole thing?
A. (Moves head up and down.)
Q. And did you replant it in some type of grass?
MR. PALOUTZIAN: I'm going to object to the question. Misstates the testimony. Go ahead. I think you said 480 acres.
BY MR. TEBBUTT:
Q. And that's what you said, right, 480 acres?
A. Oh, I'm sorry. You said whole thing.
Q. Okay. And of the 480 acres, how much did you harrow?
A. All of it.
Q. Okay. And what did you do after you harrowed it?
A. We left it.
Q. How many times did you harrow it?
A. Some places two times. Most places three times.
Q. Okay. Did you apply pesticides?
A. No.
Q. To any of that 480 acres?
A. Define pesticides.
Q. Roundup.
A. Well, Roundup's a herbicide.



Q. Well, herbicide is a category of pesticides, isn't it?
A. Some portions of it we did and some we didn't.
Q. Okay. So about -- of the 480 acres, had many acres did you apply Roundup on?
A. Seventy-five at the most.
Q. Okay. And why did you apply Roundup to 75 acres?
A. Because we knew we were going to plant grass on it.
Q. What did you plant on it?
A. Kikuyu grass.
Q. On all 75 acres?
A. Uh-huh.
Q. So since the time that you planted the 36 acres that we discussed earlier, you planted another 39 acres?
A. Yes.
Q. When did you do this?
A. In July of '15, July and August of '15.
Q. Okay. So in July and August of '15 you harrowed that 39 acres?
A. Yes.
Q. How many times?
A. Five times.
Q. And applied Roundup how many times?

A. Twice.

Q. Okay. So when you harrow it, you brought the soil so it's basically just a big soil field, correct?

A. Yes.

Q. Did you place any -- do you know what a best management practice is?

A. Uh-huh (moves head up and down).

Q. In the context of the work you're doing on the HDF property, what's constitutes a best management practice?

MR. PALOUTZIAN: I'm going to object that it calls for an expert opinion, lacks foundation, calls for speculation.

BY MR. TEBBUTT:

Q. Go ahead.

A. BMPs, best management practices are procedures outlined in writing as to how work should be done.

Q. Okay. Did you have any BMPs in place related to the harrowing that you did on any of the acreage on the facility?

A. No.

MR. PALOUTZIAN: Same objections.

BY MR. TEBBUTT:

Q. And the answer is no?

A. No.



Q. The area that you harrowed, how close was that to any of -- any edges of the fields? How close was that to any irrigation ditches?

MR. PALOUTZIAN: The question is over broad, lacks foundation, calls for speculation. Go ahead.

THE WITNESS: Restate that question again.

BY MR. TEBBUTT:

Q. Yes, the field that you harrowed to plant kikuyu grass in July and August of 2015, what was the closest irrigation ditch to any of those fields?

MR. PALOUTZIAN: Same objections. Go ahead.

THE WITNESS: They were around two of the ditches. An eight-acre patch was around two ditches and then the --

BY MR. TEBBUTT:

Q. The what? I'm sorry.

A. An eight-acre patch was near the ditches.

Q. Okay.

A. And then the balance of it was located near one of the ditches.

MR. TEBBUTT: Go off the record for just a second.

(Off the record from 11:05 to 11:06.)

(Garmatz Deposition Exhibit No. 4 was marked for identification.)

BY MR. TEBBUTT:

Q. Mr. Garmatz, I'm going to hand you a green marker, which I think might be a good color for what we're about to do. Yeah. And if you could with the green marker, please, on Exhibit 4, which is -- let me strike all that.

Do you recognize Exhibit 4, sir?

A. Yes.

Q. Okay. And do you recognize it to be a figure from -- produced by HDF as part of its proposal to put a dairy site at the Mahaulepu property?

A. Yes.

Q. Okay. I'm going to ask you to draw the area that was planted in July and August of 2015 on Exhibit 4 with the green marker. Can you do that for us?

A. (Writing.)

Q. Okay. So there are two areas -- well, actually, if I may ask you, this line here that goes to the irrigation pivot, does it complete --

A. (Writing.)

Q. There we go. All right. So there are essentially two areas that you've indicated on Exhibit 4 as the areas that were harrowed and then planted in



kikuyu grass in July and August 2015, correct?

A. Yes.

Q. Could you please put the No. 1 in one of them and 2 in the other?

A. (Writing.)

Q. And then circle the number, please.

A. (Writing.)

Q. Okay. Do you know how many -- approximately how many acres No. 1 is?

A. Eight.

Q. Okay. And No. 2, how many acres?

A. Just thinking here.

Q. Okay.

A. Approximately 30.

Q. Okay. And the total is approximately 39, you said earlier?

A. Yeah.

Q. Okay. I'm going to hand you a brown marker, and if you could tell me where the irrigation ditches are in proximity to fields 1 or 2. Well, hang on just a second. Let me back up. Move your hand, please. Okay.

Before you do that, do you see the stream or river markings are in light blue on the key?

A. Uh-huh (moves head up and down).

Q. Is that yes?

A. Yes.
Q. Okay. And the stream or river marking, is that what runs right along the green line that you have on the west side of field one?
A. Yes.
Q. And is there a name for that river or stream?
A. Ditch.
Q. What do you call it?
A. Ditch.
Q. Is that -- that's all you call is the ditch?
A. Uh-huh (moves head up and down).
Q. And does a ditch also enter in the upper left-hand corner of field two coming from north of the green line that you put in?
A. Yes, yes.
Q. And does that join up with the ditch that --
A. Yes.
Q. Just a moment, please. That borders the green line that you drew in on the west side of one?
A. Yes.
Q. And where does that ditch go? The ditch where -- after the confluence of the two ditches that we're discussing here, and I'm going to ask you with my blue pen to circle the confluence of those ditches.
A. Define confluence.



Q. Where this ditch that we talked about that runs into the northwest corner of field two meets up with the ditch that comes in along side the west edge of field one.
A. (Writing.)
Q. Okay. So that's the confluence where you've circled there.
And then where does that ditch proceed then? Before you mark, just tell me where it goes.
A. (Indicating.) Straight to the south.
Q. Okay. So is that the purple line at that point?
A. Yes.
Q. Okay. And is that open to the surface all the way?
A. Define open to the surface.
Q. Open to the air.
A. Yes.
Q. Okay. So none of it is piped underground?
A. Oh, no, no.
Q. That's what I was trying to get at. Okay.
THE WITNESS: I need to take a break.
(Break from 11:13 to 11:18.)
BY MR. TEBBUTT:
Q. Mr. Garmatz, I'm going to ask you some more

questions with respect to the categories of questioning in Exhibit 2. Have we discussed everything there is to discuss about 1A with grading and grubbing?

MR. PALOUTZIAN: I'm going to object to the form of the question. Go ahead.

THE WITNESS: Yes.

BY MR. TEBBUTT:

Q. With respect to 1B, the watering troughs, how many watering troughs have been installed?

MR. PALOUTZIAN: Object to the form of the question on that as well. Go ahead.

THE WITNESS: Approximately 160.

BY MR. TEBBUTT:

Q. Okay. And those to the concrete watering troughs referred to in 1B in Exhibit 2, correct?

A. Correct.

Q. And what did you do to prepare the area for the installation of the water troughs? Was it -- well, let me ask you this: Was the preparation similar for all 160?

A. Yes.

Q. Tell me what the preparation was.

A. The ground was left as is, level as it was, and we brought in the limestone from the quarry and leveled the ground and raised the water trough up on a level



plane so they could place the water trough on that level plane.

Q. Okay. Was there any excavation work done?

A. No.

Q. So the limestone was added to the surface?

A. Correct.

Q. And built up?

A. Built up and leveled.

Q. Okay. And it was brought from the neighboring quarry?

A. Yes.

Q. The one that's pretty close to the site?

A. Yes.

Q. That you can see from the site?

A. Yes.

Q. And how much over ground level was each water trough built up or the setting for the water trough?

A. The design was 12 to 15 inches, but some places we had to put more. If the ground was unlevel, we had to put more.

Q. Okay. And are all the watering troughs, do they now have waterlines that connect them?

A. No.

Q. Do any of them have waterlines that feed them?

A. Some.

Q. How many?
A. Forty.
Q. Are they in one particular area, those 40?
A. Yes.
Q. Okay. And are they fed by one of the two irrigation pipes that was installed at the facility that you testified about earlier?
A. No.
Q. Are they fed by an existing waterline?
A. No.
Q. How are they fed?
A. Not fed at all yet.
Q. Right. But that infrastructure is there, correct?
A. Uh-huh.
Q. Is that a yes?
A. The infrastructure to the --
Q. To the watering troughs.
A. That was installed.
Q. Okay. And when was that installed?
A. April of '14, March and April of '14.
Q. And those installations were in addition to the two pipes that you testified about earlier, correct?
A. Correct.
Q. And how was that piping installed?



A. We used a tool that digs down in the ground by the force of a bucket of an excavator, large excavator. We call it the wedge bullet. And the pipe is attached to the bullet that comes along in the ground underneath. It digs down about 16, 18 inches. Just a thin line.
Q. Okay.
A. And the pipe trailer is right behind it. And as you -- as the excavator moves backwards, the bullet stays in the ground continuously, and the excavator just drives it where he wants the line to go.
Q. Okay. So the earth along the line is disturbed, it's moved up and around, is it or not?
A. Yes, it is.
Q. Okay.
A. Just a small portion. Not very large. I mean, four or five inches might be the most because that bullet stays in the ground as it pulls that pipe. And then the pipe is in the ground and right behind the bullet. The ground comes together. I mean, it's just a thin piece of steel, real (indicating).
Q. Okay. And how wide is the area of disturbance?
A. Two to three inches, four inches. Let's just say six inches.
Q. And how many feet of the bullet piping, is that what you call it? What was the phrase you used? I'm

sorry, Mr. Garmatz.

A. Bullet. We call it the bullet drill is what we call it.

Q. Bullet drill.

A. Yeah.

Q. Okay. How many feet of piping was installed with the bullet drill?

A. I wouldn't know that figure. I couldn't tell you that.

Q. Approximately.

MR. PALOUTZIAN: Lacks foundation, calls for speculation. Go ahead.

THE WITNESS: Thirty-five hundred feet.

BY MR. TEBBUTT:

Q. Okay. Do you know what the distance is between the water troughs? Is it kind of a similar distance between them?

A. It's a similar pattern.

Q. Okay. So are they laid out circularly, linearly?

A. Linearly.

THE COURT REPORTER: Hang on one second. Something happened with my machine.

(Court Reporter machine malfunction.)

(Off the record from 11:25 to 11:27.)



BY MR. TEBBUTT:

Q. Do you know what the distance is between the water troughs generally?

A. Estimate 200 feet.

Q. Okay. And the water troughs are patterned such that they'd be available in the paddocks that the cows would be able to use, correct?

A. Two water troughs per paddock.

Q. Okay. Are all the water troughs that would be -- that are planned for the site installed now?

A. No.

Q. How many more water troughs need to be installed?

A. Well, the difference in the number that I gave you before from -- no, there's a total of 238 water troughs. What's the number I gave before?

Q. You said there're 40 that had piping to them.

A. Yeah. But you asked me how many had been installed.

Q. Right. And I don't remember.

A. I don't know what that difference number is.

MR. PALOUTZIAN: I believe the testimony was more than 60.

THE WITNESS: Yes. So there's probably 70 to 80 that need to be installed yet.

BY MR. TEBBUTT:

Q. Okay. Are there any other waterlines other than the two irrigation lines that we talked about and the waterlines that are installed to the approximately 40 troughs that are already installed? Are there any other waterlines that have been installed on the site since you started in October 2013?

A. No.

Q. The first the pivot, when was that installed?

A. March 2014.

Q. Okay. And is that Pivot 1 as depicted on Exhibit 4?

A. Yes.

Q. So that's March 2014 was its installation, correct?

A. Yes.

Q. Were there bridges or ramps installed to allow Pivot 1 to do its job?

A. Yes.

Q. And how many pivots or ramps were installed?

A. Well, you've got 12 towers.

Q. Let's just say for Pivot 1 to start with.

A. I'd say 18 to 20.

Q. Okay. In the field that covers Pivot 1, about 18 to 20 ramps?



A. Uh-huh (moves head up and down).

Q. Describe how a ramp is installed.

A. Well, they're mechanically --

MR. PALOUTZIAN: Let me just state the question is vague and overbroad. Go ahead. Go ahead.

THE WITNESS: They're mechanically put together. They're welded together before they're placed.

BY MR. TEBBUTT:

Q. Where was that work done?

A. On the edges.

Q. Of the fields?

A. In the fields, yes.

Q. Okay.

A. And then the large excavator would attach it in the middle, and each location of bridge had a GPS site. We would determine that GPS site and center one into the bridge on one side of the bank, and then we would go to the other side and determine what the GPS point is and situate that point in the middle. And then we had -- there's long spikes, 32 inches long, that are on the edge -- ends of the bridges. And we would have a backhoe that would be there, that once it was set and everybody agreed it matched the GPS, would set both sides down into the ground.

Q. How would you set them down?
A. Backhoe, hydraulic. The bucket would push it in the ground.
Q. Would push the spike down?
A. Yes.
Q. Did you prepare the areas where the anchor ends of the bridges went?
A. Where it was needed.
Q. And so what would you do to prepare the ground where it was needed?
MR. PALOUTZIAN: The question is vague. Go ahead.
THE WITNESS: We would drag the soil back, just the width of the bridge.
BY MR. TEBBUTT:
Q. And how wide are the bridges?
A. Thirty inches.
Q. Okay. And how far would you drag the soil back?
A. Just far enough to make sure that the tire could get on top of the bridge.
Q. How many feet would that be?
A. In worst case scenario, probably three feet.
Q. What do you think the average is?
A. Two to three feet.



Q. And how many bridges did you have to do that for?
A. I couldn't tell you that exactly.
Q. More than half of them?
A. Oh, no. No.
Q. More than five?
A. Yeah. Let's say 5 to 10.
Q. Five to 10 for Pivot 1?
A. Uh-huh (moves head up and down).
Q. Was that also true for Pivot 2? Same number -- are there the same number of ramps or are their fewer?
A. There's fewer, because it only crosses one drain. It crosses this drain right here (indicating).
Q. Okay. Does Pivot 2 not cross the drain that comes through the field where Pivot 1 is?
A. Yes.
Q. It does cross that?
A. Yes.
Q. So are there ramps there, too?
A. Yeah, there's ramps there, too. My mistake.
Q. And is there actually a third waterway that Pivot 2 crosses right here?
A. Yeah, but it's not designated for bridges.
Q. There are no bridges on this --
A. No.

Q. -- particular segment?
A. No, it's just a swale, going to be a swale.
Q. Okay. So do you have names for these -- this particular what you call a swale?
A. No.
Q. Do you have a name for this one (indicating)?
A. We call it the main drain -- main ditch.
Q. Okay. Can you just write the initials -- or just write the word, main ditch, somewhere right next to that and point to it, please?
A. (Writing.)
Q. And just draw an arrow.
A. (Writing.)
Q. Okay. And what do you call this -- the ditch that's to the --
A. Center ditch.
Q. -- east of it? Is that right? West, east?
A. East, east.
Q. I'm confused. East. Thank you.
A. (Writing.)
Q. Okay. Are there any other ditches on the property that you have names for?
A. I call this the No. 6 (writing).
Q. So that's the swale we were just talking about?
A. Uh-huh.



Q. Would you put an arrow to that, please?
A. (Writing.)
Q. Okay.
A. Call this one the one that comes down here. That's right here, the No. 3 (writing).
Q. And the No. 3 goes into a little pond on the property?
A. No. This map isn't a hundred percent right. It goes into this -- it goes into the main ditch.
Q. So can you take my blue pen and draw the continuation where it goes into the main ditch?
A. (Writing.) That's where it needs to be, right here, not here.
Q. Okay. So this ditch is off, you think, a little bit?
A. Yes.
Q. Potentially a little bit to the northeast?
A. Yes. Northwest.
Q. Northwest, okay. So that's No. 3 ditch?
A. Uh-huh (writing).
Q. Okay. And you drew squiggly lines through the other No. 3 ditch because you think that's incorrectly sited on the map, correct?
A. Yes.
Q. Okay. Any other water courses or ditches that

you have names for on the site?

A. No.

Q. And all of these ditches eventually converge just south of the site, correct?

A. Correct.

Q. Okay. And then eventually go to the ocean through the Waiopili Stream?

A. Correct.

Q. And are there other swales on the property that are unnamed?

A. No.

Q. There are no other ditches or swales that could carry water off the site in your mind?

MR. PALOUTZIAN: Lacks foundation, calls for speculation. Go ahead.

THE WITNESS: No.

BY MR. TEBBUTT:

Q. Were you present when the ground water monitoring wells were installed on the site?

A. Yes, sir.

Q. For all four of them?

A. Yes, sir.

Q. And have there been just four thus far?

A. That's all.

Q. Describe the site preparation for the first



monitoring well.

A. Just mowed the grass. They went in and started.

Q. Did you do any excavating or digging?

A. No.

Q. When the wells were drilled, where did the cuttings from the drilling go?

A. We kept them local. Just brought 'em off to the side.

Q. How far away from the actual drilling site?

A. Twenty feet at the most.

Q. And did you do anything to them?

A. No, just kept them there.

Q. Just going back to my question earlier. I just wanted to clarify. You said -- well, let me ask you this question with respect to the other ditches: Are there any other smaller unnamed ditches that go to the main ditches that drain to -- that eventually drain into the ocean?

MR. PALOUTZIAN: Lacks foundation, calls for speculation. Go ahead.

THE WITNESS: Yeah.

BY MR. TEBBUTT:

Q. And are they depicted on Exhibit 4?

A. Yeah.

Q. All right. Circle, if you will, the headwaters of those ditches.
A. (Writing).
Q. Okay. So that's the beginning of it?
A. Uh-huh.
Q. Okay. And that's actually along the -- okay. Is that the eastern ridge or western ridge? Eastern ridge of the -- eastern edge of the property?
A. Uh-huh.
Q. Okay. And that doesn't go onto the property?
A. Yes.
Q. It does?
A. Uh-huh.
Q. Where does it go onto the property?
A. Right here (indicating).
Q. Okay. And so take your pen and draw where it goes.
A. (Writing.)
Q. Okay. Does it end there?
A. Yes.
Q. Or does it hook up with the center ridge?
A. Ends there. Ends there.
Q. And so it doesn't hook up with any of the other ditches or water courses? Does it continue somewhere?
A. It ends here.



Q. What does it end in?
A. In a field.
Q. Okay.
A. The large area currently.
Q. All right. So do you have a name for that ditch?
A. No, no.
Q. Okay.
A. Haven't worked with it.
Q. Okay. You haven't done anything on that?
A. No.
Q. Okay. So can you put an X on the spot where you said it terminates.
A. (Writing.)
Q. Okay. And then circle it, please.
A. (Writing.)
Q. Okay. Are there any other ditches like that on the property or just -- are there other ditches that come onto the property?
A. Yeah, we've got one back here.
Q. So take the blue pen and draw the outline of that one, too, please.
A. (Writing.)
Q. And did that -- the one you just drew with the blue pen starting on the western side by the pumping

station going right across the top where it says, Drip irrigation 3.9 percent, and then continuing over, does that continue over to the main ditch?

A. Yes.

Q. And it --

A. Enters the main ditch.

Q. Enters the main ditch. And do you see water flowing in that ditch sometimes?

A. Yes.

Q. Okay.

A. That's the Waita drain.

Q. That's what's called the Waita drain?

A. Right.

Q. Okay. And are there other low spots on the site that when, you know, we were there during the Rule 34 inspection, you said there were a number of low spots around the facility. Are there other low spots that are not drawn on Exhibit 4?

A. You mean -- what do you mean by low spots?

Q. Well, low spots that or old swales or something like that.

MR. PALOUTZIAN: The question is overbroad, it's vague.

THE WITNESS: There's a line that runs right through here (indicating).



BY MR. TEBBUTT:

Q. What kind of line?

A. It's where the old PVC line is that feeds all these people down here (indicating).

Q. Feeds them what?

A. Water.

Q. From where?

A. Waita.

Q. So has that sort of eroded and become a low spot where that pipe is over time?

A. Yes.

Q. Okay. And so that runs parallel to the center between the main ditch and the center ditch?

A. Right here, right here (indicating). Parallel to it all the way down.

Q. Okay. Where does it start?

A. Right here (indicating).

Q. And it comes off the dotted yellow line?

A. No, no, no, no, no, no, no. It starts -- there's a pump station right here (indicating).

Q. Okay.

A. We call it a pump station.

Q. All right.

A. And that's where that P --

Q. Can you write PS next to that, please?

A. (Writing.)
Q. Okay. And then draw where it goes.
A. (Writing.)
Q. So it goes from the pump station, fairly close to the middle of where the main ditch and the center ditch are, correct?
A. Yes, yes.
Q. And what does it go to once it goes off the HDF site?
A. To other people.
Q. Other farms?
A. Yes.
Q. For irrigation?
A. Yes.
Q. Is there an end point right there where it ends?
A. I couldn't tell you that. I wouldn't know.
Q. Okay. And so that's -- the PS line is a low spot in the fields?
A. Uh-huh (moves head up and down).
Q. Okay. Have you ever seen water running in there?
A. No.
Q. Were you responsible for the well completion reports?



A. No.
Q. Were the well drillers responsible for that?
A. Correct.
Q. Did you review their reports?
A. Yes, sir.
Q. Did you review them before they were submitted to the state?
A. No.
Q. Do you know if anyone from HDF reviewed them before they were submitted to the state?
A. Tom Nance or our advisor.
Q. One of your consultants?
A. Yes.
Q. Have you done any work on repairing or replacing fencing along the perimeter of the HDF property?
A. No. Define repairing or fencing.
Q. Well, is there -- all right. Let's try it this way: Is there a fence all around the perimeter of the HDF property?
A. Some fencing, which would be neighbors' fencing.
Q. Okay. Does HDF own fence that goes all around its property?
A. We don't have anything installed.

Q. Okay. So the fences then are all neighbors' fences, not HDF fences?
A. Uh-huh (moves head up and down).
Q. Has HDF maintained any of those fences?
A. No.
(Garmatz Deposition Exhibit No. 5 was marked for identification.)
BY MR. TEBBUTT:
Q. Sir, handing you what's been marked Exhibit 5, an aerial photo, do you recognize the area that's depicted in this photo?
A. Yeah.
Q. Do you recognize it to be some portion, at least, of the HDF site?
A. Yeah.
Q. Do you see what we're going to refer to and what was referred to in Exhibit 2 as the keyhole pond?
A. Yes, sir.
Q. Tell me how that pond -- well, strike that. When was that keyhole pond dug?
A. Late April or early May of '14.
Q. And why was it dug?
A. Observation purposes.
Q. Observation of what?
A. Possible rock formations closer to the surface.



Q. So would you characterize it as a geological excavation?
A. Yeah.
Q. All right. And what were the results of that excavation?
A. That there was no rock there.
Q. Okay. Were any samples taken?
A. No.
Q. Any soil samples taken?
A. No.
Q. No water quality samples?
A. No.
Q. What's the source of the water in that pond?
A. Probably groundwater.
Q. How deep was that pond dug?
A. Originally dug about 8 to 10 feet.
Q. And what about the area around it, was that excavated at all before that pond was dug?
A. No, we just had the excavator down -- well, the excavator might have done some work around it. But I was there that day, and I don't recall any of that going on there.
Q. The excavated material, what was done with that?
A. As you see there, it's placed to your left in

that little berm, that grassy berm.

Q. Can you, with my blue pen, please circle the area where the excavated material was placed?

A. (Writing.) How do you want me to identify it?

Q. Just put EXC.

A. (Writing.)

Q. Do you see how the area there looks squared off?

A. Uh-huh (moves head up and down).

Q. Where keyhole pond was.

A. Uh-huh.

Q. Was there excavation done to create that square or rectangular area?

A. I couldn't tell you that. I wouldn't know.

Q. Wasn't, in fact, that whole area excavated before the keyhole pond was dug?

A. I couldn't tell you that.

Q. Who could?

MR. PALOUTZIAN: Calls for speculation, lacks foundation. Go ahead.

THE WITNESS: Probably Mason, the excavator operator.

BY MR. TEBBUTT:

Q. Mason who?

A. Slako, S-l-a-k-o.



Q. Were you there with him the whole day when that --

A. No, I came later that day when they decided to go ahead, but I remember we followed the excavator in there.

Q. Who's we?

A. Myself and Doyle Waybright.

Q. Just the two of you?

A. No, Marty was there also.

Q. Who's Marty?

A. Marty Forster is the guy that owns Effluent Irrigation.

Q. Okay. Who else was there?

A. Myself and Doyle and Mason. And I believe Adam was with us, too. I'm not for sure about that.

Q. Who requested that this area be dug?

A. The geophysicist that was doing the soil work, the geophysical study for the slab for the parlor, the dairy parlor.

Q. And who is that?

A. I can't recall his name.

Q. Was he present during the excavation?

A. No.

Q. Was this all done in one day?

A. Yeah, one afternoon.

Q. Did you take pictures for the geophysicist?
A. No, we never did.
Q. How did he get information about what you did?
A. We just told him, called him the next day and told him what we ran into. But this wasn't for his study.
Q. What was it for then?
A. Our own information.
Q. For what kind of information?
A. To determine if there was any stone or what depth the stone was at.
Q. Was this the area where you planned to put the lagoon, the effluent lagoon?
A. Yes.
Q. So was part of the purpose to determine depth to groundwater?
A. No, we were looking for stone.
Q. Have you determined what the depth to groundwater is in that area?
A. Varies from time to time.
Q. Right where the keyhole pond is, have you determined the depth to groundwater there?
A. Like I said, it varies.
Q. From what to what?
A. Two or three feet.



Q. Have you changed your lagoon design plan for the proposed dairy based on the work that was done at the site?
A. No.
Q. Do you know if any neighbors have installed additional fencing along the perimeter of the HDF property since HDF said it was planning to put a dairy site there?
A. Yes.
Q. How many?
A. Only one to my knowledge.
Q. And how much additional fencing?
A. Oh, man. He probably put in a thousand feet.
Q. Where?
A. On his boundaries.
Q. Yeah. Which are his boundaries?
A. He's right here (indicating).
Q. Okay. Draw just a line across the red for where it starts.
A. His boundaries?
Q. No, where the -- where you say the fence is.
A. Okay. It started way back here (writing).
Q. Okay. And if you go above that line, just put the name of the person, say right up here.
A. (Writing.)

Q. Whose property it is.
A. Evan Vasconcelles.
Q. Okay. I'm just going to take my pen and draw an arrow to the fence. All right. And I'm just going to write down, New fencing, okay? When was that installed, do you know?
A. The summer of '15.
Q. Okay. I'll just writing down, New fencing summer of 2015, all right?
A. No, put repaired fencing.
Q. Repaired fencing. Okay.
A. Not new, repaired.
Q. All right. Did HDF assist with any of that --
A. No.
Q. -- repair?
A. No.
Q. Did it pay for any of it?
A. No.
Q. When we were there at the nursery in March; end of this group of questions for now; there was additional disturbed area around the perimeter, the planted area, correct?
A. Correct.
Q. When had that been plowed?
A. Disked.



Q. Disked. Pardon me.
A. I've maintained that disked area since late '14, early '15 to keep any grasses that might leach into the field, into the nursery. We had a lot of watergrass down there.
Q. A lot of what? Watergrass?
A. Watergrass, yeah.
Q. Okay. And so that area was disked, how deep?
A. Six inches.
Q. Okay. And is that a practice that you do regularly on that same area?
A. Yes.
Q. Do you intend to plant that area?
A. Yes.
Q. The part that was disked?
A. Uh-huh (moves head up and down).
Q. Has it been planted since we were there?
A. No.
Q. Has there been any soil amendments or other materials brought in and added to that area that was disked when we were there in March 2016?
A. Define soil amendments.
Q. Well, anything from off the site. Let's start with that.
A. Okay. Now repeat your question again.

Q. Yes. Has anything from off site been added to the area that was disked in March 2016?

A. No.

(Garmatz Deposition Exhibit No. 6 was marked for identification.)

BY MR. TEBBUTT:

Q. Handing you what's been marked as Exhibit 6, is this the area, part of the area at least, where we were just talking about that was disked?

A. Uh-huh (moves head up and down).

Q. When was that disked? This is, I will represent you, is a picture from the site inspection in March of 2016.

A. No, it was probably done 30 days before then based on the growth of what you see there.

Q. Okay. And has it been disked since?

A. I don't believe so.

Q. Is it still in that similar condition?

A. Pretty much so, yeah, yeah.

Q. So that's native soil that we see there?

A. Yeah, yeah.

Q. Has there been anything -- any fertilizers or any pesticides, herbicides, added to that area?

A. I've sprayed the green grass that's growing.

Q. In the disked area?



A. Yes, sir.

Q. Sprayed it with what?

A. Roundup.

Q. So it looks mostly the same as what it did in March at this point?

A. Yeah, yeah.

MR. TEBBUTT: Why don't we take a break for lunch?

MR. PALOUTZIAN: Okay.

(Break from 12:03 to 4:47. Moved location.)

(Garmatz Deposition Exhibit No. 22 was marked for identification.)

MR. TEBBUTT: Back on the record with Mr. Garmatz.

BY MR. TEBBUTT:

Q. Mr. Garmatz, it's my duty it remind you that you're still under oath.

A. Correct.

Q. Do you understand that?

A. Correct.

Q. Okay. When we were talking this morning, one question -- or one answer you gave me about the nursery, you said the nursery is now three and a half acres and it was originally four. Do you recall that testimony?

A. Correct, yes, yes.
Q. Why it is 3.5 acres now when it was initially four?
A. When the E&I folks came to install the pivot, the main point section was located in the area right in the middle of the pivot -- right in the middle of the nursery. And so they tore out a lot of the ground around it, and I never replaced it.
Q. Okay. Did it have anything to do with any archeological issues around the nursery?
A. No, no.
Q. When you first started for HDF, you had one other employee, Mr. Waybright, is that right in October 2013?
A. No. No, not at that time.
Q. When did Mr. Waybright start?
A. February of '14.
Q. Okay. Was it January or February, do you remember?
A. February.
Q. Okay. Has HDF had any other employees since Mr. Waybright left besides you?
A. No.
Q. During the Rule 34 inspection, there were two guys there wearing HDF construction crew shirts. Who



were they?
A. They were Grove Farm personnel.
Q. What were their names?
A. Roy Gagasa.
Q. Gagasa?
A. Yeah.
Q. How do you spell that, do you know?
A. G-a- -- just a second for this phone to come on. G-a-g-a-s-a.
Q. And the other person?
A. Royce. Just a second. I'll get you that. Royce Kawabata, K-a-w-a-b-a-t-a.
Q. And you said they were both Grove Farm employees?
A. Uh-huh.
Q. How many HDF construction crew T-shirts did you guys make up?
A. I think it was 300 Approximately. I don't know that number for sure, but approximately 300.
Q. Di you just give 'em out?
A. Yeah.
Q. I'm going to hand you what's been marked as Exhibit 22 in this case, which is a declaration of you in support of the defendants' motion for summary judgment filed back on November 25th, 2015. Do you see

that?

A. Uh-huh (moves head up and down).

Q. I'm going to ask you some questions about it. You signed that under penalty of perjury, correct?

A. Uh-huh.

Q. In paragraph five of your declaration you list the construction that was performed at the property from February 2014 to June '14. Is that a complete list?

A. (Writing.) Just two or all of -- just five?

Q. Yeah, five, A through F. Is that a complete list of the construction activities that took place between February 2014 and June 2014?

A. Yeah, yes, (writing).

Q. Paragraph seven --

MR. PALOUTZIAN: Let's not mark it up. Don't mark it.

MR. TEBBUTT: Did he mark on it?

MR. PALOUTZIAN: He put some checkmarks on there.

BY MR. TEBBUTT:

Q. Okay. So the checkmarks next to -- on Exhibit 22 next to paragraph five A through F, were made by you, correct?

A. That's correct.

Q. Okay. All right. Keep that in front of you,



but let's not mark on this anymore, please.

In paragraph seven, it says, In addition, between February and April of 2015, ground work, drilling, casing and grouting work was completed on four separate vertical monitor wells.

What groundwork was done?

A. Well, they drilled the wells from the ground, from the top of the ground.

Q. Understood. How is that different than drilling? What's the groundwork that was done?

MR. PALOUTZIAN: Objection, asked and answered. Go ahead.

THE WITNESS: The only groundwork that we did there was we sprayed the ground before they went in there.

BY MR. TEBBUTT:

Q. How soon before?

A. A couple weeks.

Q. To kill the vegetation to allow easier access?

A. Yes, sir.

Q. Did you do any backhoe work or any harrowing?

A. No. We also mowed some areas there also.

Q. Okay. So you also did some mowing, too, for access?

A. Yeah.

Q. And you said no backhoe work?
A. No.
Q. Sir, if you'll take a look at Exhibit 1 to your deposition. That's the pile of invoices that we talked about earlier this morning. I'd like you to take a look at HDF 000544 and 545. Do you see those two pages?
A. Yeah.
Q. And do you see the entries for backhoe, well drilling?
A. Yeah.
Q. On 3/25/15 three hours at $75?
A. Uh-huh.
Q. What was done with the backhoe associated with the well drilling?
A. I couldn't tell you.
Q. And so there was backhoe work done?
A. Well, if they're billing us for it, yeah.
Q. Okay. And you even have notes. It says, Under budget. Is that your language?
A. Yeah, that's mine, that's mine.
Q. Okay. So you approved that invoice?
A. Yeah, yeah.
Q. Okay. Same thing with -- on 545, entry for 4/8/15 backhoe, well drillers, two hours at 75. And you said that that was on budget, correct?



A. Yeah.
Q. So you approved that work as well?
A. That's correct.
Q. So that contradicts your prior statement about whether there was backhoe work being done, correct?
A. That's right, correct.
Q. Are there any other statements that you've made thus far today that you'd like to correct that are incorrect?
A. No.
MR. PALOUTZIAN: I'm going to object to the form of the question.
BY MR. TEBBUTT:
Q. If you look at HDF 000548. Do you have that in front of you?
A. Uh-huh (moves head up and down).
Q. The entry is --
A. Hold on, hold on, hold on. Yeah. 548, okay.
Q. 548. The entry for 6/9/2015, irrigation repairs, nine hours. What type of irrigation repairs were undertaken?
A. That's back in June. I'm sorry. I can't tell you that. I'm sure that it was done, but I can't tell you what that would be. I just can't recall that far back.

Q. Okay. Are there any documents that you would have that would tell you what was done other than this invoice?

A. No, sir.

Q. Do you know who did that work? Whether it was Mr. Bloemke?

A. Mr. Bloemke.

Q. On 6/26/15, entry for replace eight-inch valve at pivot, labor.

MR. PALOUTZIAN: Are we on a different page now?

BY MR. TEBBUTT:

Q. Yeah, next page, 549. Do you see that entry?

A. Uh-huh (moves head up and down).

Q. What was that, do you know?

A. Well, the valve at the No. 1 pivot froze, and we had to replace the eight-inch valve.

Q. So was that all above-ground work?

A. Yeah, yeah.

Q. Turn to the next page, 550. There are two entries for fencing on 7/15 and 7/14/15. Do you see that?

A. Uh-huh (moves head up and down).

Q. Do you know what kind of fencing work was done?

A. Well, that was about the time that we were



starting to set the fence line by the GPS points, and I would use Scott Bloemke to help me do that.

Q. What fencing line?

A. The perimeter fence line.

Q. So --

A. The perimeter.

Q. So I'm sorry. What were you doing? Explain to me what that was?

A. There's GPS locations for all the fence posts.

Q. And so you were doing the GPS locating?

A. Uh-huh (moves head up and down).

Q. And he was assisting you with that?

A. Yes, yes.

Q. On the entry for 7/18/15 on that same page, harrow. Do you know what area was harrowed?

A. Down around the nursery.

Q. On a page or two later, 552, on 7/1/15, entry for backhoe work. Do you know what kind of backhoe work was done?

A. 7/1, that was the day that we lost the -- the bolts broke on the end portion of the pivot, the end gun. And Scott and myself and one -- another AJAR employee came down, and we used the backhoe to lift the end section up so we could place new bolts through.

Q. The next page, 553, there's an entry for a

period of time June 29, '15 through July 23, '15. It says, Shred trees and grass for fence installation. Do you see that?

A. Yes.

Q. How many trees were shredded during that time period?

A. Same thing we discussed this morning when I told you we shredded so many lineal feet.

Q. Okay.

A. We discussed this already.

Q. All right. Next page, 554, there are a series of entries for fencing. What kind of fencing was done? Let's start with 7/23.

A. Same thing we were doing before. Setting those -- setting that fence line.

Q. Okay. So that was all GPS work?

A. Yes.

Q. Did you stake anything?

A. Yes, sir.

Q. What did you stake with?

A. Wooden stakes.

Q. Are those stakes still in place today?

A. The biggest portion of them are not.

Q. Have they been removed by you or?

A. No, not been removed by me.



Q. Do you know who they've been removed by, if anyone?

A. I couldn't tell you that, wouldn't know.

Q. They've just kind of fallen off over time?

A. Yeah, yeah.

Q. On 8/6/15 on 554, entry backhoe, pivot. Can you tell me what that is?

A. I'd be guessing if I told you that.

Q. Okay. You remembered the one on 7/1/15, but you don't know what happened on 8/6/15, is that correct?

A. Yeah, I recall the date at that point that that pivot broke.

Q. Okay. Nothing jumps out in your memory about 8/6?

A. The only thing it could possibly be is the lower pivot, the No. 2 pivot on your map. We had some backfill work that needed to be done there.

Q. Okay. Does the next page help you with that, 555. It says, Cap eight-inch line, field 728?

A. No, no.

Q. Is that different than the 8/6 entry?

A. Yeah, yeah.

Q. Okay. So labor and backhoe for the 8/3/15 entry, what was -- what did that entail?

A. There was a line riser broke, and it was

leaking severely, so we turned off the water and dug down like, again, 8 or 12 inches and reset the riser on the main line.

Q. Is that the one at the nursery, the riser at the nursery?

A. Yes.

Q. And I think we have might have had a picture of it earlier in Exhibit 6.

A. Yeah.

Q. Is that it? Is that the riser?

A. No, because it's back here a ways. It's not in the picture.

Q. Okay. Is it close to that apparatus?

A. Yeah, yeah.

Q. Okay. Do you still have Exhibit 1 in front of you, sir?

A. Yes.

Q. I just want to ask you a few more questions. 518, HDF 518, maybe halfway through the bundle. Do you have that one in front of you?

A. Uh-huh.

Q. There are a number of things crossed out.

A. Uh-huh.

Q. Why are they crossed out?

A. I don't know why they're crossed out. There's



another invoice that goes with that, because this is 235 -- 203505B, so there's goes to be 203505A.

Q. Or maybe even just 505?

A. Huh?

Q. Or maybe even just the 505?

A. Oh, here it is right here. Your number is 510.

Q. Okay.

A. No, this is 405. That's not the right one.

Q. How about 532?

A. Yeah, that's it.

Q. Okay.

A. Notice the dates. Some of the work was done in November, and some of the other work was done in December. As it states -- as it's written up there on the top. Yeah there, see --

MR. PALOUTZIAN: Just let him ask a question.

BY MR. TEBBUTT:

Q. Yeah, I'm just kind of curious why I have two, but I guess it doesn't really matter, does it?

All right. Next, 533. There's an entry for backhoe work. Do you know what that was regarding?

A. I couldn't tell you.

Q. So in your preparation for the deposition did you look over the backhoe entries --

A. No.
Q. -- and try to determine what they were about?
A. No, I didn't.
Q. Okay. Let's look at 530, please. And again, this is still in Exhibit 1. The entry for 11/10/14, it says, Move fence post, three hours at 60. What fence post was moved?
A. Like we talked about this morning. We moved fence posts from one area to the other so I could plant that kikuyu in that field where the fence posts were at. We talked about it this morning.
Q. So is that the fence posts that were just laid in the field?
A. They were in bundles.
Q. In bundles, okay. So it wasn't that you were actually replacing the fence post?
A. No, no.
Q. Okay. What about the repair of the two-inch drain in that next entry on 11/18/14, what was that about?
A. I couldn't tell you.
Q. What is the two-inch drain?
A. That's probably the two-inch drain on the nursery. The drip system has a drain on it.
Q. Is that -- that's a two-inch drain system?



A. Uh-huh (moves head up and down).
Q. All right. Let's take a look at 534, please, entry on 1/14/15 for backhoe. Do you know what that was in relation to?
A. No, I sure wouldn't.
Q. Does the context of the other work done help you -- help tell you what that might have been related to?
A. No, no.
Q. All right. Let me ask you questions for the next one, 535, entry on 1/5/15 for backhoe.
A. Again, I can't tell you.
Q. Same with 1/9.
A. Uh-huh.
Q. Is that the same answer, you don't know?
A. Yes, sir.
Q. All right. 536, entry for backhoe and bold, 1/28/15, two hours.
A. Couldn't tell you that either.
Q. All right. Take a look at 540, entry on 2/17/15, water irrigation, any idea what that is?
A. More than likely it's just a short period of time, and I probably was away from the trailer, and Scott probably turned on the pivot system.
Q. Okay. Entry 2/19/15, mowing, soil samples.

What kind of soil samples were taken?

A. That's when the U of H came out and took the samples for the EIS instead of -- that's all.

Q. Okay. Instead of the what?

A. Nothing.

Q. There was something there. Instead of who? Somebody else was going to take the soil samples?

A. No, U of H was collecting their soil samples.

Q. 541, next page, there's a column for backhoe and dump truck in March of 2015. What backhoe work was done?

A. Probably the loading of the HDF truck.

Q. With what?

A. I couldn't tell you. I'd have to get refreshed on this.

Q. Okay. Same thing with the dump truck that was used for four hours, it looks like, on one of the days. What was the dump truck used for?

A. I'd have to get my mind refreshed and find out.

Q. Did it have anything to do with moving rocks around?

A. No, no.

Q. Dirt?

A. I just don't want to guess now.

Q. Okay. What do you recall ever using a dump



truck for on site?

A. I don't.

Q. At all.

A. At this point, no. I mean, I can --

Q. Okay. Just asking. Next page, 542, did AJAR assist the well drillers?

A. Yeah.

Q. How did they assist them?

A. We supplied them water so that they could run their rigs. We had to stay there and pay attention to the well.

Q. What kind of drilling system was used, do you recall?

A. It's an upright system, runs in the back end of a truck, large truck.

Q. So is the water used to --

A. Cool.

Q. Cool the bit?

A. Yeah.

Q. And so the water that was used to cool the bit got spit back up onto the ground?

A. Yeah, you had some of that coming back up.

Q. Did you see any of that run off anywhere, the water that was used?

A. No, we contained it.

Q. How did you contain it?
A. With small berms that we built around the well site -- that the well drillers built around the well site. They used sandbags to contain the water.
Q. How long did they leave the sandbags in place after they finished drilling?
A. They were finished with the well, they were gone.
Q. Had the water disappeared at that point?
A. Oh, yeah.
Q. Okay. I don't know if I've asked you about 544 yet. I don't think I have, right? I asked about a few of the others. You see, backhoe, well drilling there?
A. Uh-huh (moves head up and down).
Q. What kind of work would the backhoe --
A. I don't couldn't tell you that either.
Q. Okay. On --
MR. PALOUTZIAN: I think you did ask about that.
MR. TEBBUTT: Well, I did about some others. I don't think it was that one.
MR. PALOUTZIAN: I wrote down, 544 and 545, does not know what the backhoe work was done on 3/25.
BY MR. TEBBUTT:
Q. All right. On 545, the entry for 4/6/15, it



says, Move PVC pipe. What was that?
A. PVC pipe that was located within that area where we had the -- where the fence posts were, and I wanted to get that out of there, clean that area all up.
Q. So those were the bundles of PVC pipe?
A. Yes, and there was some loose PVC pipe also.
Q. How much of that PVC pipe had been used for the irrigation system?
A. Had been used or was going to be used?
Q. Had been used.
A. There was probably twice that much there, so what's there probably represents the other half that needs to be installed yet.
Q. Okay. I want to ask you some more questions about -- have we looked at Exhibit 22, your declaration?
A. Yes, we have.
Q. Do you have that in front of you?
A. Yeah. That's the one I marked.
Q. All right. Don't do that again.
A. Yep.
Q. Paragraph 13, it says, I continue to gather various materials that were spread out over the property when construction was halted.
In addition to, you talk about including irrigation piping and fencing materials. What other

materials?

A. That's all.

Q. That's all?

A. Yeah.

Q. Do you remember receiving a specific basically stop work order on construction activities from Mr. Datta?

A. Yeah, an email, and then him and I would communicate on the phone.

Q. Did he help define what things to do and not to do?

A. Yes, sir.

Q. What did he tell you to do and not to do? Let's start with the to-dos. What did he tell you to do, to continue doing or?

A. Continue to produce grass, manage the grass.

Q. Anything else?

A. (Moves head from side to side.)

Q. Okay. What did he tell you not to do?

A. Any additional development of the grass crop other than what he told me to do.

Q. So does that include laying more irrigation?

A. Yeah.

Q. Or installing waterlines to the water troughs?

A. That's correct.



Q. Or installing more water troughs?

A. Couldn't do that.

Q. Did he tell specifically not to do that stuff?

A. I understood that, yes.

Q. My question is: Did he tell you specifically not to do that stuff?

A. Yes, yes.

Q. Okay. Did you have any other lists of things, that you said, Can I do this or can I not do this, other than the things I've mentioned?

A. No, he was very clear. I understood what he wanted to do.

MR. TEBBUTT: I think we're going to break for the rest of the day.

MR. PALOUTZIAN: All right.

MR. TEBBUTT: We'll pick up in the morning.

THE COURT REPORTER: Reading and signing?

MR. PALOUTZIAN: Yes.

(Concluded at approximately 5:22 p.m., June 13, 2016.)

* * * * *

I, JAMES J. GARMATZ, VOLUME 1, hereby certify that I have read the foregoing typewritten pages 1 through 133, inclusive, and corrections, if any, were noted by me, and the same is now a true and correct transcript of my testimony.

DATED: Koloa, Hawaii _____

_____

JAMES J. GARMATZ

Signed before me this _____

day of _____ 2016.

_____

Friends of Mahaulepu, Inc. vs. Hawaii Dairy Farms, LLC; Civil No. 1:15-cv-00205-LMK-KJM; Deposition taken on June 13, 2016, by Terri R. Hanson, RPR, CSR 482.



STATE OF HAWAII )
) ss.
COUNTY OF KAUAI )

I, TERRI R. HANSON, RPR, CSR 482, do hereby certify:

That on Monday, June 13, 2016, at 9:02 a.m. appeared before me JAMES J. GARMATZ, VOLUME 1, the witness whose deposition is contained herein; that prior to being examined, the witness was by me duly sworn;

That pursuant to Rule 30(e) of the Hawaii Rules of Civil Procedure, a request for an opportunity to review and make changes to this transcript:

_X_Was made by the deponent or a party (and/or their attorney) prior to the completion of the deposition.
___Was **not** made by the deponent or a party (and/or their attorney) prior to the completion of the deposition.
___Was waived.

That the foregoing represents, to the best of my ability, a full, true and correct transcript of said deposition.

I further certify that I am not an attorney for any of the parties hereto, nor in any way concerned with the cause.

This 135-page Deposition of James J. Garmatz, Volume 1, dated June 13, 2016, was subscribed before me this 23rd day of June, 2016, in Lihue, Hawaii.

_____
TERRI R. HANSON, CSR 482
Registered Professional Reporter

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

---------- )

FRIENDS OF MAHAULEPU, INC., ) CIVIL NO.

Hawaii non-profit corporation, ) 1:15-cv-00205-

Plaintiff, ) LMK-KJM

vs. )

HAWAII DAIRY FARMS, LLC, a )

Delaware Limited Liability )

Company; ULUPONO INITIATIVE, LLC; )

a Delaware Limited Liability )

Company; MAHAULEPU FARMS, LLC; a )

Delaware Limited Liability )

Company, )

Defendants. )

---------- )

DEPOSITION OF JAMES J. GARMATZ,

VOLUME 2,

Taken on behalf of Plaintiff at Sheraton Kauai Resort, 2440 Hoonani Road, Koloa, Hawaii 96756, commencing at 8:35 a.m. on June 14, 2016, pursuant to Notice.

REPORTED BY:

TERRI R. HANSON, CSR 482

Registered Professional Reporter



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I N D E X


| EXAMINATION BY | PAGE |
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| Mr. Tebbutt (continued) | 139 |

EXHIBITS FOR IDENTIFICATION

| | |
|---|---|
| Deposition Exhibit No. 4A<br>Diagram. | 187 |
| Deposition Exhibit No. 23<br>Letter, United States Department of the Interior. FOM_001028 - 001033 | 196 |
| Deposition Exhibit No. 24<br>Results of Analyses, Report of Analytical Results. HDF00011 and HDF000647 | 199 |
| Deposition Exhibit No. 25<br>Letter, February 2, 2014. HDF-PROD2-000377 | 230 |
| Deposition Exhibit No. 26<br>Letter, June 1, 2016. | 230 |




WHEREUPON, the following proceedings were duly had:

JAMES J. GARMATZ,
after having been first duly sworn,
was examined and testified as follows:

EXAMINATION

BY MR. TEBBUTT:

Q. Good morning, Mr. Garmatz.

A. Good morning.

Q. We are back on the record, in both your individual and your 30(b)(6) deposition continuing from yesterday. Do you understand that?

A. Yes, sir.

Q. And you're still under oath.

A. Yes, sir.

Q. Okay. Today I just want to ask you a few questions -- well, about a number of topics. So let's just start with, in 2014, did a number of workers come from New Zealand to work on the HDF site?

A. Yes.

Q. How many?

A. Eight to 10 depending on which time.

Q. Okay. And did HDF arrange for their work visas

to come to work at HDF?

A. No.

Q. Did HDF pay for their lodging while they were here?

A. Yes.

Q. Okay. And so HDF arranged housing for them while they were here?

A. Correct, yes.

Q. And what did those -- you said 8 to 10 people?

A. (Moves head up and down.)

Q. What did those 8 to 10 people do? Well, first of all. Let me back up.

Approximately when did they arrive?

A. First part of February of 2014.

Q. Okay. And how long did they stay?

A. Stayed until middle part of May. The last -- the 15th of May and the 30th of May.

Q. Okay. Was that about when you got the stop work order from Mr. Datta or was it before that that they left?

A. It was that time.

Q. Okay. And during that three or so month period, what did they do?

A. Well, they manufactured all the water troughs, they constructed the water pads that the water troughs



go on, they installed some of the water trough waterlines, they built both pivots, No. 1 and No. 2, they installed the waterline in Pivot No. 2, partially installed the waterline in No. 1, they installed the water trough -- excuse me -- the water -- the pivot bridges.

Q. Anything else you can think of?

A. They helped in the unloading of some of the containers of equipment that had been received, they put together the pivot bridges, and they made sure that the No. 1 pivot was functional before they left.

Q. What do you mean by that?

A. We ran water through it, we made sure it moved, we made sure that the electronics was correct, just made sure that it was workable.

Q. Okay. Pivot 1 is operating now?

A. I need to change that 'cause you and I are opposite.

Q. Okay.

A. I call the top pivot No. 1.

Q. Okay.

A. Pivot No. 2 is the lower one.

Q. So you call 2 --

A. (Indicating.)

Q. -- the northern most one, correct? Even though

the map that we have --

A. No.

Q. Just a second. Let me just clear the record up. Exhibit 4 is the map that we talked about, and it says Irrigation Pivot No. 1 on the more northerly of the two pivots, and the southerly is Pivot 2. But you referred to -- when you're testifying now, you're referring to Pivot 1 as Pivot 2 and Pivot 2 as Pivot 1, correct?

A. No, sir. It's exactly like you got on the map. It's Pivot Irrigation No. 1 is the top pivot and Pivot No. 2 is the bottom pivot.

Q. Oh, so we're correct then?

A. Yes.

Q. Okay. I just wanted to clarify that.

A. I remembered it different.

Q. All right. So I'll just ask you this: Is Pivot 1 operating now?

A. Yeah.

Q. It's functional? It's operating? It's -- you're using it for irrigation purposes?

A. Uh-huh (moves head up and down).

Q. Same with pivot 2?

A. No.

Q. It doesn't have water to it?



A. It doesn't have water to it.

Q. Okay. So your question earlier about -- or your statement earlier about getting water to Pivot 2, is that what they tested to make sure it was running properly?

A. No, never did anything with this one but just install it and put it in place.

Q. Okay. So has Pivot 2 operated at all?

A. No.

Q. Have you done any test runs with Pivot 2?

A. No.

Q. Okay. So there's no water to Pivot 2 right now?

A. No, no.

Q. Is that correct?

A. That's correct.

Q. Okay. Where were the water troughs manufactured?

A. We manufactured the water troughs in the begass-house. The begass-house.

Q. Is that the old sugarcane factory?

A. That's correct.

Q. Okay. So right near the proposed dairy farm site but not on it?

A. Correct.

Q. Okay. And where were the water pads manufactured?

MR. PALOUTZIAN: Misstates testimony. Go ahead.

THE WITNESS: The water pads were constructed --

BY MR. TEBBUTT:

Q. Constructed.

A. No, no. The water pads were prepared on site with the hauling in of the material that is stored within the farm to have a level pad of --

Q. Right. Okay. And so what's the name of the New Zealand group that did this?

A. Effluent and Irrigation.

Q. Okay. So they manufactured the water troughs to the begass-house, correct?

A. Yes.

Q. B-e-g-a-s-s?

A. Yes.

Q. They then constructed the water pads on which the troughs would be placed, correct?

A. Yes.

Q. And --

A. I think a better word instead of construction would be developed, because there was no construction



involved. We just hauled the equipment -- the material in and leveled it.

Q. I see. So it was laying limestone and what other materials you used to create the water pads in place?

A. Correct.

Q. And once they manufactured the water troughs, did they install them?

A. Yes.

Q. And I think we discussed yesterday, it was about 160 of them that were installed, correct?

A. Correct.

Q. Had the other remaining ones that would be needed for the proposed dairy site, have they been constructed, too?

A. No.

Q. Are there any water troughs that have been constructed sitting around that haven't been installed?

A. Yes.

Q. How many?

A. Probably 30 approximately.

Q. The pivots, were they constructed in place?

A. Define in place.

Q. On site.

A. Yes, sir.

Q. Okay. So close to where they were going to be used?
A. Yes.
Q. Was there any preparation of the work areas where the pivots -- I'll say assembled, is that a proper term or?
A. No.
Q. Constructed a better term?
A. No.
Q. What's the term we should use?
A. Placed together 'cause that's what you do, is you place them -- you put 'em together.
Q. Put 'em together. That's why I said assembled.
A. Yeah.
Q. Is assembled --
A. Assembled, yeah, that's a good word.
Q. Is that a good word?
A. Yeah.
Q. Okay. So were there any assembly areas created for the workers when they assembled the pivots?
A. No, there wasn't, because you had to go -- each station was different.
Q. Okay. Did you mow the areas where --
A. No.
Q. Just a minute. Let me finish my question,



please.
A. Okay.
Q. Just like yesterday. Let's not talk over each other, please.
Did you mow any areas to make it easier to assemble the pivots?
A. No.
Q. Did you disturb any ground in any other way --
A. No.
Q. Okay. Again, you've got to let me finish my question.
MR. PALOUTZIAN: I think he thought you were done.
MR. TEBBUTT: I understand that, but sometimes it doesn't happen that way.
BY MR. TEBBUTT:
Q. So were there any other ground preparations that were done to assemble the pivots?
A. No.
Q. So this is the group, you said, that installed the waterline to Pivot 2?
A. Which group?
Q. The E&I group.
A. Correct, yes.
Q. And partially -- you testified earlier

partially installed the waterlines to Pivot 1, isn't it the other way around?

A. Correct.

Q. So they partially installed the waterline to Pivot 2?

A. Correct, yes.

Q. And they did install the waterline to P1, correct?

A. Correct.

Q. 'Cause P1 has been operating since that time, correct?

A. Correct.

Q. While E&I was here, were there any alterations to the pivot tracks made while Pivot 1 was operational?

MR. PALOUTZIAN: Object, vague and ambiguous.

THE WITNESS: Rephrase your question.

BY MR. TEBBUTT:

Q. Yes, were there any alterations to the tracks over which the pivot moved?

A. Define alterations.

Q. Any kind of modifications to the pivot track, to the ground itself.

A. While E&I was here?

Q. Correct.



A. No.

Q. Okay. There were some afterwards, correct?

A. No, there wasn't.

Q. The Pivot 1 got stuck at various times, didn't it?

A. Oh, yeah.

Q. So that's what I'm referring to about alterations to the ground to make the pivot track run better.

A. Okay. Yes. In that case, yes.

Q. Okay. How many times have the pivot tracks been modified at Pivot 1?

A. Numerous times.

Q. Okay. And more than 10?

A. Yes.

Q. More than 20?

A. Yes.

Q. More than 30?

A. No.

Q. Okay. What types of modifications have been made to the pivot tracks?

A. Placing of rocks found within the fields into the bottoms of the pivot tracks.

Q. Why?

A. To improve the hardness of the ground

underneath the tire tracks.

Q. Are you done with your answer?

A. Yes.

Q. Okay. And is that because the pivot tracks got -- or the wheels of the pivot got stuck?

A. That's correct.

Q. Any other reason why you had to do that, or you chose to do that?

A. Initially, before the pivot ran, we should have compacted that ground and altered it, but we didn't do it. So that caused the pivot tracks to be made. Since that time, we've improved our working -- our practices on that, and it shouldn't happen no more.

Q. Have you compacted some ground in the field where Pivot 1 is located?

A. Yes, sir.

Q. How much of the land?

A. Probably a 13- to 16-inch width and the length of the wheel track within the working area of Pivot No. 1, present working area of Pivot No. 1.

Q. For all the tire tracks?

A. No, not all.

Q. Okay. How many?

A. One, two, three, four, five, six. I believe I'm up to seven. Number seven now.



Q. And how many tracks are there?

A. Ten.

Q. And is part of your plan to compact the other three tracks as well?

A. That's my plan.

Q. And when you have compacted the seven tracks thus far, have you removed rocks that were in -- that you had placed in there?

A. No.

Q. Okay. And let me just clarify the record. Had you placed rocks in those seven pivot tracks that have been compacted?

A. Yes.

Q. In all seven?

A. No.

Q. How many of them?

A. Just three of 'em.

Q. Okay. I'm going to show you, again, Exhibit 4. Starting with the most outside track -- I assume that the tracks run the full circumference of the area, correct?

A. That's correct.

Q. So the outside one would have the largest circumference and the inside would have the shortest?

A. That's correct.

Q. Did you start with the longest track or the shortest track for the seven that you've done?
A. Shortest.
Q. So you started from the inside out?
A. Correct.
Q. Okay. And from the inside out, let's just imaginarily for the time being call the tracks 1 through 10. One being the shortest circumference.
A. Correct.
Q. Are there rocks in the first track?
A. No.
Q. Second track?
A. No.
Q. Third track?
A. No.
Q. Fourth track?
A. Yes.
Q. How many rocks did you place in the fourth track?
A. Numerous.
Q. More than 20?
A. Yes.
Q. More than 50?
A. Yes.
Q. More than a hundred?



A. Yes.
Q. More than 200?
A. Yes. Thousands.
Q. Thousands in track two.
A. Track.
Q. Well, what's -- I'm sorry. Track four. What size rocks were placed in there?
A. Do you mean anything --
Q. Use your hands and show me the smallest one and the largest one.
A. Smallest one.
Q. Would be about fist size?
A. Yeah.
Q. Okay. And the largest.
A. And the largest one, anything that I could handle. Anything that I could lift.
Q. So up to about a hundred pounds?
A. Yes.
Q. Is that a fair assessment?
A. Yes, very.
Q. Okay. Having moved a lot of rocks in my day, I can gather that.
A. Yeah.
Q. All right. And then anything in between?
A. Yes.

Q. Just whatever you found on the site?
A. Yes.
Q. Okay. So that's pivot four. When was that done?
A. Early -- no, from April of '14 through January of '15.
Q. Okay. And then pivot five?
A. No.
Q. You haven't done any in pivot five?
A. No.
Q. Or track five we're talking. Track six?
A. Yes.
Q. Okay. And how many -- when did you start putting rocks in track six?
A. Same time, same time we talked about above.
Q. Okay. Okay. And is it about the same number? Hundreds or thousands of rocks?
A. Yeah.
Q. And all the same size?
A. Yes. Same process.
Q. That we talked about?
A. Same process, yes.
Q. Okay. And track seven?
A. Small portion of track seven.
Q. Okay.



A. Let's just say a hundred foot of track seven.
Q. Okay. So we have rocks -- a significant number of rocks in four and six?
A. Right.
Q. And a small number in seven?
A. Correct.
Q. Are you done with seven, adding rocks?
A. Yes.
Q. Okay. And do you need to add -- have you added rocks to 8, 9 or 10?
A. No.
Q. And you don't think you do?
A. No.
Q. Okay. And it's 8, 9, and 10 that haven't been compacted yet, correct?
A. That's correct.
Q. When did you do the compacting on track one?
A. April of '14. That's the first one I did.
Q. Okay. Is that the rolling machine that's referred to in the invoices?
A. No, sir.
Q. What did you use to compact the tracks?
A. I purchased calcium finds from Glover and deposited them within the track.
Q. And what did you use to compact the tracks?

A. Tractor tire.
Q. Is that it?
A. Uh-huh (moves head up and down).
Q. Yes?
A. Yes, sir.
Q. Okay. So track two, when was that compacted?
A. After No. 1 was complete, which was within weeks. Within a couple weeks after No. 1 was complete.
Q. So that was approximately what month?
A. May.
Q. Of 2014?
A. May of '14.
Q. And then track three, when was that compacted?
A. June.
Q. Of 2014?
A. Yes, sir.
Q. Track four, when would that have been compacted?
A. We did -- we did No. 1 and No. 4 in conjunction with each other because they were the worst ones. So No. 4 was scattered all the way from April all the way till late in the year, 'cause it was the worst one.
Q. Okay. Track five, when was that compacted?
A. Late in the year.
Q. Of 2014?



A. Yeah.
Q. So October, November?
A. October. October.
Q. Okay. Track six, when was that compacted?
A. That was November when it started raining.
Q. November of '14?
A. Right.
Q. And track seven, when was that compacted?
A. In conjunction with six. Same time.
Q. Okay. So when it's rained on the site, I assume you've seen some pretty heavy rains?
A. Uh-huh (moves head up and down).
Q. What do you think the heaviest rainfall is that you've observed on the site since you've been there?
MR. PALOUTZIAN: Objection, calls for speculation, lacks foundation. It's overbroad. Go ahead.
THE WITNESS: Seven-inch rainstorm the day after Thanksgiving of '13.
BY MR. TEBBUTT:
Q. Was that a 24-hour event?
A. No, it was an overnight event.
Q. So less than 24 hours, seven inches of rain?
A. Twelve, about 12 hours, yeah.
Q. Twelve hours.

A. Let's say 12 to 18 hours 'cause -- yeah, 12 to 18 hours.

Q. Okay. And how much -- and how did you know that there was seven inches of rain that day?

A. We've got a weather data on our farm. And then Grove Farms also has a weather data machine on our farm also. Not a machine but an instrument.

Q. So there's two difference weather stations on that site?

A. Uh-huh (moves head up and down).

Q. Is that yes?

A. Yes.

Q. And do you operate them both?

A. No.

Q. You operate just one?

A. The HDF weather station, yes. I don't operate it. It operates itself.

Q. Okay. And has that been functioning the entire time you've been there?

A. Yes, sir.

Q. And so how does that record weather events?

A. Electronically through satellite. It delivers the information to Ag Hub in New Zealand. Ag Hub sends it back to me via computer.

Q. Okay. And how often does Ag Hub sent it back



to you?

A. Instantaneously.

Q. So you get it every day?

A. Yes.

Q. You get the feed for what's happened every day?

A. Yes.

Q. Does this aid you in determining how much to irrigate?

A. Yes, it's what I use.

Q. During the seven-inch rain event after Thanksgiving in 2014 --

A. '13.

Q. '13, sorry. Thank you. Did you observe the water flow through the ditches on the site?

MR. PALOUTZIAN: The question is overbroad and vague as to time. Go ahead.

THE WITNESS: Just the lower ditches is all. I didn't observe the upper ditches.

BY MR. TEBBUTT:

Q. Okay. When you refer to the lower ditches, what lower ditches are you referring to? Let's refer to Exhibit 4.

A. This one and this one (indicating).

Q. So the main ditch and the center ditch?

A. Yes, yeah. Where it comes together.

Q. Okay. So you went down to off site where it -- there's a confluence of the two, is that correct?
A. Yeah, yeah.
Q. And was there flooding in -- over the banks of either of those ditches?
A. There was flooding right here (indicating). Okay.
Q. At the bottom of the taro farm field?
A. Right, right.
Q. The bottom, the southeast corner?
A. Yeah. This takes a real tight cut right there, that cut at that turn.
Q. Okay.
A. And there's a bridge that sits right here (indicating).
Q. Right.
A. And that bridge was full of silt that hadn't been properly maintained. This bridge is off property now, okay?
Q. Okay.
A. And Grove Farms is responsible for that bridge, and they had not cleaned the silt out of that. And they arrived on the morning after Thanksgiving and cleaned the silt out from underneath that bridge and all through this area, and the water began to flow, and everything



above -- the surface water that I saw right here at that area went down immediately.
Q. Okay. And so the flooded area -- actually that bridge that you're referring to, that's where we took one of the samples during the Rule 34 inspection, correct?
A. Yes, sir.
Q. Okay. And during the time of the Rule 34 inspection, you said that property was not on site, correct?
A. That's correct.
Q. But in Exhibit 4 it is shown as being on site, correct?
A. Yeah, this map is out of date.
Q. Okay. So did the property line boundaries change then since this map was created?
MR. TEBBUTT: Objection, calls for speculation, lacks foundation. Go ahead.
THE WITNESS: Yes.
BY MR. TEBBUTT:
Q. Okay. And when was the property line boundary changed?
MR. PALOUTZIAN: Same objections.
THE WITNESS: July or August of '15.
MR. TEBBUTT: Okay. Obviously the witness

knows the answers, so I don't know if your objection is proper.

MR. PALOUTZIAN: It's not for you to decide, I don't think.

BY MR. TEBBUTT:

Q. Why was the property boundary line changed?

MR. PALOUTZIAN: Same objections.

THE WITNESS: Request from Grove Farms.

BY MR. TEBBUTT:

Q. From whom at Grove Farms?

A. Arryl Kaneshiro, Dave Hinazumi.

Q. And were those --

A. Warren Haruki.

Q. Okay. Sorry. Are there other people?

A. No.

Q. Were those requests made to you?

A. Yeah.

Q. How? By phone or in person?

A. Phone, by phone.

Q. Okay. And what was the reason for the request to change the site boundaries?

MR. PALOUTZIAN: Calls for speculation, lacks foundation. Go ahead.

THE WITNESS: Mr. Haruki wanted an eight-foot barrier around the boundary in the placement



of the fencing so that there could be a path -- pathway to walk around the facility, a maintained pathway around the boundary of the facility.

BY MR. TEBBUTT:

Q. When you say the facility, you're talking about the --

A. Entire.

Q. -- proposed HDF dairy?

A. The entire facility, yes.

Q. So the whole boundary was moved in approximately eight feet, the whole perimeter?

A. Some boundaries were -- most boundaries were done at eight foot. There were some boundaries done more than that.

Q. Okay. To allow access depending on --

A. There you go. There you go.

Q. -- the topography of the area?

A. Yes.

Q. So I'm trying to recall. The original acreage of the site was some 586, is that correct?

A. That's correct.

Q. So how much did the boundary change affect the amount of property that the dairy is now leasing from Grove Farm?

MR. PALOUTZIAN: Misstates the evidence.

Go ahead.

THE WITNESS: I could not correctly quote you that number because I'd have to look it up for you at this point.

BY MR. TEBBUTT:

Q. Do you have that somewhere, that number?

A. Would have it, yes.

Q. Where would you have it?

A. In the latest WMP plan.

Q. And when was the latest WMP plan created?

A. Within the last 30 days to coincide with the EIS.

Q. So was that submitted with the EIS?

A. No, it was submitted separately.

Q. So that was submitted to DOH within the last 30 days?

A. Correct.

Q. And that has the new correct acreage amount in it?

A. Correct.

Q. Do you remember about how many acres it reduced the overall property?

A. Between 15 and 16 acres.

One thing that I want to mention there that I think is important along with that, is those changes



also took into effect the 35-foot barrier that we were going to keep with -- out of the fence lines to the drains or the ditches. We've got an area on each side of the ditches that goes out 35 feet.

Q. What do you mean an area?

A. We measure 35 feet away from the bank, and that will be the first existing fence line, which means there's a boundary or a -- let me think of a good word. Barrier or safety zone or setback. Thirty-five-foot setback from all drains. And this new acreage takes into consideration that 35-foot setback because that's not going to be a part of the property that we'll be able to farm because it will be out of the fence line.

Q. So then will you -- HDF will not be leasing that land? Is that -- will that be Grove Farm land or will that be HDF-leased land?

A. That would be HDF's land to care for per NRC requirements.

Q. What requirements are you referring to?

A. The planting of native plants, the maintenance of the grass, the maintenance of the sides -- the bank sides, the size of the drains or the ditches. Just overall taking care of them. Keeping them in --

Q. Okay. Is there a particular regulation or guidance that you're referring to?

A. NRCS has a plan -- has a guidance within their plan that indicates that we should have a 35-foot setback on all their -- on all blueline drains.

Q. Okay. Do you remember the number of that guideline?

A. No, sir. No, sir.

Q. Okay. So asking you some more questions of Exhibit 4 here again. Will there be -- you have already identified ditch number -- a number of ditches that you handwrote onto the map, and we discussed that yesterday. Will there be a 35-foot setback on either side of No. 3 ditch?

A. Yes, yes.

Q. Did we have a name for the ditch that is in the upper right-hand corner?

A. No, no.

Q. We don't, okay. So that's the one on the east side of Pivot 1, the unnamed ditch, correct?

A. Yes.

Q. All right. Just for purposes of this deposition, is it okay if I write in here unnamed ditch for purposes of identifying this one?

A. Yes.

Q. Okay. Will there be a 35-foot setback on either side of the unnamed ditch?



A. Yes.

Q. And similarly will there be the 35-foot setback on either side of the center ditch?

A. Yes.

Q. And same question, will there be a 35-foot setback on either side of the main ditch?

A. Yes.

Q. Will there be a 35-foot setback on either side of No. 6 ditch?

A. Yes.

Q. And will there be a 35-foot setback on the southwestern ditch that runs from the pumping station into the main ditch?

A. Yes, sir.

Q. Do you have a name for that ditch? I think you mentioned one yesterday, and I don't think we --

A. We call it the Waita ditch.

Q. Okay. Is it okay if I write on here Waita ditch?

A. Uh-huh (moves head up and down).

Q. Okay. And how do you spell Waita?

A. W-a-i-t-a.

Q. Okay. Are there any other places on the site that I have not asked you about where there will be 35-foot setbacks?

A. Up here (indicating).
Q. Okay.
A. And up here (indicating).
Q. Okay. So the two that you're referring to are the ones we discussed yesterday that come from off the site and then converge where you have the circle right below where No. 1 is indicated on Pivot 1, correct?
A. Yes.
Q. Okay. Any other places?
A. As this ditch comes down in the final plans.
Q. And this is the unnamed ditch we're talking about right now.
A. Yes, yes. It will be fed -- it will be deadheaded here and fed into this drain around here and coming to here (indicating).
Q. So it will be rerouted so that it will be hydrologically diverted to the center ditch?
A. Correct, that's in the plans.
Q. That's in the plans.
A. It's not been completed or done with or anything done with it yet. And there'll be a 35-foot setback from here and all the way into here (indicating).
Q. Okay. When you said to a ditch over here, what ditch exists there now?



A. There's a large swale there right now.
Q. Okay. 'Cause I asked you about as far as on the property yesterday, and we --
A. I'm sorry.
Q. Just a minute, just a minute. And we didn't get that answer. So this is a new swale from yesterday, correct?
A. Yes, yes, I did --
Q. I would like you with my blue pen to draw that existing swale, please?
A. (Writing.)
Q. Okay. And do you have a name for that?
A. No, never named it.
Q. How about if I just write in here swale?
A. It would be great.
Q. Okay?
A. Yes, sir.
Q. Because we don't have that anywhere else on the map. So it's the only swale.
Are there other swales that you can remember today that you didn't remember yesterday?
A. There's a low spot that runs the edge of this property up and down determining -- determined by the actual elevation of this ground. Sometimes it's deep. Sometimes it's level. Sometimes it's deeper.

Q. Okay.
A. I would go ahead and list that if we're talking about swales.
Q. All right. Why don't you take my blue pen and right that one in?
A. (Writing.)
Q. Okay. Why don't we call that -- let's rename this one Swale 1. Can we just put a one next to that?
A. (Writing.)
Q. And call that Swale 2.
A. (Writing.)
Q. Okay. And Swale 2, is that still within the HDF boundary after the lot line adjustment, I'll call it?
A. Some yes and some no.
Q. Okay. And eventually Swale 2 converges with the center ditch, correct?
A. That's correct.
Q. And let me ask you some questions about the storm event in November of 2013. Did you go over and look at the whole site after that storm event?
A. Yeah. The following Saturday afternoon.
Q. So two days after Thanksgiving?
A. Yes.
Q. Okay. And the storm had happened on Friday?



A. Friday starting at 3:00 a.m. in the morning and rained until noon, and then it rained off and on from noon on till evening, and then it cleared up.
Q. Okay. On the day after -- so Thanksgiving night really into Friday, 3:00 a.m., all day Friday mostly?
A. Yes.
Q. Not quite, but mostly?
A. Yeah, yeah.
Q. Okay. So did you walk over the whole site then on Saturday?
A. Yes.
Q. Did you see water in the unnamed ditch on that Saturday?
A. No.
Q. Did you see water in Swale No. 1?
A. Small portions, just small portions.
Q. Okay. Did you go to the unnamed ditch?
A. Yeah, yeah.
Q. Okay. So you saw some amount of water in Swale 1?
A. Yes.
Q. Did you follow Swale 1 to where it converges with the center ditch?
A. Swale 1 --

MR. PALOUTZIAN: Let me insert a belated objection. I think the question misstates testimony. Go ahead.

THE WITNESS: Swale 1 will not be -- is not built at this point or constructed or developed at this point.

BY MR. TEBBUTT:

Q. Okay. So you think there is an end point of Swale 1?

A. Yeah, it's right here, right there in the middle of that field (indicating). Like we talked yesterday. We referred to that yesterday.

Q. So the unnamed ditch and Swale 1 then converge at that end point?

A. No. Swale 1 doesn't exist at this point. It's just -- we're going to turn this into a ditch.

Q. Okay.

A. It's just a low area right now.

Q. Okay.

A. And this unnamed ditch comes down here and dumps right in the middle this field (indicating).

Q. Okay. So Swale 1 has an end point similar to what the unnamed ditch has right now?

A. Well, it comes and ultimately will drain into this (indicating).



Q. All right. But I'm asking right now, is there a swale right now where you drew that line?

A. Yes, yeah. But it -- go ahead.

Q. So when you saw water in Swale 1 on the day after or two days after Thanksgiving in November 2013, where did you see water in Swale 1?

MR. PALOUTZIAN: Misstates testimony. Go ahead.

THE WITNESS: Just right here in this area right here (indicating).

BY MR. TEBBUTT:

Q. Okay. So can you put a bracket or maybe a paren on either side where you saw water?

A. (Writing.)

Q. Okay. And did you follow -- did you look at the end point of where you saw the water to see if it continued anywhere?

A. Yeah. It continued on down this line right here (indicating).

Q. The water did continue down the line?

A. Yeah.

Q. And did it reach the center ditch?

A. Yes.

Q. Okay. So on that day the water in Swale 1 did continue down and it discharged into the center ditch?

A. Correct.
Q. Okay. So the second bracket then isn't really correct then, is it? Because you said there was water all the way through there.
A. There was water collecting here because this is a low spot right there (indicating).
Q. Okay. But there was water flowing the rest of the way through?
A. Yeah, yeah.
Q. Okay. And did you go up to the small streams that converge near the top of Pivot 1 where we have the circle?
A. Yes, sir.
Q. And was there water flowing in both portions of those streams?
A. No.
Q. Was there one flowing in either of them?
A. The one coming from the northwest.
Q. Okay. And how much water, would you say?
A. Two feet. Two feet high, two feet deep; 24 inches deep.
Q. Okay. Are you good at estimating cubic feet per second flows?
A. No.
Q. Okay. Or gallons per minute?



A. Even worse.
Q. All right. Fair enough. There was water flowing though from the northwest ditch to that convergence, correct?
A. Correct.
Q. Did you see any water coming from the northeast ditch?
A. Very, very little.
Q. But some?
A. Yeah. Very minimal.
Q. Okay. How about Ditch 3, did you go -- did you observe Ditch 3?
A. Yeah, there was water in that also.
Q. How much?
A. Probably three feet wide. The problem with that is it would come down here and then this ditch ends. Okay. There's no destination for it to come across here, across this road at present (indicating). So all this water just went shwoo.
Q. So it fanned out?
A. Yeah.
Q. Did it go up across the road?
A. No.
Q. So it just created a lake basically?
A. Right. Right behind here (indicating).

Q. How long did it take for that lake that you're referring to to disappear?
A. Everything was pretty much gone by Monday.
Q. Okay. Did you go back and observe that lake?
A. Oh, yeah.
Q. And was it completely gone by Monday?
A. No, not a hundred percent. I would probably say it was down to less than 10 percent of the volume that I saw initially.
Q. All right. Was there still water flowing in the northwest ditch that we talked about?
A. Yes, yes.
Q. Okay. And that's right next to No. 1 on the map, correct?
A. Uh-huh, uh-huh (moves head up and down).
Q. Was there still water in Swale No. 1 on the Monday?
A. No.
Q. So did you see any water flowing in Swale No. 1 into the center ditch on Monday?
A. Just what was draining out of this one.
Q. So there was some that was still draining all the way through and into the center ditch?
A. Yeah, yeah. It had eroded a point right here where it was building (indicating). And then it eroded



a point, pretty much drained that very same day, that Saturday or gone by Sunday.
Q. You know, water has a funny way of doing that, doesn't it?
A. Yeah.
Q. No. 6 ditch, did you observe water -- or did you observe Ditch 6?
A. Yes.
Q. And did it have water in it?
A. No.
Q. None whatsoever?
A. None whatsoever.
Q. I assume the main ditch had water in it?
A. Yes.
Q. Did it have a lot of water in it?
A. Yeah.
Q. How much would you say?
A. Probably six feet across and three feet high.
Q. Okay.
A. Thirty-six inches deep. Yeah, that would be about right.
Q. Okay. Where we talked about where the flooding occurred down by the bridge, how much -- how far upstream did it back up?
A. It backed into the taro farm.

Q. How far into the taro farm?
A. It had about a 30-foot radius right inside his gate there.
Q. Go ahead and just kind of draw that radius that you talked about.
A. (Writing.)
Q. So that's the flooding. Could you just put F 11/13 there, please? 11/13.
A. (Writing.)
Q. And there you go. And that would designate the flooding in November of 2013, okay?
A. Uh-huh.
Q. The Waita ditch, did you observe that ditch?
A. No, no.
Q. You didn't observe it at all?
A. I observed it, yes.
Q. Did it have water in it?
A. No. Well, the same amount that it always carries.
Q. So it does carry water?
A. All the time.
Q. All right. So there's constant flow there?
A. Yes, it's overflow from the dam.
Q. All right. But you didn't observe more water in there?



A. No.
Q. How about Swale No. 2, did you observe water in that? Or, first, did you observe it?
A. This one over here (indicating)?
Q. Yes, in that same time period, that Saturday.
A. Yeah, yeah, yeah.
Q. And was there water flowing in that?
A. No. No, not flowing, just standing. Standing. It's pretty difficult to flow 'cause there's high spots and low spots along here (indicating).
Q. Okay. Did you follow that swale to its confluence with the center ditch?
A. Yes.
Q. And was there water flowing into the center ditch from that swale, too?
A. Yes, yes.
Q. How much?
A. Oh, a smaller head, probably two-foot wide; 12, 13, 14 inches deep.
Q. Okay. Since you've been there -- since this event in November 2013, have there been other events where you've observed similar water flows on the site from storm events?
MR. PALOUTZIAN: Objection, vague.
THE WITNESS: Just one time.

BY MR. TEBBUTT:

Q. When was that?

A. I can't even recall now. It had to have been the winter of '14.

Q. The winter of '14. '14-'15?

A. '14.

Q. Of, well --

A. Winter. Let's just say February and March of '14. February or March of '14.

Q. Okay. So a couple months after the event you saw in November of 2013?

A. Uh-huh (moves head up and down).

Q. Okay. Do you remember what the rain amount was then?

A. It was like over five inches. Just a little over five inches over about a three-day period.

Q. Okay. And did you see similar amounts of water in all the ditches we just talked about?

A. Yes.

MR. PALOUTZIAN: Objection, vague.

THE WITNESS: Yes. Somewhat less.

BY MR. TEBBUTT:

Q. Somewhat less, okay.

A. Yeah.

Q. From your weather station information that



you've obtained since 2013, how many rain events have been over five inches?

A. Just those two to my knowledge.

Q. And so the rain events are recorded on a daily basis, is that correct?

A. Yes, sir. Yes, sir.

Q. So they're summarized on a daily basis?

A. Yeah.

Q. 'Cause it's constant information, right?

A. Every 24 hours.

Q. Every calendar day it's summarize?

A. That's correct.

Q. And does it have information by 60-second intervals, 30-second intervals?

A. One-minute intervals, but it's recorded on hourly at the most.

Q. Okay.

A. And daily in the reports.

Q. Okay. But the raw data has it compiled on an hourly basis?

A. Yes.

Q. Okay.

A. Upon request.

Q. So is that information still available today, that computer data?

A. Yes.
Q. And so whose computer is that located in?
A. Mine.
Q. And is that the same computer that you've had since you started in 2013?
A. Yes.
Q. Are you going to upgrade that computer?
A. Yes.
Q. When?
A. Very soon.
MR. TEBBUTT: Okay. I'm going to ask that there be a hold put on the old computer as the information is transferred so it not be lost in the transfer in case we need that for some reason.
MR. PALOUTZIAN: Okay.
MR. TEBBUTT: Okay. You agree to do that?
MR. PALOUTZIAN: I do.
THE WITNESS: I need to take a break.
(Break from 9:29 to 9:39.)
BY MR. TEBBUTT:
Q. Just to wrap this up, are there any other unnamed ditches on the property that you haven't identified on Exhibit 4?
A. (Writing.)
Q. One more?



A. Yeah.
Q. Okay. Any others you can think of?
A. No.
Q. You're sure?
A. That's it.
Q. Okay. And so the one you just added in, let's call that --
A. Let's call it No. 3, 'cause that's how --
Q. Well, we already have a No. 3 ditch.
A. Okay.
Q. All right. Do you have a name for that?
A. Un-un (moves head from side to side.)
Q. Let's call it Unnamed Ditch 2.
MR. TEBBUTT: Off the record.
(Off the record from 9:41 to 9:41.)
BY MR. TEBBUTT:
Q. Okay.
A. I want to make a point here.
Q. Yes.
A. The Waita ditch and the unnamed ditch run parallel to each other here.
Q. Okay. And do they meet at the main ditch by the bridge?
A. Yes.
Q. The bridge we're referring to is the one that

flooded in November 2013.

A. No. Let me correct that, no.

Q. Okay.

A. This water comes around here, okay. It comes down to here, and then these two ditches come into the ditch back here a ways (indicating).

Q. The Waita ditch comes into the main ditch, right?

A. Uh-huh.

Q. And the other ditch, how does that traverse -- no, not yet. Don't write on the back of that yet. How does the Unnamed Ditch 2 traverse the main ditch? Is it culverted under it?

A. Repeat that question.

Q. Yeah. I'm just trying to figure out the hydrology here of the unnamed Ditch 2. You said it flows down on the edge of the taro farm, correct?

A. Uh-huh (moves head up and down).

Q. And you said it doesn't discharge into the main ditch?

A. Yes, it does.

Q. Oh, it does?

A. Yes, it does.

Q. Above the bridge or below the bridge? Above meaning to the west, and below meaning to the east.



A. I've got to draw it for you.

Q. All right. Let's just do it with a separate piece of paper then. Let's use that piece of paper. Draw me the hydrology filtrator. Refer to Exhibit 4. So you're referring to Exhibit 4. Can we call this Exhibit 4A? Just this piece of paper, just for fun?

MR. PALOUTZIAN: Whatever you want to do.

BY MR. TEBBUTT:

Q. All right. Let's call it Exhibit 4A. We'll mark it at the end when he's done.

A. Okay.

Q. Hang on. Don't talk yet. The court reporter's not ready. Okay. Go ahead.

A. This is the bridge that you're talking about. It's a concrete bridge.

Q. Right. Where we took that sample during the Rule 34 inspection, yes.

A. You took this sample right here on this bank.

Q. Correct. From the bridge. We dipped the bucket down off the bridge. Do you remember that?

A. Yeah.

Q. Okay.

A. This is the road, and this is the ditch over here. Okay. This continues down this way, and then continues this way (writing).

Q. Okay.
A. Okay. You've got the Waita ditch that comes down here and comes into there (writing).
Q. All right. Below the bridge.
A. Discharges below the bridge, yeah.
Q. Okay.
A. Then you've got the No. 2.
Q. No. 2 unnamed.
A. Unnamed ditch that runs parallel to this and comes into this at that point (writing).
Q. All right. Beautiful. So that also comes in and converges with the main ditch below the bridge?
A. Correct.
Q. Okay.
A. But not before the bridge.
Q. Okay. So if you would just put Waita on the bottom one.
A. (Writing.)
Q. And Unnamed No. 2.
A. (Writing.)
Q. Okay. And Waita is W-a-i-t-a, is that right?
A. Waita, yeah.
Q. Okay. So can we correct the spelling on that? You just put the A and the I in different places.
A. (Writing.)



Q. Okay. And so let's put bridge right where you have that written in there.
A. (Writing.)
Q. Okay. And then let's draw some crosshatches across the road so we know which is the road.
A. (Writing.)
Q. And then if you'll write, Road, next to it with an arrow.
A. (Writing.)
Q. Okay. And then main ditch for --
A. (Writing.)
Q. Okay. Anything else you want to use for what will be marked as Exhibit 4A?
MR. PALOUTZIAN: The question is overbroad and vague.
BY MR. TEBBUTT:
Q. Anything else we need to identify on here?
A. No.
MR. PALOUTZIAN: Same objection.
MR. TEBBUTT: Okay. All right. Let's take a break so we can put Exhibit 4A on there.
(Garmatz Deposition Exhibit No. 4A was marked for identification.)
BY MR. TEBBUTT:
Q. And would you just put your name at the bottom

of 4A, Jim Garmatz's drawing?
A. (Writing.)
Q. Okay. And I forget whether I asked you this or not, but Unnamed Ditch No. 2, on the Saturday after Thanksgiving in November 2013, did you see water flowing in that ditch?
A. Very minimal.
Q. Okay. But some?
A. Some.
Q. Okay. And did you see water flowing in that ditch in February or March, the other storm event of 2014?
A. Very minimal again.
Q. About the same amount?
A. Yes.
Q. Okay. Is there going to be a 35-foot -- what was the word you used?
A. Setback.
Q. Setback.
A. Yes.
Q. From Unnamed Ditch 2 as well on both sides?
A. Yes.
Q. So does that mean the area between Unnamed Ditch 2 and the Waita ditch where it comes pretty close to one another will not be able to be used at all for



paddocks?
A. Yes, yes.
Q. Do you know whether the acreage that will not be available to use for paddocks is calculated into the EIS?
A. The exact acreage?
Q. Yes, the reductions because of the setbacks. Do you know if there's a special calculation for that?
A. I can't tell you that.
Q. Okay.
A. I don't know that.
Q. I think we're done with that, but I won't guarantee it. I'm going to wrap this around.
When did you first see nene on the site?
A. I've seen nene as early as I got here.
Q. So in October 2013?
A. Well, I arrived on the site in July of '13, still as a consultant.
Q. Okay. And you saw nene then?
A. Oh, yeah.
Q. How many?
A. See a couple flying.
Q. How many on the ground on the site?
A. I would never count them exactly, you know.
Q. Dozens?

A. Sometimes 4, sometimes 12, sometimes 20. You know, I just would never count 'em, you know. They blend in well with the ground, and sometimes it's hard to count 'em.

Q. How many nests have you seen on the site?

A. Oh, numerous nests.

Q. Numerous?

A. Yeah, 15, 16.

Q. Have you seen any nests in 2016?

A. Yes.

Q. How many?

A. Three. Three that I've seen.

Q. Okay. And when you've seen a nest in 2016, what do you do?

A. I build a -- mark an area 50 feet around the nest.

Q. So 50 feet circumference?

A. Uh-huh (moves head up and down).

Q. So what's the radius from the nest?

A. I said that wrong. Fifty feet from the nest.

Q. Okay.

A. Okay. That's just here with the 50 feet this way and make a circle.

Q. Okay. So a 50-foot radius?

A. Right.



Q. Okay. And what do you make a circle with?

A. Basically I'll put signs up. I've got signs that I maintain in my pickup, and I'll put signs up.

Q. What kind of signs?

A. Indicating -- they're just a small sign. (Indicating), nenes are nesting.

Q. What are they made of?

A. Plastic -- they're made of paper and then they're coasted with plastic, a plastic covering. And then I'll mark off the area. I and my -- Scott and myself are the only ones that are ever on the farm or supposed to be on the farm ever, okay. And we know where those areas are, so we know -- we'll close the road or -- we had one nene alongside that road, and we closed that road until she nested out and left.

Q. How long was that, what kind of period of time?

A. Oh, shoot, it was almost 30 days.

Q. So other than -- how many signs do you put around the nest? Do you have standard --

A. Depending on where they're at. You know, one or two.

Q. And is there anything else that you do as part of your normal procedure?

A. I won't touch the area within it. I won't water it. I won't mow it. I won't fertilize it.

Q. Do you contact anyone and let 'em know that it's there?

A. The state people come on the property on nearly on a weekly to biweekly basis, and I always inform them of stages as to where we're at with those nests.

Q. What state people?

A. DLNR people they're hired --

Q. DLNR?

A. Yes, Department of Land and Natural Resources.

Q. And why do they come on the site?

A. It's their job.

Q. I know. But to do what?

A. Monitor nenes. We've got a nene biologist and then we've got her two assistants.

Q. Okay. Are there other endangered species that you monitor for on site?

A. I'm sure that they have been there, but as far as me being attentive to them, no.

Q. So no other endangered species that you're aware of?

A. Oh, I'm definitely aware.

Q. Okay. What other species are you aware of that use the site?

A. I couldn't list them for you. The nenes are the only ones that I really stay cautious about.



Because in the portion that we're on on a daily basis -- of the farm that we're on a daily basis, the nenes are the only ones that we see.

Q. Okay. So you don't take any other mitigative measures for other species?

A. If the biologist is to see 'em when they come onto the farm, he will let me know, and we do protect their nesting also if they're nesting. Or if he sees another endangered species on the farm, he'll notify me and let me know and let me know where he saw it and what I need to do to set aside the area.

Q. How many times have you been notified by the biologist of other endangered species on the site?

A. Two or three times. Three times, three times.

Q. When?

A. Oh, I couldn't give you the exact dates on that.

Q. Was it this year?

A. Oh, no, no.

Q. 2015?

A. 2014 when construction was going on. They were -- I asked them to come onto the farm on a weekly basis and even twice-a-week basis to make sure that --

Q. Back during construction?

A. Uh-huh (moves head up and down).

Q. Have you asked them to come on site at all in 2016?

A. Oh, yeah, they're there all the time.

Q. Do they come in at their will or at your request?

A. No, their will. They got a key to the farm.

Q. Okay. And so do you remember what species you were notified were present?

A. We talked a lot about the nene, and then we saw an owl.

Q. What kind of an owl?

A. Oh, I couldn't tell you. I'm sure there's a name for it, but I didn't pay that close of attention to it.

Q. 'Cause we had talked about the nenes, but you said there were three times you were notified in 2014 about other endangered species other than nene.

A. Yeah, but I can't recall the actual bird -- I can't remember the bird that they were talking about or the --

Q. But it was a bird? Was it a shearwater, does that ring a bell?

A. No, no, it wasn't a shearwater. I know that one.

Q. Okay.



A. I recall the owl, because the owl was very, very large, very large. And they ultimately displaced that -- caught the owl, trapped the owl, and took it to another place.

Q. Do you know why they did that?

A. 'Cause of the construction that was going on.

Q. Okay.

A. They didn't want to have the owl to have a problem with the construction.

Q. Okay. Have you ever mowed over a nene nest?

A. No. No, no, no, no, no, no, no.

Q. Have you ever mowed over a live nene?

A. No. Oh, my God, no.

Q. Well, sometimes these things happen.

A. Yep.

Q. When you're not paying attention or even if you are, it can happen.

A. Do you know a nene nest? You know it.

Q. Why? What's distinguishing about it?

A. Well, the female's laying and the male's guarding.

Q. Do they squawk?

A. Oh, shoot. You come within a hundred feet of him, he's raising all sorts of hell. That's why they're so easy to find.

Q. Do you have any communications with the United States Fish and Wildlife Service?

A. No.

Q. Have you ever seen a letter from the United States Fish and Wildlife Service regarding your project here?

A. I'm sure there might have been, but I can't recall one right offhand.

(Garmatz Deposition Exhibit No. 23 was marked for identification.)

BY MR. TEBBUTT:

Q. Mr. Garmatz, handing you what's been marked as Exhibit 23, a letter from the U.S. Fish and Wildlife to Jeffrey Overton at Group 70, subject: Technical assistance for the proposed Hawaii Dairy Farms, Kauai. The letter stamped February 23rd, 2015. Do you see that?

A. Yes.

Q. Have you ever seen this letter before?

A. No.

Q. I'm just going to ask you a few questions. Do you know if one of the birds that the state DLNR asked you about was a Hawaiian petrel? Does that sound familiar?

A. No, sir.



Q. How about a band-rumped storm petrel?

A. No, sir.

Q. Have you ever seen a requirement from the Fish and Wildlife Service to have a hundred-foot buffer around active nene nests or broods?

A. No, I've never seen that.

Q. Do you see that at the top of page three, the very first bullet?

A. Yes, yeah.

Q. So you don't do that, you do a 50-foot, correct?

MR. PALOUTZIAN: I'm going to object that the question is vague, as is the statement, a hundred-foot buffer.

MR. TEBBUTT: Okay. Well, as the old objection, goes the document speaks for itself.

MR. PALOUTZIAN: I agree.

BY MR. TEBBUTT:

Q. And so you haven't notified the Fish and Wildlife Service of the presence of nene, correct?

A. No, I've notified -- no.

Q. And so you've never -- do you know if you've submitted a post-construction report, the last bullet on the top of page three, to the Fish and Wildlife Service after completion of your project?

A. No, that's not been done.
Q. There was some water quality sampling that was done on the site in, I believe it was 2015, right? Do you recall that?
A. State that again, I'm sorry.
Q. Water quality sampling done on the site by HDF in 2015?
A. Yes. Surface water or groundwater?
Q. Surface.
A. Okay.
Q. Is that a fair assessment, that there was surface water sampling done?
A. Yes.
Q. Do you know if there was any surface water sampling done during the period that construction was going on in 2014?
A. No.
Q. There was no water quality sampling done then?
A. No.
Q. By HDF?
A. No.
Q. That's correct? Am I correct?
A. No sampling was conducted.
Q. Right. Okay. We had some double negatives there. I just wanted to make sure we were getting the



right statement.
What level of involvement did you have with the surface water sampling in 2015?
A. I took them to the collection areas, delivered them to the collection areas.
Q. So you were present when the samples were taken?
A. Yes, sir.
Q. And did you get the results of the samples, too?
A. Yes, sir.
(Garmatz Deposition Exhibit No. 24 was marked for identification.)
BY MR. TEBBUTT:
Q. Mr. Garmatz, I've handed you Exhibit 24, which is two pages of results of sampling from the HDF site and some places, I think, just off site, samples that were taken November 24, 2014, one by Mr. Steven Dollar and the other by the Department of Health. Do you see those?
A. Yes, sir.
Q. Mr. Dollar is a consultant for HDF, correct?
A. Yes.
Q. And he was at that time?
A. Yes.

Q. And you said you've seen these kinds of -- you've seen these sample results, correct?

A. Yes.

Q. Did you have any discussion with Mr. Dollar about why the results on the second page of Exhibit 24 are so different than the results on the first page of Exhibit 24?

MR. PALOUTZIAN: Objection, argumentative and it's vague and overbroad. Go ahead.

THE WITNESS: No.

BY MR. TEBBUTT:

Q. Do you see that the enterococcus numbers are significantly different?

A. Yes, sir.

Q. Did you ever ask Mr. Dollar why that was the case?

A. No.

Q. Did he ever raise it with you?

A. Not to my knowledge, no.

Q. Have you ever discussed why these results are so different with anyone other than Mr. Dollar?

MR. PALOUTZIAN: Same objection.

BY MR. TEBBUTT:

Q. You didn't talk to Mr. Dollar. Did you speak with anyone about why the results are so different?



MR. PALOUTZIAN: Objection, argumentative. Go ahead.

THE WITNESS: Discussed it amongst our team members.

BY MR. TEBBUTT:

Q. Who?

A. Greg Gaug and Kyle Datta.

Q. Who's Greg Gaug?

A. Gaug, G-a-u-g.

Q. Who's Greg Gaug?

A. He's an employee of Ulupono.

Q. Okay. In what capacity?

A. I don't know what Greg's capacity is. He heads up the financial side of the project.

Q. Okay. So what was your discussion with Mr. Datta and Mr. Gaug about the Exhibit 24 results?

A. The difference it 'em.

Q. And what was the discussion?

A. Well, we just discussed them as far as why they were -- why there was a difference.

Q. And what was the discussion about?

A. Greg and Kyle were going to get with Steve and ask him.

Q. And did they?

A. I couldn't tell you.

Q. They didn't follow up with you about that?
A. No, no. A lot of stuff they don't follow up with me about.
Q. Having looked at this more, is there any other -- anything that comes to your mind about why those differences existed?
MR. PALOUTZIAN: Objection, that calls for an expert witness. Go ahead.
THE WITNESS: No, I can't comment on that. I'm not an expert in water quality.
I need to take a break.
(Break from 10:14 to 10:22.)
BY MR. TEBBUTT:
Q. Sir, I just want to ask you a few more follow-up questions about endangered species. Have you seen a Koloa duck on the site?
A. Yes.
Q. How many times.
A. Just twice.
Q. Were those some of the ones that you notified DLNR about?
A. No, because they notified me about it, and I went and looked at 'em. They saw 'em before I did. And then they said, Here they're at. Let's go look at 'em so I can see 'em.



Q. Were they nesting sites?
A. No, no. They were just -- in fact, the first time they showed me, they weren't even on the site. They were off the site.
Q. Okay.
A. And then the second time they were sitting on the road that was within the boundaries, the main road that goes down the center of the farm.
Q. How about the stilt, have you seen the stilt?
A. No.
Q. You haven't seen one?
A. No, no.
Q. You're not aware of any?
A. Not on the farm, no, sir.
Q. How about a coot?
A. No. Now, people tell me that -- no, I'm not going to say that.
Q. Go ahead. You can say it.
A. No, I'm fine.
Q. Please complete. People tell you what?
A. That they're hard to distinguish between other birds, too. So you might not see what they're like. So...
Q. Okay. I don't mean this in a bad way or anything else. But I'm just noticing, and I just want

to ask you, do you feel agitated or anything right now? Are you feeling all right? 'Cause I noticed you took a break rather sharply. And I just want to ask if you're feeling okay.

A. Feeling great.

Q. Okay. I'd like you to take a look at Exhibit 14, which has been marked in this case. Have you ever seen this document before? Go ahead and read it to yourself. Take your time. Let me know when you're done.

A. Okay. I was --

Q. Yeah. Have you seen this document?

MR. PALOUTZIAN: He's asking whether you've seen it before.

THE WITNESS: Not the top one, no.

BY MR. TEBBUTT:

Q. Okay. The bottom one obviously was to you.

A. Yes.

Q. Did you forward that -- the email dated Friday, March 24, 2014, at 4:30 p.m. from Sina Pruder, did you forward that to Mr. Datta?

A. Yes.

Q. But you hadn't seen Mr. Datta's email?

A. No, no.

Q. How do you get along with Mr. Datta?



A. Fine.

Q. Does the email that -- from Mr. Datta to Mr. Clay and Ms. Hennessey influence your opinion of how you get along with Mr. Datta at all?

A. No, because Mr. Datta before he sent this email called and confirmed the same thing in a conversation with me. So we had a long discuss before this email was written.

Q. About what?

A. About all these topics.

Q. I see. About the sizing of the facility?

A. No, not so much that. It was that he was not comfortable with me going forward with heading up the permitting. And, you know, he asked -- first question out of his mouth, he says, Are we ready to load up?

And I said, Load up. And I said, Yeah, we're ready to load up.

And he says, You're not comfortable going forward with what's going on?

And I said, No. And I said --

And he said, Neither am I.

Q. What does load up mean?

A. Attach Group 70, get Patricia Henry involved.

Q. So you wanted to load up, you mean, bringing in more experts and lawyers?

A. Yes.

Q. Did you have a discussion with him about whether to scale the facility down from 2,000 head to 699?

A. Well, that was an ongoing discussion early on after we felt the pushback from the community. Initially, you know, it was going to be a larger facility. The original plans were going to be a larger facility. But both myself and Ms. Hennessey, who was their PR relations folks who -- her and I had been on the island discussing this, and we had suggested that we possibly change our numbers down to a number that would be less than 700 to start the facility out with.

Q. And was that to avoid the large CAFO regulatory process?

MR. PALOUTZIAN: I'm going to object that it calls for specification. It's vague. Go ahead.

THE WITNESS: No, because we knew the large CAFO would take longer than what we had intended to get done.

BY MR. TEBBUTT:

Q. Right. So is that why you scaled the project down to 699?

A. No.

MR. PALOUTZIAN: Same objections.



THE WITNESS: No.

BY MR. TEBBUTT:

Q. Why did you scale it down to 699?

MR. PALOUTZIAN: Same objections and it's misleading. Go ahead.

BY MR. TEBBUTT:

Q. At least the initial phase.

MR. PALOUTZIAN: Same objections.

THE WITNESS: We felt it would be community friendly to start out at a lower amount.

BY MR. TEBBUTT:

Q. But you still intended to get to 2,000, correct?

MR. PALOUTZIAN: Same objections. You're asking his personal view of the project?

MR. TEBBUTT: What his knowledge of it is.

MR. PALOUTZIAN: Well, the question is vague as posed. Go ahead.

THE WITNESS: We just felt it would be more friendly to the neighbors.

BY MR. TEBBUTT:

Q. Why would it be more friendly?

A. 'Cause we could prove to them that the project works.

Q. And then you'd scale it up to 2,000?

MR. PALOUTZIAN: Same objections.

THE WITNESS: If the grass could handle it.

BY MR. TEBBUTT:

Q. So is your main contention whether the grass can handle more than 699 cows?

MR. PALOUTZIAN: Objection, vague.

THE WITNESS: I know that it can handle more than 699, but whether we go there or not will be determined later.

BY MR. TEBBUTT:

Q. And when you say whether the grass can handle it, is that in terms the glass feeding the animals?

A. That's correct.

Q. What about whether the grass can uptake the waste from the animals?

A. Well, I know that it can do that.

Q. Why do you know that?

A. Because of the grass yield test that we've taken and studies we've done.

Q. And what studies are those?

A. The grass yield studies that have been performed over the past two years.

Q. Okay. And are those included in the EIS?

A. Yes.

Q. And is it your contention that they show that



the grass will take up all the nutrients from --

A. Yes.

Q. Just a minute. From the manure waste?

A. Yes.

Q. What happens in a storm event of the size of the ones you saw in November 2013 and February of 2014? What happens to the lagoons in that situation?

MR. PALOUTZIAN: Objection, the question is overbroad, it calls for an expert opinion, it's an incomplete hypothetical, lacks foundation, calls for speculation. Go ahead.

THE WITNESS: Ask the question again.

BY MR. TEBBUTT:

Q. Yes. When a large storm event like the two that happened right after Thanksgiving in 2013 and then the other one you testified about in February or March 2014, over -- it was over five inches, what happens to the lagoons in that situation?

MR. PALOUTZIAN: Same objections.

THE WITNESS: The lagoons will be managed to best management practices and that would not happen.

BY MR. TEBBUTT:

Q. What would not happen?

A. The overflow of the lagoons.

Q. Isn't part of the present protocol that you

would have to empty the lagoons prior to such a storm event?

A. Not for that size of a storm event, no.

Q. What size storm event would require you to empty the lagoons prior to storm events?

MR. PALOUTZIAN: Same objections. It's also getting into the realm of not being relevant to the claims in this case. Go ahead.

THE WITNESS: Twenty-four-hour, 25-year event.

BY MR. TEBBUTT:

Q. And what size is that?

A. Over eight inches.

Q. Now, just to clarify, the 699 cows that are planned to be brought into the facility, they would be brought in pregnant cows, correct? That's the plan?

MR. PALOUTZIAN: Same objections.

THE WITNESS: Say that again.

MR. PALOUTZIAN: Let me just state an objection. I don't think that's relevant to the claims being made in this litigation. Go ahead and answer the question.

BY MR. TEBBUTT:

Q. Yeah. So the plan is to bring in 699 pregnant cows, correct?



A. To the facility, yes.

Q. Right. And how long would it be before they gave birth?

MR. PALOUTZIAN: Same objection.

THE WITNESS: Should give birth within 60 days of each other, beginning to end.

BY MR. TEBBUTT:

Q. Okay. And from the time they're brought onto the facility till they give birth, how much time would you expect?

MR. PALOUTZIAN: Same objection.

THE WITNESS: They will not come onto the facility until they're within 15 days of giving birth.

MR. TEBBUTT: Okay. Can we take about a six-minute break?

MR. PALOUTZIAN: All right.

(Break from 10:37 to 10:46.)

BY MR. TEBBUTT:

Q. I just have a few more questions for you. You know, famous last words. I want to ask you if you've ever heard of mill ditch?

A. Mill ditch?

Q. Yeah.

A. No.

Q. Okay. Not Mill Ditch 9, A or B?

A. No.
Q. Okay. How about Waiopili ditch?
A. Yes.
Q. Okay. And what do you consider Waiopili ditch? Is it on the map? Is it on Exhibit 4?
A. Yeah.
Q. What do you consider to be Waiopili ditch?
A. These two drains come together right down here underneath your white portion of your map (indicating).
Q. So the center ditch and the main ditch, where they converge?
A. Yes.
Q. That in your estimation become Waiopili ditch?
A. Yeah, that's how I consider it. I don't know what everybody else considers it, but that's how I consider it.
Q. You don't consider anything on the property to be part of Waiopili ditch?
A. No.
Q. Okay. Did you help the Ulupono Initiative or Mr. Omidyar prepare their tax rebate request in any way?
A. No.
Q. Did you provide any answers to questions from their accountant about that tax application?
A. No, no, no.



Q. What about the invoices that were related to the work that was requested for the rebate?
A. No, no.
Q. Did you answer any questions about the invoices and whether they related to this project or not for the tax rebate?
MR. PALOUTZIAN: Objection, calls for speculation, lacks foundation. Go ahead.
BY MR. TEBBUTT:
Q. Go ahead and answer.
A. I don't recall.
Q. So it's possible Mister -- that you spoke with Mr. -- is it Haed?
A. I don't recall that name.
Q. Okay.
MR. TEBBUTT: Off the record for just a second.
(Off the record from 10:48 to 10:51.)
BY MR. TEBBUTT:
Q. Mr. Garmatz, I'm going to show you an invoice from All Property Consulting, Inc, dated February 2, 2014. And I'm going to ask you some questions about it.
A. Okay.
Q. We only have the one electronic copy. So it will become Exhibit 25 to the deposition.

A. Okay.
Q. So if you don't mind, I'm going to look over your shoulder.
A. That's fine.
Q. While I ask you some questions.
MR. PALOUTZIAN: Or I can show him on my computer. Whatever you prefer. I have it pulled up on my screen as well.
MR. TEBBUTT: All right. Do you want to do that? That would probably be little easier. Thanks.
BY MR. TEBBUTT:
Q. And let's just make sure we're looking at the right thing.
A. Yes.
Q. Just to be on safe side. Looks good, okay.
Mr. Garmatz, do you know who Bob Farias is?
A. Yeah, yeah, Bobby Farias. I know him very well.
Q. Okay. F-a-r-i-a-s.
A. Yes. There's junior now. Make sure we refer to junior.
Q. Okay. So there's a junior and a senior?
A. Yes.
Q. Okay. And I assume senior is junior's father?
A. Yes.



Q. And do you work with both gentlemen?
A. Yes.
Q. In what capacity have you worked with Mr. Farias, Sr.?
A. He did some clearing out at the farm.
Q. When?
A. In 2014, early 2014.
Q. So that -- is this invoice, is this name from the senior?
A. No, this is from junior.
Q. Okay. I was asking you about senior. So did senior do some of the clearing, too?
A. Yes, yes.
Q. But junior is the one that does the invoices?
A. No. Junior is a totally separate entity. All property consulting is junior's entity.
Q. Okay. So Mr. Farias does he -- Mr. Farias, Sr., does he has a separate entity or is he just on his own?
A. Yeah, separate entity.
Q. Do you know the name of his entity?
A. I was afraid you were going to ask me that. I can't tell what it is right offhand.
Q. Okay. It's not R Ranch is?
A. No, it's Ross Farias.

Q. Okay. I'm going to just go through this invoice and ask you some stuff. 'Cause I asked -- earlier we discussed some invoices, and there wasn't as much detail. This might help with some detail.

So on the left side of the page, I assume those are the dates of the work, is that correct?

A. Uh-huh (moves head up and down). Yeah.

Q. And is that billing for February 2014 work or January 2014 work. Do you know?

A. January.

Q. Okay. 'Cause the invoice is February 2nd, right?

A. Right.

Q. Okay. So the first entry says, 2nd, so that would be the 2nd of January?

A. Uh-huh (moves head up and down).

Q. Locate disk for farm to prep ground.

A. That's correct.

Q. What does that mean, locate disk, do you know?

A. Well, he was looking for a disk. I'd asked him to find me a disk that we could start some prep ground with on the farm.

Q. Okay. If you don't mind, could you take your hand from in front of your mouth. Thanks. It's clearer for the court reporter.



A. Mr. Farias is a consultant, and he just does active work for me in the month of January, and these are the tasks that I asked him to help me with. And this is the hours spent.

Q. Does this every January?

A. No.

Q. Or just January of 2014?

A. Yeah, yeah.

Q. Okay.

A. And all those are tasks that I asked him to do for me.

Q. Sure.

A. And you see the hours that he spent doing those, and he totals them up there, and it's a total of 36 hours at $95, and we paid that.

Q. Right. Sure. The second entry says, Meetings at the farm, grass plot, land clearing, ground prep.

A. Yes.

Q. What's the land clearing and ground prep refer to?

A. That's basically what we discussed while we were at the farm having our meeting.

Q. But yet there was actually work done, too, right, the land clearing and ground prep?

A. No, no.

Q. So the meeting took five hours?
A. Yeah, you betcha. Yeah, we talked a bunch about how we were going to do it, where we were going to do it, how it was going to get done.
Q. Okay. The entry on the 14th.
A. Okay.
Q. It says, Worked at farm site drainage and cleaning, prepared for delivery of pivots, six hours.
A. That was some work that we talked about there. And, let's see, where's the drain? It's also a possibility that Bobby might have used my tractor that day to mow some grass because we did have the pivots coming in about that time in containers.
Q. So you're saying he mowed some grass for the delivery of the pivots?
A. Yeah, to place the pivots out of the containers.
Q. Okay. 'Cause I think I asked you --
A. I can't tell you exactly how that was -- what was done there on that date.
Q. Yeah. 'Cause I asked you earlier about whether you did any special preparation for the pivots, and I think you said no earlier.
A. Yeah.
Q. Does this refresh your recollection that there



was some preparation done?
A. Well, this is for the delivery of the pivots, you know, the containers that came in that they were delivered in. And you have to take the containers -- the material out of the containers. And there was six of the containers. So I'm sure that we did some ground prep for it, yeah. I'll have to change my wording.
Q. Okay. I'm done with that one. Can you go to the June 1, letter, please. Mr. Garmatz, you have in front of you what will be labeled under stipulation of counsel as Exhibit 25 [sic], the June 1, 2016, letter from Group 70 to Hawaii Department of Health. Do you see that letter? Do you see that document in front of you? Sir, do you see the document?
A. Yeah, I see it.
Q. Okay. It's a two-page letter, correct?
A. Yes.
Q. And have you seen this letter before today?
A. No.
Q. This is the first time you've seen it?
A. Uh-huh (moves head up and down). Let me finish reading it, please.
MR. TEBBUTT: Okay. While you're reading it, I would just like to say for the record that Exhibit 25 [sic] is a document dated June 1, 2016, from

Group 70 to the Department of Health that should have been provided to us in response to request for production of documents, and to our understanding was not. We found this on our own.

MR. PALOUTZIAN: Okay. Well, I'm not sure what you consider to be the deadline for production of documents. But...

THE WITNESS: Okay.

BY MR. TEBBUTT:

Q. Does having read through the letter refresh your recollection whether you've seen this letter before?

A. I've not seen this letter before.

Q. Okay. Have you discussed the contents of the letter with anyone at Group 70?

A. It was discussed in a phone conversation.

Q. When?

A. Three weeks ago.

Q. Who was on the call?

A. Just myself and Paul Matsuda.

Q. And how long did that discussion take place?

A. Two to three minutes.

Q. And did you initiate the call or did Mr. Matsuda?

A. Matsuda called me.



Q. What did he ask you?

A. Just keep me updated.

Q. Did he tell you that the request for an extension of the storm water permit was going to be filed?

A. Uh-huh.

Q. And did you -- did he ask for any specific information from you?

A. No, no, just an update.

Q. He was just letting you know that the request would be filed?

A. Correct.

Q. And what did you say?

A. Fine.

Q. Did you discuss anything other than -- or did you say anything other to him than, Fine, during the conversation?

A. No, just indicated to him that that would be all right. So thank you for the information.

Q. What information -- additional information relevant to the NOI application was needed, do you know?

MR. PALOUTZIAN: Objection, lacks foundation, calls for speculation.

THE WITNESS: I wouldn't know that. I wouldn't know that.

BY MR. TEBBUTT:

Q. Did you discuss any of that additional --

A. No.

Q. Just a minute. Please let me finish my question.

Did you discuss any of what additional information was needed with Mr. Matsuda on that phone call?

A. No.

Q. Have you had any discussions with him on any other phone calls about what additional information was needed for NOI application?

A. I do not recall.

Q. Sir, if you'll take a look at Exhibit 20. I think we're done with this one. You can move the computer.

This is a submission dated August 17, 2015, from HDF concerning the storm water permit. Do you see that?

A. Uh-huh (moves head up and down).

Q. Have you seen this document before?

A. Yeah, I've seen portions of this, yes, sir.

Q. Okay. I'd like you to turn to -- towards the back, FOM_002602 through 2608. Let me know when you get there. Do you see 2602 through 2608?



A. Uh-huh (moves head up and down).

Q. Oh, okay. So you're looking at that upside down. It's okay. So if you turn just briefly to 2608, please. Do you see the signature line on 2608, and it has your name on it?

A. Uh-huh.

Q. Did you actually submit that document?

A. Yes.

Q. Who wrote that document for you or did you write it yourself?

A. Oh, no. Group 70.

Q. Okay. Did Mr. Matsuda write that for you?

A. Yes, sir.

Q. And how much time did you spend working with Mr. Matsuda on that letter?

A. Oh, 20, 25 hours.

Q. Okay. Did you do that with him in person or over the phone or --

A. Both.

Q. How did you do it?

A. Both.

Q. Okay. Did you go to Honolulu and meet with him about the letter?

A. Yes.

Q. And how much time did you spend with him

working on that letter?

A. About six hours over there in Honolulu.

Q. And did he come over here to work with you on this, too?

A. Yes.

Q. And how much time did he spend with you working on it?

A. Full day, eight-hour day, long day.

Q. Just the two of you?

A. Ryan Char was also there.

Q. And who's Ryan Char?

A. He's another individual at Group 70.

Q. Okay. He's not an attorney, though, is he?

A. No.

Q. Okay. So it was just at most the three of you working on this?

A. Uh-huh (moves head up and down).

Q. Okay.

A. I believe Amy Hennessey was there also.

Q. Okay. Is the information in the letter dated August 14, 2015, correct?

MR. PALOUTZIAN: Objection overbroad.

THE WITNESS: To the best of my knowledge.

BY MR. TEBBUTT:

Q. Okay. Take a look at 2604 of that letter. Do



you have that in front of you?

A. Uh-huh.

Q. Look at E, Locations of any crossing of state waters as required by Section 7.2.6.1. Do you see that?

A. Uh-huh.

Q. And it says, Crossings of Mahaulepu Ditch are indicated in Figure 6B. Crossings will be constructed per applicable NRCS conservation practice standards. Do you see that?

A. Yes.

Q. Where is Mahaulepu Ditch?

A. Mahaulepu Ditch is the main ditch on the farm. That's what they designated it as.

Q. So on Exhibit 4, Mahaulepu Ditch is the main ditch or the center ditch or is that both?

A. It's this one (indicating).

Q. So that's the center ditch, correct?

A. Yeah.

Q. And that starts all the way at the top of the property?

A. Yes.

Q. Next to 1 and 2?

A. Yeah.

Q. And where they converge?

A. That's correct.

Q. Okay. And it says, Crossings will be constructed. Hadn't the crossings already been constructed and put in place?

A. At this point?

Q. Yes.

A. Yes.

Q. In August of 2015.

A. Yes.

Q. So that's an incorrect statement, isn't it?

A. Yes, that's incorrect.

Q. It's a lie basically, isn't it?

MR. PALOUTZIAN: Objection, it's argumentative.

BY MR. TEBBUTT:

Q. And it says, Will, which means future, correct? Is that correct?

A. Yes.

Q. And that had already been done, correct?

A. Yes.

Q. So the letter is incorrect, isn't it?

A. (Moves head up and down.)

Q. Isn't it, Mr. Garmatz?

A. Yes, yes.

Q. And I'd like you to take a look at FOM_002493 earlier on in the submission. Do you see that in front



of you?

A. Uh-huh.

Q. It has, Disturbed area for farm improvements under NOI, NPDES general permit. Do you see that?

A. Say that again.

Q. It says down at the bottom, it's the map, Figure 6B, Disturbed area for farm improvements under NOI, NPDES general permits. Right?

A. 92493?

Q. (Indicating.)

A. Okay, okay.

Q. See that?

A. (No response.)

Q. Did I read that correctly?

A. Yeah.

Q. Okay. And the listings under there include installation and trenching for watering facilities at each paddock, correct? It's one of the listings. The third one down under the disturbed area. Do you see that?

A. Yeah. That's the disturbed area that's already in place.

Q. Right. So those are the water troughs, correct?

A. Yes.

Q. And the next line down, the next bullet point is, Installation/Trenching for new potable water distribution line from existing potable well source to the dairy facility. Has that been put in place?

A. No.

Q. On the map itself there are four references to new animal crossings per NRCS Practice Code 578. Do you see that?

A. Uh-huh.

Q. Those had already been installed by the time this was submitted, hadn't they?

A. No.

Q. Okay.

A. Nope.

Q. Okay. How about -- strike that.

Oh, the maintenance of all agricultural ditches and Mahaulepu Ditch in accordance with MOU between USACE, NRCS and EPA. Do you see that?

A. Yes, sir.

Q. That maintenance had already been done, hadn't it?

A. No.

Q. The maintenance, had it been done on the ditches, had it not been done as of August of 2015?

A. No, no.



MR. PALOUTZIAN: Assumes facts not in evidence.

BY MR. TEBBUTT:

Q. What was the maintenance that was done on those ditches prior to 2015?

A. The same thing we discussed this morning, maintenance within the 35-foot setback per NRCA -- NRCS rules.

Q. Okay. And then if you'll take a look at 002602, please. It's the first page of the letter. Do you see that?

A. Uh-huh.

Q. Under the query 2, it says, Land disturbance associated with this project as listed in the NOI has not at commenced?

A. Uh-huh.

Q. Including, but not limited to, preliminary site construction such as installation of fencing and irrigation systems.

Irrigation systems had already been -- some of the irrigation systems had already been put in place prior to that letter, correct?

A. That's correct.

Q. So this letter is incorrect, again, isn't it?

A. Yes.

MR. TEBBUTT: I'm done. Thanks.

MR. PALOUTZIAN: Request to review the transcript.

(Garmatz Deposition Exhibit Nos. 25 and 26 were marked for identification.)

(Concluded at approximately 11:15 a.m., June 14, 2016.)

* * * * *



I, JAMES J. GARMATZ, VOLUME 2, hereby certify that I have read the foregoing typewritten pages 136 through 230, inclusive, and corrections, if any, were noted by me, and the same is now a true and correct transcript of my testimony.

DATED: Koloa, Hawaii _____

_____

JAMES J. GARMATZ

Signed before me this _____
day of _____ 2016.

_____

Friends of Mahaulepu, Inc. vs. Hawaii Dairy Farms, LLC; Civil No. 1:15-cv-00205-LMK-KJM; Deposition taken on June 14, 2016, by Terri R. Hanson, RPR, CSR 482.

STATE OF HAWAII )
) ss.
COUNTY OF KAUAI )

I, TERRI R. HANSON, RPR, CSR 482, do hereby certify:

That on Tuesday, June 14, 2016, at 8:35 a.m. appeared before me JAMES J. GARMATZ, VOLUME 2, the witness whose deposition is contained herein; that prior to being examined, the witness was by me duly sworn;

That pursuant to Rule 30(e) of the Hawaii Rules of Civil Procedure, a request for an opportunity to review and make changes to this transcript:

_X_Was made by the deponent or a party (and/or their attorney) prior to the completion of the deposition.
___Was **not** made by the deponent or a party (and/or their attorney) prior to the completion of the deposition.
___Was waived.

That the foregoing represents, to the best of my ability, a full, true and correct transcript of said deposition.

I further certify that I am not an attorney for any of the parties hereto, nor in any way concerned with the cause.

This 97-page Deposition of James J. Garmatz, Volume 2, dated June 14, 2016, was subscribed before me this 24th day of June, 2016, in Lihue, Hawaii.

_____
TERRI R. HANSON, CSR 482
Registered Professional Reporter

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June 21, 2016

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**RE: FRIENDS OF MAHA'ULEPU'S REQUEST FOR EXTENSION OF PUBLIC COMMENT PERIOD ON HAWAI'I DAIRY FARM'S DRAFT ENVIRONMENTAL IMPACT STATEMENT**

Dear Dr. Pressler, Ms. McIntyre, Dr. Kawaoka, Ms. Hennessey, and Mr. Overton,

On behalf of Friends of Māhā'ulepu (hereinafter abbreviated as "FOM"), I write to request that Hawai'i Department of Health ("DOH") and Hawai'i Dairy Farms ("HDF") agree to extend the period for submission of public comments concerning HDF's Draft Environmental Impact Statement ("DEIS") for its proposed dairy facility.

Just last week we learned that HDF had submitted certain "updates" to their Waste Management Plan ("WMP"), received by DOH on June 1. To my knowledge, the public has not been formally notified that the WMP has been revised; the fact that FOM serendipitously discovered the June 1 update does not constitute notice to the public. The



community will therefore be severely limited in its ability to submit comments on HDF's complete proposal if it remains unaware that the June 1 updates exist. Further, FOM has discovered multiple factual inconsistencies between HDF's Waste Management Plan of 7/23/14, its Waste Management Plan Update of 6/1/16 and its DEIS of 6/8/16. Even if the public were to be informed of the June 1 updates to the WMP, it remains unclear which facts and information are correct such that they are properly the subject of evaluation and comment. Some, but not all of the changes in the June 1 updates have been incorporated in the DEIS.

DOH should require HDF to resubmit an integrated and comprehensive WMP and DEIS wherein the Dairy Plan is consistent throughout. The comment period on the DEIS should not begin until HDF has resubmitted complete, consistent documents for review and the public has been notified. Additional pending action by a federal court also supports further extension of the comment period, as discussed below.

Disturbingly, we learned during depositions given under oath that HDF has fundamentally misrepresented and falsely certified to DOH the timing and degree of construction activity that has already taken place on its proposed dairy site. These misrepresentations and false statements will be offered as evidence in FOM's Clean Water Act citizen enforcement action currently pending before the Hon. Leslie Kobayashi of the Federal District Court for the District of Hawaii (No. 1:15-cv-00205-LMK-KJM). Given the interrelated nature of these two matters, and the fact that DOH is presently the approving agency for both the DEIS and any potential stormwater discharge permit, FOM requests that the comment period on the DEIS also be extended to allow for Judge Kobayashi to make a determination on the Parties' respective Motions for Summary Judgment in the Clean Water Act case. FOM intends to file its motion in sufficient time for both motions to be heard on the scheduled date of August 8, 2016.

DOH has raised questions about the accuracy and completeness of HDF's applications for General Stormwater NPDES permit coverage for discharges associated with construction activity since HDF first applied for coverage in September of 2014. *See* DOH comment letter of October 24, 2014, attached hereto as Exhibit 1. Subsequent comment letters from DOH included the same inquiry. *See, e.g.*, DOH comment letter of July 16, 2015, attached hereto as Exhibit 2. We learned on June 13 and 14, through the depositions of Mr. James Garmatz, HDF's farm manager, and Mr. Kyle Datta, general partner of Ulupono Initiative, that HDF's response to DOH's repeated, specific inquiry as to whether construction activities have occurred on the proposed dairy site, finally submitted in August 2015, was false. Many of the very activities for which HDF requested NPDES coverage had already been underway for months. HDF's certifications that the activities for which it seeks permit coverage have not already taken place (e.g., "after the fact" discharges/activities) are likewise false. For example, in HDF's May 7, 2015 application materials, Mr. Datta certified that the information provided in the NOI did not contain "after the fact" discharges. That May 7, 2015 application specifically listed certain activities that HDF wished to be covered under the NPDES permit, including, *inter alia*, "trenching for and installation of new potable water distribution system for livestock consumption through watering facilities and concrete troughs."

Contrary to that certification, Mr. Garmatz testified that approximately 160 watering troughs had already been installed at the site, with ground-disturbing water lines installed to approximately 40 of the troughs.

Mr. Garmatz also testified about numerous other construction activities that have occurred at the site, including the March 2014 installation of approximately 1000-1500 feet of underground irrigation piping which is connected to a functioning irrigation pivot. Mr. Garmatz signed an August 14, 2015 letter, along with its most recent NPDES stormwater permit application to DOH stating that "land disturbance associated with this project as listed in the NOI has not commenced, including but not limited to, preliminary site construction such as installation of fencing and irrigation systems." Letter of August 14 attached hereto as Exhibit 3. This statement, too, is clearly false. When the transcripts from these depositions are complete, we will provide them to DOH. DOH will no doubt find the testimony enlightening. Because a federal district court judge will soon opine on these issues, which reveal the veracity of at least one set of permitting materials that HDF has submitted to DOH, DOH and HDF should agree to allow Judge Kobayashi to render a determination on the merits of the Clean Water Act case prior to the commencement of the time for public comments on the DEIS. FOM and other members of the public would then have the opportunity to consider the opinion and findings of the federal court in submitting their comments on the DEIS.

Issues of fairness also weigh in favor of extending the public comment period in this instance. As discussed above, the public simply cannot provide comments on the contents of a WMP that it does not know exists. A new, complete WMP and DEIS should be resubmitted and available for public review and comment. Further, as you know, DOH first published the Environmental Impact Statement Preparation Notice ("EISPN") from HDF and its contractor, Group 70, on January 23, 2015. HDF has spent nearly a year-and-a-half gathering information and conducting studies to develop its approximately 2,600 page DEIS. 732 of those pages are "Technical Appendices" evaluating a broad range of subject areas, including such varied topics as archaeological features and cultural impacts, ground, surface, and marine water quality, plant and animal life, soils and nutrient balance, and economic analyses. HDF's DEIS also indicates that a number of local, state, and federal agencies, as well as over 200 individuals and community groups, have submitted comments on the EISPN. Some agencies even participated in earlier reviews of at least some of the supporting documents. The degree of unprecedented interest in and concern about the consequences of HDF's proposed dairy facility underscore the need for meaningful public review of the DEIS. It is important that this review not be based on incomplete and/or conflicting information. It certainly should not be rushed.

FOM is committed to providing a complete review and analysis of the DEIS. However, FOM is concerned that the 45-day comment period permitted under HAR § 11-200-22(b) does not allow adequate time for a thorough evaluation of the proposed project, especially when a federal enforcement action materially related to the proposed project is currently pending and we now understand a WMP update has been submitted proposing at least 27 changes in HDF's WMP of 7/23/14. Reviewing, evaluating, and



opining in 45 days on a DEIS that took over ten times that duration to complete is a tall order, especially when elements of the DEIS do not comport to the recent WMP updates. Therefore, FOM requests that DOH require HDF to resubmit a fully integrated WMP with consistent content in the DEIS. The 45-day public comment period should then begin upon HDF's resubmittal and notice of these documents or from the federal district court's issuance of a decision on the Parties' Motions for Summary Judgment, whichever is later. The motion hearing is presently set for August 8, 2016, meaning that any public comments should be due no earlier than September 7, 2016 (and potentially later, depending on the date of issuance of a decision or resubmittal and notice of HDF's fully integrated WMP and DEIS). In the alternative, and at the very least, FOM asks for the comment period to be extended an additional 45 days to and including September 7, 2016.

As you consider this request, FOM urges you to reflect on the numerous statements that HDF has made to the public about its desire to be good neighbors and to respond to public concerns about the proposed dairy operation. Agreeing to extend the public comment period is an opportunity for HDF to live up to that commitment. FOM looks forward to your response.

Sincerely,

/s/ Charles M. Tebbutt
Charles M. Tebbutt
Law Offices of Charles M. Tebbutt, P.C.
*Counsel for Friends of Māhā'ulepu*

*cc via US Mail to:*

The Honorable David Y. Ige
Governor, State of Hawaii
Executive Chambers
State Capitol
Honolulu, HI 96813

Mr. Douglas Chin, Esq.
Attorney General, State of Hawaii
Department of the Attorney General
425 Queen Street
Honolulu, HI 96813

Ms. Sina Pruder, P.E.
State of Hawaii, Department of Health – Wastewater Branch
919 Ala Moana Blvd., Room 309
Honolulu, HI 96801-3378

*cc via e-mail to*:

Patricia McHenry, Esq.
Cades Schutte
pmchenry@cades.com
*Counsel for HDF*

Linda Paul, Esq.
linpaul@aloha.net
*Counsel for FOM in Federal CWA case*

# EXHIBIT 1

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
EMD/CWB

10014PJF.14

October 24, 2014

Mr. Kyle Datta
Manager Partner
Hawaii Dairy Farm LLC
P. O. Box 1690
Koloa, Hawaii 96756

Attention: Mr. Jim Garmatez
Facility Manager

Dear Mr. Datta:

**Subject: Comments on the Notice of Intent (NOI) for Hawaii Dairy Farm Koloa, Island of Kauai, Hawaii File No. HI R10E533**

The Department of Health (DOH), Clean Water Branch (CWB) has not received a response to our September 24, 2014 NOI comments for the subject facility. Our September 24, 2014 comments are as follows:

1. Clarify if any land disturbance associated with this project commenced.
2. Clarify if any activities in the NOI have already commenced.
3. Clarify if the county grading permit applies to activities provided in the NOI.
4. Clarify if construction will occur in, under, or over State waters and if a permit is needed from the Army Corps of Engineers, Regulatory Branch.
5. Provide a copy of the Storm Water Pollution Prevention Plan that meets Hawaii Administrative Rules (HAR), 11-55, Appendix C requirements.
6. The Certifying person listed on the Signatory and Certification Statement does not match Item No. 2. of the CWB NOI Form. Please revise.
7. Please provide the owner's street address information.
8. Please provide the receiving state waters classification information.

The DOH-CWB expects to receive a response to our comments by **November 7, 2014**. If the DOH-CWB does not receive the required information by **November 7, 2014**, we will assume that you are no longer interested in obtaining coverage under the National Pollutant Discharge Elimination System General Permit for discharges of stormwater associated with construction activities, and we will terminate the processing of your NOI.



If additional time is needed, you may submit a written request with the specific amount of time needed and justification.

For future submittals, include **File No. HI R10E533** and the following certification statement in your cover letter:

> **"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."**

Should you have any questions, please contact Ms. Jiaping Fouse of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

STUART YAMADA, P.E., CHIEF
Environmental Management Division

JF:np

c: Mr. Kyle Datta, Hawaii Dairy Farm LLC [via e-mail kdatta@ulupono.com]
Mr. Jim Garmatez, Hawaii Dairy Farm LLC
[via e-mail jim@hawaiidairyfarms.com only]
Group 70 International [via e-mail rchar@group70int.com only]

# EXHIBIT 2

DAVID Y. IGE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EMD/CWB

07022PJF.15

July 16, 2015

Mr. Eric Kyle Datta
Managing Partner
Hawaii Dairy Farm LLC
P. O. Box 1690
Koloa, Hawaii 96756

Attention: Mr. Jim Garmatez
Facility Manager

Dear Mr. Datta:

**Subject: Comments on the Notice of Intent (NOI) for Hawaii Dairy Farm Koloa, Island of Kauai, Hawaii File No. HI R10E716**

The Department of Health (DOH), Clean Water Branch (CWB) acknowledges receipt of your NOI Application (e-Permitting Submission #: 26C-DWXA-VBZ8) on May 7, 2015, for the subject project. We have reviewed the submittal and have the following comments:

1. Please provide the Owner's street address information. CWB does not accept a P. O. Box as the Owner's street address.
2. Clarify if any land disturbance associated with this project has commenced, including but not limited to preliminary site construction, such as installation of fence and irrigation system etc. that is mentioned in the following report: http://thegardenisland.com/news/local/hdf-faces-lawsuit/article_603afbae-150d-5463-a27a-ffb6bb7fd575.html
3. Clarify if any activities in the NOI have already commenced.
4. Clarify if the county grading permit exemption (Figure 10) applies to all activities provided in the NOI.
5. The Storm Water Pollution Prevention Plan (SWPPP) does not meet the requirements in Hawaii Administrative Rules (HAR), Chapter 11-55, Appendix C (NPDES General Permit for Construction Storm Water). Please revise your SWPPP by ensuring all of the required information from Section 7 of HAR, Chapter 11-55, Appendix C, is included. Please submit the revised SWPPP.

The following information is missing in your SWPPP as required by Section 7 of Appendix C.

a. The intended sequence and estimated dates of construction activities information as required by Section 7.2.5.
b. A map or drawing showing the approximate slopes before and after major grading activities and drainage patterns as required by Section 7.2.6.1.
c. A map or drawing showing the locations of the project site's construction entrance/exit(s), areas used for storage and for disposal of wash water as required by Section 7.2.6.1.
d. Locations of any contaminated soil or contaminated soil stockpiles as required by Section 7.2.6.1.
e. Locations of any crossings of state waters as required by Section 7.2.6.1.
f. Locations of all potential pollutant-generating activities identified in Section 7.2.7.
g. In your SWPPP Item No.2.5, you identified the project site non-storm water sources. Please see the bullet list below. However, Section 7.2.8 requires you to provide information on the design, installation, maintenance, and location(s) of the control measures to prevent discharges of your identified non-storm water. Please provide this information.
   - Discharges from emergency fire-fighting activities;
   - Landscape irrigation;
   - Water used to wash vehicles and equipment;
   - Water used to control dust;
   - Potable water including uncontaminated water line flushings;
   - Routine external building wash down;
   - Pavement wash waters;
   - Uncontaminated air conditioning or compressor condensate;
   - Uncontaminated, non-turbid discharges of ground water or spring water;
   - Foundation or footing drains; and
   - Construction dewatering water.
h. Please provide the pollution prevention procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where spills and leaks etc. occur as required by Section 7.2.11.1.





The above required information shall be submitted through the CWB NOI Form for revised NOIs. This is accessible through the e-Permitting Portal website at: https://eha-cloud.doh.hawaii.gov/epermit. After you login, click the [History] tab located at the upper middle page, find your submittal from the list of history, click [view] icon, at the right side of the page, under [Actions], click [Revise Submission] tab. Follow the instructions to complete and submit this form. All submissions shall include a CD or DVD containing the downloaded e-Permitting submission and a completed Transmittal Requirements and Certification Statement for e-Permitting NOIs Form, with original signature and date.

The DOH-CWB expects to receive a response to our comments by **August 17, 2015**. If the DOH-CWB does not receive the required information by **August 17, 2015**, we will assume that you are no longer interested in obtaining coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for discharges of stormwater associated with construction activities, and we will terminate the processing of your NOI.

If additional time is needed, you may submit a written request with the specific amount of time needed and justification.

Should you have any questions, please contact Ms. Jiaping Fouse of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

STUART YAMADA, P.E., CHIEF
Environmental Management Division

JF:np

c: Mr. Eric Kyle Datta, Hawaii Dairy Farm LLC [via e-mail kdatta@ulupono.com]
Mr. Jim Garmatez, Hawaii Dairy Farm LLC
[via e-mail jim@hawaiidairyfarms.com only]
Mr. Paul Matsuda, Group 70 International
[via e-mail pmatsuda@group70int.com only]
(w/Receipt No. 37017 for $500 Filing Fee only)
Mr. Ryan Char, Group 70 International [via e-mail rchar@group70int.com only]

# HDF faces lawsuit

TheGardenIsland.com

wavesfile

Bill Buley/The Garden Island

Waves crash in on Mahaulepu Beach on a recent cloudy afternoon.

|

LIHUE — Oregon-based environmental attorney Charlie Tebbutt on Monday filed a lawsuit alleging violations of the federal Clean Water Act on the part of those behind a proposed dairy in Mahaulepu Valley.

The suit claims the backers of Hawaii Dairy Farms — a proposed $17.5 million, 576-acre operation — have and continue to violate federal water regulations by installing irrigation systems, wells and water troughs without a state stormwater construction permit.

Specifically, the suit alleges that these ongoing construction activities are "reasonably likely to cause discharges of pollutants," including dirt, debris, sewage sludge, rock and sand, into Waiopili Stream and other nearby waterways.

"The fact that HDF is publicly saying one thing while violating the law by undertaking construction activities is a sign that this company is willing to do anything to try and get its way, and that is certainly not the way to proceed in Kauai," Tebbutt said.

Tebbutt is representing the nonprofit group Friends of Mahaulepu in its fight to stop HDF, a company backed by eBay Founder Pierre Omidyar's Ulupono Initiative. The suit also names Mahaulepu Farm among the illegal "dischargers."

Amy Hennessey, HDF's spokeswoman, has said the only activity taking place on the site is the growing and mowing of grass for pasture and the installation of water quality monitoring wells and fencing. All pasture cultivation activities, including the installation of an irrigation system, are authorized under the Natural Resources Conservation Service Conservation Plan and are not subject to National Pollutant Discharge Elimination System requirements because they are for agricultural purposes, she said.

"We believe this suit is without merit and a regrettable waste of the community's resources," Hennessey said in a prepared statement. "It is unfortunate that Friends of Mahaulepu group is using litigation instead of conversation to address its concerns about Hawaii Dairy Farms' planned pasture-based dairy."

HDF filed an application for a stormwater permit in September 2014, but did not complete the permit process after the company decided to first conduct a voluntarily Environmental Impact Statement prior to construction, Hennessey said.

The application lapsed due to inactivity, she said. HDF has filed a new application to restart the process.

"While Hawaii Dairy Farms does have its building permits from the County of Kauai, we are demonstrating good faith by not moving forward with construction until after the completion of the EIS," Hennessey said.





"As the first pasture-based dairy in the state, Hawaii Dairy Farms has encountered new, unique situations in the regulatory process. This uncharted path has led Hawaii Dairy Farms to work closely with the federal, state and county governments to ensure adherence to all regulatory standards."

The lawsuit comes 60 days after FOM filed a notice of intent to sue the defendants for launching preliminary site construction projects without a stormwater National Pollutant Discharge Elimination System permit.

Bridget Hammerquist, president of FOM, said the group is committed to protecting the Mahaulepu area from pollutants.

"FOM is supportive of safe agriculture that does not risk the public's health or threaten the environment, but this proposal not only threatens the Mahaulepu area, but is operating in disregard for the law already," she said in a prepared statement. "The harm and further degradation of one of Kauai's most revered locations must be stopped."

The lawsuit states that HDF's preliminary construction work, including grading and excavating, is a likely source of the pollution ending up in Waiopili Stream, which flows off Grove Farm land and enters the ocean near Makauwahi Cave Reserve and downhill from the proposed dairy site.

Recent testing has shown it is Kauai's most polluted stream — of several that continuously fail to meet state water quality standards.

Bacteria tests conducted by Surfrider Foundation's Kauai Chapter found that pollution levels in the stream are 275 times higher than the bacteria limits set by the government, according to data released by the ocean protection group. Test results from nearby waters where the stream meets the sea are nearly 17 times greater than state and federal limits, the data shows.

Surfrider and FOM mailed a petition last month to the Department of Health and its Environmental Health Administration calling for the stream to be listed as an impaired waterway under the Federal Water Pollution Control Act. They also requested public health warning signage.

"FOM has previously offered to sit down with HDF to discuss the foolishness of the proposal to put 2,000 head of cattle in the Mahaulepu Valley," Tebbutt said.

FOM is not the only entity that has taken legal aim at HDF.

Kawailoa Development, LLP, owner of the nearby Grand Hyatt Kauai Resort and Spa and the Poipu Bay Golf Course, filed suit against HDF in 5th Circuit Court last July, claiming its business, recreational, environmental and aesthetic interests would be adversely affected should the dairy move into the neighborhood.

In light of public concern surrounding the project, HDF agreed in November to move forward with a voluntary Environmental Impact Statement — one demand of Kawailoa's complaint.

Hennessey said HDF's consultants are working on the draft EIS statement and plan to share the document for public comment this summer.

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# EXHIBIT 3

Hawai'i Dairy Farms

MAHA'ULEPU, KAUA'I

*Grass farmers with a passion for dairy.*

August 14, 2015

Ms. Jiaping Fouse
Engineering Section, Clean Water Branch
State of Hawai'i Department of Health
PO Box 3378
Honolulu, HI 96801-3378

Dear Ms. Fouse:

Hawai'i Dairy Farms (HDF) wishes to clarify its responses to the comments provided on our NOI Application (e-Permitting Submission #: 26C-DWXA-VBZ8) via a letter received from the State of Hawai'i Department of Health (DOH), Clean Water Branch (CWB), on July 16, 2015:

1. ***Please provide the Owner's street address information. CWB does not accept a P.O. Box as the Owner's street address.***

   The address of the owner has been included in our NOI application.

2. ***Clarify if any land disturbance associated with this project has commenced, including but not limited to preliminary site construction, such as installation of fence and irrigation system etc. that is mentioned in the following report: http://thegardenisland.com/news/local/hdf-faces-lawsuit/article 603afbae-150d-5463-a27a-ffb6bb7fd575.html***

   Land disturbance associated with this project as listed in the NOI has not commenced, including but not limited to, preliminary site construction such as installation of fencing and irrigation systems.

   While HDF has in good faith temporarily postponed construction activities while a voluntary Environmental Impact Statement (EIS) is being conducted, HDF reserves the right to proceed with preliminary agricultural-related site construction activities that are allowed without an NPDES permit so long as it is covered under a National Resource Conservation Service (NRCS)-reviewed Conservation Plan, which the project currently has in place. This includes and is not limited to the installation of irrigation and pivot systems and fencing.

   As such, HDF has prepared plans to begin installing fencing. As the fence posts are put into place using a ram and not through excavating and grading, an NPDES permit for this particular activity is not required. Gate posts, which will require excavation, will not be installed at this time until the NOI is approved and an NPDES General Permit for Construction Activities is granted to cover these improvements.



3. ***Clarify if any activities in the NOI have already commenced.***

   One particular activity indicated in the NOI had been partially completed but has been halted since the beginning of 2014. Some drinking water trough facilities, along with the accompanying water piping, were installed. HDF installed these facilities, following consultation with DOH in early 2014, on NPDES permitting requirements. Notes from that meeting indicated that the watering facilities, intended for agricultural and livestock consumption only, did not require NPDES permitting and would be covered under HDF's Conservation Plan, reviewed by NRCS. Some troughs and pipes were subsequently installed and the trenches were backfilled and the areas stabilized.

   DOH has since clarified that the watering facilities should be covered under the NPDES General Permit. The remaining troughs to be installed have been listed in this NOI application.

4. ***Clarify if the county grading permit exemption ~~Figure 10~~ [now Figure 11A] applies to all activities provided in the NOI.***

   The county grading permit exemption applies to all the activities provided in the NOI; the NRCS-reviewed and West Kaua'i Soil and Water Conservation District-approved Conservation Plan on which the exemption is based covers in general terms all those activities.

5. ***The Storm Water Pollution Prevention Plan (SWPPP) does not meet the requirements in Hawaii Administrative Rules (HAR), Chapter 11-55, Appendix C (NPDES General Permit for Construction Storm Water). Please revise your SWPPP by ensuring all of the required information from Section 7 of HAR, Chapter 11-55, Appendix C, is included. Please submit the revised SWPPP.***

   ***The following information is missing in your SWPPP as required by Section 7 of Appendix C.***

   a. ***The intended sequence and estimated dates of construction activities information as required by Section 7.2.5.***

      The general contractor, when selected, will amend or update this section of the SWPPP as required with specific dates prior to the start of construction. The following sequence and estimated dates of general construction phases or activities are estimated:

      1. Notice to Proceed — 6/1/2016
      2. Mobilization and Installation of Stormwater Controls — 6/2/2016
      3. Clearing, grubbing, grading, and site preparation and construction
         a. Duration = 6 months — 6/15/2016
      4. Temporary Stabilization of Required Areas — As Needed
      5. Final Stabilization — 1/1/2017
      6. Removal of Temporary Stormwater Controls — 6/1/2017
      7. Removal of Construction Equipment and Vehicles — 6/1/2017

   b. ***A map or drawing showing the approximate slopes before and after major grading activities and drainage patterns as required by Section 7.2.6.1.***
      Figures depicting pre-construction, during construction, and post-construction topography for the dairy facility are included. Approximate slopes are added to the figures.

Figures depicting pre-construction topography for the extents of the entire farm are also included. Construction of the roadways, raceways, fencing, irrigation systems, water infrastructure and watering troughs, will not significantly impact the existing topography. Construction plans will be provided to include the farm improvements beyond the extent of the facility at a later date when completed, and will provide further detail.

Additionally, the NOI application does not cover grading and excavation within pasture, field, and crop areas, as these activities are exempt from NPDES permitting requirements in conjunction with an NRCS-reviewed Conservation Plan and if the improvement is for the purpose of growing crops.

The project will not be phased. However, construction will commence first on the dairy facility while the overall farm improvements will follow.

c. ***A map or drawing showing the locations of the project site's construction entrance/exit(s), areas used for storage and for disposal of wash water as required by Section 7.2.6.1.***

Figures 6A and 6B have been revised to show the project site's construction entrance/exit and area used for storage and for disposal of wash water as required.

d. ***Locations of any contaminated soil or contaminated soil stockpiles as required by Section 7 .2.6.1.***

No contaminated soils or soil stockpiles have been identified on the project site at this time. No contaminated soils are anticipated at this time.

e. ***Locations of any crossings of state waters as required by Section 7.2.6.1.***

Crossings of Maha'ulepu Ditch are indicated on Figure 6B. Crossings will be constructed per applicable NRCS conservation practice standards.

f. ***Locations of all potential pollutant-generating activities identified in Section 7.2.7.***

Locations of potential pollutant-generating activities will be determined by the general contractor, once selected. Tentative locations of specific activities that may generate pollutants, from both stormwater and non-stormwater sources, are identified on Figures 5 and 6, A and B. These activities thus far include:

1. Soil erosion from disturbed areas **[from activities identified on Figures 5 and 6]**
2. Soil erosion from soil stockpiles **[from activities identified on Figures 5 and 6]**
3. Storage of construction debris, green waste, and general litter **[primarily at facility]**
4. Application of fertilizers **[primarily on farm areas disturbed and to be planted]**
5. Application of pesticides **[primarily on farm areas disturbed and to be planted]**
6. Application of paints, solvents, etc. **[primarily at facility]**
7. Operation and Maintenance of equipment such as oils, fuel, and hydraulic fluid **[offsite]**
8. Asphalt paving operations **[primarily at facility]**
9. Concrete operations **[primarily at facility]**
10. Storage and/or disposal of hazardous materials/waste **[primarily at facility]**
11. Storage of metals **[primarily at facility]**



12. Application of dust control water **[primarily at facility]**
13. Application of concrete truck water **[primarily at facility]**
14. Application of construction exit wash waters **[primarily at entry to farm on Figure 6]**

g. ***In your SWPPP Item No.2.5, you identified the project site non-storm water sources. Please see the bullet list below. However, Section 7.2.8 requires you to provide information on the design, installation, maintenance, and location(s) of the control measures to prevent discharges of your identified non-storm water. Please provide this information.***

- *Discharges from emergency fire-fighting activities;*
- *Landscape irrigation;*
- *Water used to wash vehicles and equipment;*
- *Water used to control dust;*
- *Potable water including uncontaminated water line flushings;*
- *Routine external building wash down;*
- *Pavement wash waters;*
- *Uncontaminated air conditioning or compressor condensate;*
- *Uncontaminated, non-turbid discharges of ground water or spring water;*
- *Foundation or footing drains; and*
- *Construction dewatering water.*

Discharges from the following non-stormwater sources and the information on design, installation, maintenance, and, if applicable, tentative location(s), of the best management practices (BMPs) used to control and prevent discharges of potential pollution are described in Section 5 of the SWPPP.

Additional design and installation of the BMPs are further described below:

| | |
|---|---|
| *Discharges from emergency fire-fighting activities;* | While unlikely to be present at the site, contain liquid waste from emergency firefighting activities (should the need arise) and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Landscape irrigation;* | Landscape irrigation will be minimized and controlled to prevent excess watering and excess water runoff. Sophisticated irrigation controllers and the installed pivot system are designed to apply irrigation at levels to prevent erosion and runoff of water and pollutants. Shut off water to broken water lines or valves to prevent excess flow, and pump or bail water from trenches excavated to repair water lines. |

| | |
|---|---|
| *Water used to wash vehicles and equipment;* | Generally, vehicular wash down will occur offsite. Equipment will be washed and runoff from the wash down area will be controlled using a sediment trap or basin. Soaps must be phosphate free and biodegradable. Cleaning of equipment with soaps should not occur on site unless wastes are fully contained.<br><br>If a vehicle must be cleaned on site, locate the wash area away from watercourses and utilize a wash area that is paved and bermed, collect the wash water, and dispose of properly and not to a watercourse. Use only when necessary. Use as little water as possible and discharge wash racks to sanitary sewer. |
| *Water used to control dust;* | Dust control waters will be applied at rates that prevent excess watering and excess water runoff. |
| *Potable water including uncontaminated water line flushings;* | Flushings of water lines will not be disposed of directly into storm drains, open ditches, or streams. Re-use for irrigation where feasible. |
| *Routine external building wash down;* | External building wash down water will not be disposed of directly into storm drains, open ditches, or streams prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Pavement wash waters;* | Minimize waste material by collecting waste by dry methods. Pavement wash water shall be disposed of in designated facilities, located a minimum of 50 feet away from watercourses. Locate washout areas into a temporary pit or bermed area. Dispose of concrete in a designated area and allow concrete to set, so it can be broken up and disposed. Line the washout facility. |
| *Uncontaminated air conditioning or compressor condensate;* | Contain liquid waste and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |



| | |
|---|---|
| *Uncontaminated, non-turbid discharges of ground water or spring water;* | Contain liquid waste and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Foundation or footing drains; and* | Contain liquid waste and do not allow liquid to flow into the drainage system or watercourse prior to treatment. Utilize a holding pit or sediment basin. Capture liquid waste using temporary dikes or berms, and direct to a sediment trap. Dispose of liquid waste through dewatering or through a sedimentation basin. |
| *Construction dewatering water.* | Waters may be run through a sediment trap or dewatering filter before discharge. The discharge point shall be protected from erosion from the discharge of dewatering effluent. |

***h. Please provide the pollution prevention procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where spills and leaks etc. occur as required by Section 7.2.11.1.***

Spills will be cleaned up immediately or as soon as reasonably-able depending on the type of spill (if the spill is hazardous or significant such that it cannot be controlled by personnel in the immediate vicinity). Notification and reporting will be as follows:

1. Minor Spills (such as small quantities of oil, gasoline, paint, etc.)
   a. Contain the spread of the spill
   b. Recover the spilled materials using absorbent materials
   c. Clean the contaminated area and properly dispose of contaminated materials

2. Semi-Significant Spills
   a. Contain the spread of the spill
   b. Notify the project foreman immediately
   c. If the spill occurs on paved or impervious area, clean up using "dry" methods such as absorbent materials. Contain the spill by encircling it with absorbent materials.
   d. If the spill occurs on dirt areas, contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soils.
   e. If the spill occurs during rain, cover the spill with tarps to prevent contaminating runoff.

3. Significant / Hazardous Spills
   a. Notify the local emergency response (Dial 911). Report significant spills to the fire department.

b. Contractor to notify the proper County of Kaua'i officials, including but not limited to the public works department and building department. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
c. Notify the State of Hawai'i, Department of Health, Hazard Evaluation and Emergency Response (HEER) Office for spills of State reportable quantities:
   i. A listed substance designated under Hawai'i Administrative Rules (HAR) section 11-451-5(b), in quantities equal to or exceeding the reportable quantity criteria in section 11-451-6(b) in any 24-hour period; or
   ii. An unlisted substance designated under section 11-451-5(c), in quantities equal to or exceeding the reportable quantity criteria in section 11-451-6(c) in any 24-hour period.
d. Notify the National Response Center at (800) 424-8802 for spills of Federal reportable quantities, in conformance with the requirements in 40 CFR Parts 110, 119, and 302.
e. Notification shall be made first by telephone, and followed up with a written report.
f. The services of a Hazmat team should be obtained immediately, and construction personnel should not attempt clean up until the appropriate and qualified personnel have arrived at the job site.

Please contact Ryan Char, PE, LEED AP, Group 70 International, if you have any questions, at rchar@group70int.com and 808-441-2174.

This letter is also made part of the online submission and resubmittal of our NOI Application (e-Permitting Submission #: 26C-DWXA-VBZ8) through the e-Permitting Portal website.

Sincerely,

Jim Garmatz
Farm Manager

# Hawai'i Dairy Farms
# Response to Comments Provided by
# the Friends of Māhā'ulepū

GROUP 70
INTERNATIONAL

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January 11, 2017

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**Subject**: Hawai'i Dairy Farms Final Environmental Impact Statement (EIS)
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comments on Draft EIS
On behalf of the Friends of Māhā'ulepū

Dear Mr. Tebbutt:

Thank you for your comment letter with twenty-seven appendices and additional enclosures dated July 25, 2016 regarding the Hawai'i Dairy Farms (HDF) Draft Environmental Impact Statement. The following responses are offered to your comments:

Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai'i Administrative Rules).

## 1. Introduction

Hawai'i Dairy Farms is committed to establishing a sustainable, pastoral rotational-grazing dairy farm to increase current local milk production, bolster Hawai'i's declining dairy industry, and reduce reliance on imported milk from the mainland United States. The HDF project objectives include protection and enhancement of the area's natural, cultural, social and economic environment through sound agricultural planning, reservation of open space and protection of sensitive resources, and development of economic benefit (EIS Section 2.3.3 *Project Objectives*).

Māhā'ulepū refers to a land division shaped by island geography following the natural boundaries of the watershed, known in Hawai'i as an ahupua'a. These land divisions were identified as areas that contained all the resources needed by a human community, from the ocean to the mountains. The approximate size of the Māhā'ulepū ahupua'a as documented in the State of Hawai'i geographic information system is 2,724 acres. Hawai'i Dairy Farms leases just 20 percent of that area: 557 acres on the valley floor.





Five archaeological studies have been conducted in the near vicinity of the project area with numerous others in surrounding areas. No cultural materials or burials have been identified within the project area (EIS Appendix G). This is further discussed under section 6f of this letter response "Archaeological and Historic Resources". The documented ancestral remains buried at Māhā'ulepū are approximately a half-mile from the HDF site in the coastal area.

Resolution 2001-25 referenced in your letter specifically states as its purpose: "that the Council of County of Kaua'i supports and is willing to participate in collaborative planning efforts to explore options for the preservation of Māhā'ulepū and to "sustain the experience of this place as an undeveloped area with compatible uses" (emphasis added). The reference to Māhā'ulepū in the resolution refers to the larger ahupua'a, from the peak of Mount Hā'upu to the coast. The ahupua'a includes taro lo'i, grazing areas, an active quarry, a commercial stable, Makauwahi Cave, and a homesite, which all exist on private lands with limited public access to coastal areas.

Section 4.4.1 of the EIS provides a broader view of the preservation process, which would require eminent domain to take privately owned land in order to create a public park:

> "The 2000 *Kaua'i General Plan* recommended . . . planning for the future of Māhā'ulepū to take into consideration various interests and factors to include: the long-term need to manage lands for preservation of significant natural and cultural features; the landowner's desire to develop revenue-producing uses that are sensitive to the area's unique qualities . . .". . . "Grove Farm Company, Inc., in response to a State resolution supporting future preservation of the Māhā'ulepū ahupua'a, testified for re-assertion of its rights to plan for its own lands and expressed concern that development of a park or public use of Māhā'ulepū would support a takings action for government ownership."

As further described in the FEIS (Section 6.2.1 *Non-Viable Alternatives*), conservation condemnation is not considered a viable alternative to the dairy project:

> ". . . condemnation, which can occur when a local, state or federal government seizes private property . . . for public use would be contrary to the stated policies of the State of Hawai'i and County of Kaua'i, which designates lands within the valley for long-term food production to sustain the people of Kaua'i."

Finally, to fully put the U.S. National Park Service (NPS) reconnaissance study into context, one must understand the purpose of the study, which was to determine whether a full NPS special resource study was warranted. The reconnaissance study did recommend authorization of a Special Resource Study included "*so long as it focuses on non-traditional management alternatives that a) involve local partners and b) include options for continued farm and ranch operations on private agricultural lands*" (emphasis added). As described in Section 2.2.2 of the EIS, the lands have been designated as Important Agricultural Lands, therefore use of the land as a dairy farm is entirely consistent with the reconnaissance study. Agricultural use of the site for dairy operations does not preclude future conservation use outside of farm and ranch operations on private agricultural lands (EIS Section 4.26.4 *Irreversible and Irretrievable Commitments of Resources*; and Section 5.13 *County of Kaua'i*).

**2. HDF Has Not Been Truthful . . . During the DEIS Process**

Friends of Māhāʻulepū (FOM) accuses HDF of having made all decisions prior to writing the Draft EIS, and simultaneously accuses HDF of refining information between the notice of EIS preparation (the "EIS Preparation Notice" or EISPN) and preparation of the Draft EIS. HDF initiated the EIS process at the earliest practicable time and worked with its technical service provider, knowledgeable in Natural Resources Conservation Service (NRCS) practices, and other consultants, to advance design in order to address relevant issues and questions for analyses in the EIS. HDF has conscientiously designed the dairy to minimize impacts to soil and water resources using best management practices.

In developing the EIS, HDF listened to public concerns, retained knowledgeable consultants to conduct technical analyses, refined data gathered from field trials on site, and further incorporated U.S. standards and best management practices to create a world-class design for the environmentally sound pasture-based, rotational-grazing dairy.

Technical terms were refined: The Draft EIS refined terms to more clearly communicate. The term "zero-discharge" was used in the EIS Preparation Notice to represent a system designed to utilize all nutrients created on site. As noted previously, the HDF system is designed to utilize 100 percent of the manure as nutrients to grow the primary food source for the herd – pasture grass. The analyses conducted by the groundwater engineer for the EIS quantified nutrients that could potentially leave the site. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients leaving the system.

Hawaiʻi Dairy Farms has used the terminology grass-fed to describe its farm because the primary source of feed for the dairy cows will be grass. Currently there are no plans to market the milk from the farm as grass-fed milk. In January 2016, the U.S. Department of Agriculture rescinded its rules on the labeling of grass-fed beef and dairy due to the ambiguity of the regulations for classification. In order to avoid confusion, Hawaiʻi Dairy Farms no longer uses the term grass-fed and has focused on the farm being pasture-based instead.

NRCS Conservation Plan: HDF developed a Conservation Plan for the project in conjunction with U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) personnel. The plan was jointly presented it to the West Kauaʻi Soil and Water Conservation District (WKSWCD ) for its approval. In a letter dated December 17, 2013, the WKSWCD "approved" the conservation plan.

The Proposed Herd Size: The potential maximum herd size has consistently been represented as the number of cows that reflects the carrying capacity of the land as guided by the results of the nutrient analysis (EISPN Section 2.3 *Proposed Action*; EIS Section 1.2 *Proposed Project*). HDF is keenly aware of the regulatory distinction between herd sizes and will fully comply with all laws, requirements and permit conditions. The distinction between the herd sizes and permit differences is explained in the EIS Section 2.4 *Planned Dairy Development on Māhāʻulepū Agricultural Lands*. During the public scoping meeting, participants expressed an interest in understanding impacts of the committed herd size of up to 699 mature dairy cows, and the EIS analyzes and presents impacts at both the committed and contemplated herd size. Hawaiʻi Administrative Rules (HAR) §11-200-7 explicitly states in part that a group of actions shall be treated as a single action when: . . . the actions in question are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole. Therefore, the probable impacts of the potential contemplated herd size are also analyzed and clearly identified in the Draft and Final EIS.





NPDES Permit: HDF met with DOH in March 2014 to determine construction activities that would require an NPDES permit, and was advised such a permit was needed for only construction of the dairy facilities themselves. Construction activities for the sole purpose of growing crops do not require an NPDES permit per HAR §11-55, Water Pollution Control, Appendix C.

Waste Management Plan: Your comments assume the WMP is part of the EIS process, but it is not. The Waste Management Plan is a technical document that is not part of the EIS or subject to public review and comment. The State of Hawaiʻi, Department of Health (DOH), Wastewater Branch reviewed HDF's 2014 Waste Management Plan (WMP) for an operation of 699 mature dairy cows in keeping with the *Guidelines for Livestock Management* (DOH, 2010). DOH Wastewater Branch completed its review, and HDF obtained building permits to construct the dairy facility. On-going technical studies and field trials to determine grass yields and forage data improved the nutrient mass balance analysis. While the pasture-based, rotational-grazing dairy system and its infrastructure are fundamentally the same, the field-tested data based on ground-level trials and studies improved the WMP. HDF prepared a summary of the changes between the 2014 WMP and the Draft EIS for Wastewater Branch to highlight the refinements. The modifications you mention are updates to the relevant nutrient information, which is included in the Nutrient Balance Analysis and incorporated in the EIS. On July 13, 2016, DOW Wastewater Branch acknowledged that its questions on the updates to the WMP had been addressed by HDF, and that WWB had no further comments at that time.

**3. The Proposed Dairy is Subject to the Hawaiʻi Environmental Policy Act**

HDF has prepared an Environmental Impact Statement consistent with Hawaiʻi Revised Statutes, Chapter 343 (HRS 343), and Hawaiʻi Administrative Rules Chapter 200 of Title 11 (HAR §11-200), to disclose the potential for environmental impacts for the planned dairy farm at the earliest practicable time. HDF has fulfilled all requirements related to process and content, and has met both the intent and spirit of Hawaiʻi's Environmental Impact Statements statute (HRS 343) and guiding rules.

HDF does not believe there is an applicable trigger for the dairy project, but has addressed the trigger on the OEQC publication form with the following statement:

> Hawaiʻi Dairy Farms' position is that no applicable HRS Section 343-5 trigger exists; some members of the public have challenged Hawaiʻi Dairy Farms' position, and have asserted that the use of State funds and approval of a wastewater treatment unit are applicable HRS Section 343-5 triggers.

The HDF project does not use State or county lands or State or county funds. The issuance of tax credits and other tax benefits – such as tax exemptions and deductions – are distinguishable from the use of actual State funds in that these tax benefits act as forbearances or reductions of tax liabilities rather than as direct payment to taxpayers. Thus, taxpayers who receive tax benefits – including tax credits pursuant to Section 235-110.93, Hawaiʻi Revised Statutes – do not receive State funds, but instead reduce the amount they would otherwise pay to the State.

The breadth and scope of potential tax credits and other tax benefits further confirms that treating tax credits as a trigger to require environmental assessments is inappropriate. If every tax credit triggered an environmental assessment, every resident claiming renewable energy (solar) tax credits would be forced to obtain an environmental assessment, as would investors seeking qualifying high technology business tax credits, producers seeking motion picture tax credits, and developers seeking low income housing tax credits. In addition, treatment of tax benefits as the "use of State of county funds" would potentially implicate tax-exempt organizations and homeowners claiming mortgage interest deductions. For these

reasons, the receipt of tax credits and other tax benefits are not the "use of State or county funds" requiring an environmental assessment.

The approval of a wastewater treatment unit is not an applicable trigger. The WWB was only called upon to review, not approve, the Waste Management Plan which describes the effluent ponds.

**4. Responses to Purpose and Need Statement**

The project's purpose and need are supported by the fact that between 1984 and 2015, importation of milk to Hawai'i rose from 0 to 90 percent (EIS Section 2.3.2 *Project Need*). The recent announcement by Hawai'i Governor Ige at the 2016 World Conservation Congress in Honolulu, referred to as "Double Local Food Production", emphasizes the State's focus to advance the agricultural self-sufficiency of Hawai'i. HDF can play a role in contributing to the Statewide projected benefit: replacing just 10 percent of imported food with locally produced food is estimated to generate a Hawai'i economy-wide impact of $188 million in indirect sales, $47 million in earnings, $6 million in state tax revenues, and more than 2,300 jobs (EIS Section 2.3.2).

HDF has adapted the "New Zealand" model – pastoral-based rotational grazing dairy – to U.S. standards and best management practices . NRCS provides extensive guidance for agricultural operations to meet stringent standards including those under the Clean Water Act. Nutrient management is a key tenet, and the protection of waterways has been applied to the design of HDF paddocks using fencing to create large setbacks from drainages. Setbacks at HDF are designed 35-feet from each bank – for a total of 70 feet – to exclude cows from waterways. The setbacks are vegetated to create filter strips to effectively trap soil particles and organic debris from entering stormwater runoff. Setbacks and buffers from public drinking water resources are also incorporated into the farm design (EIS Section 3.3.2 *Agricultural Infrastructure* and Appendix D *Nutrient Balance Analysis*).

HDF intends to sell raw milk to an offsite milk processor/packager, as described in Section 3.6 of the EIS. While it is likely the processor will ship the milk to O'ahu for processing and packaging, two options are described to utilize the now closed Meadow Gold facility in Puhi. Such decisions will be made by the processor once milk is available from HDF. An alternative for HDF to pasteurize raw milk on Kaua'i is evaluated in EIS Section 6.6.

For Hawai'i to re-establish its dairy industry, it will require the introduction of advanced dairy farming technologies, efficient operational processes, and monitoring to ensure environmental protection standards are upheld. While it may be ideal for Hawai'i Dairy Farms to have an on-island milk-processing partner, it is logistically, financially and technically difficult to start such a business in conjunction with developing the first pasture-based dairy farm in the State. The most feasible and sustainable plan is to process HDF's milk with an existing provider on O'ahu or Hawai'i Island. In the future, on-island processing may be a more feasible option. Section 6.6 of the EIS discusses the alternative of milk processing by HDF.

How HDF will attain the project Objective 8 (EIS Section 2.3.3 *Project Objectives*) to "Protect and enhance the area's natural, cultural, social and economic environment through sound agricultural planning, preservation of open space and protection of sensitive resources, and development of economic benefit" is explained thoroughly in the EIS. HDF stands by its analysis of impacts based on evaluations conducted by reputable, local technical consultants. HDF's consultants have reviewed the reports appended to, or referenced in, your letter and their responses are expressly incorporated by reference herein. After careful evaluation of all points raised by Friends of Māhā'ulepū, agencies, organizations and individuals, which are reproduced in Volumes 3 through 9 of the EIS, HDF is confident that the dairy design and operation will be protective of the environment and serve as a model for sustainable agriculture in the Islands.





**5. Response to Description of Action**

HDF has satisfied the EIS content requirement of HAR §11-200-17(E.): "The draft EIS shall contain a project description which shall include the following information, but need not supply extensive detail beyond that needed for evaluation and review of the environmental impact: . . ." In keeping with the spirit of the Hawai'i Environmental Policy Act, HDF provided project information to agencies and to the public at the earliest practicable time. As described previously under issue 2, HDF conducted on-site field trials and technical evaluations of various resource processes in the preparation of the EIS, and additional refinements are incorporated in the Final EIS. It is important to note that the EIS is a disclosure document, and that throughout the life of the project, there will be on-going technical guidance from resource agencies such as NRCS, as well as permit compliance reviews for applicable regulations.

**a. Conservation Practices**

The EIS documents setbacks from water features in Section 3.3.2 *Agricultural Infrastructure* and 3.5 *Pasture Management*. The distances between farm facilities and water features are depicted in Figure 3.3-5 *Effluent Pond Siting*, and exceed those stated in the DOH *Guidelines for Livestock Management* referenced in NRCS Practice Standard 313.

The statement "Historically, most of the site was a wetland" with reference to the "Erickson Comments", attached to your letter as Appendix 3, is incomplete and misleading. The full statement from Erickson reads:

"The Maha'alupu [*sic*] Valley has a fascinating history as an agricultural area of Kauai. The area was a large wetland complex that was drained to promote crop growth and controlled agricultural activity. Large drainage ditches were dug to the depth needed to drain both surface water and ground water from the valley. Leveling, tilling and planting have occurred throughout history."

The EIS documents the long agricultural history of the valley noting that it was the first place in the island chain where sugarcane was grown commercially beginning the 1830s. The extensive irrigation systems built to bring water to the leeward (drier) side of the island are evidence that sufficient water was not available for the sugarcane crop in the region. The well-researched compendium, *Sugar Water, Hawaii's Plantation Ditches*, by Carol Wilcox (1996), describes the "Marsh Reservoir" as developed in in the "marshlands outside of Koloa town" in 1906. This wetland was further developed and is now known as the Waita Reservoir.

Appendix E of the EIS documents the site's ground and surface water resources. The depth to groundwater within the alluvial layer is varied. The groundwater engineer for HDF reviewed the report prepared by Erickson, which is referenced in your letter. Responses by the groundwater engineer and other technical experts on the HDF team to the Erickson report are included in Appendices 2-A and 3-A of Volume 4 in the EIS, and state:

> The depth to groundwater in the alluvium which covers the HDF site has been measured several times at all four HDF monitoring wells.

Based on the measurements, the actual depths from ground level to the groundwater is as shown below. They are substantially greater than the incorrect statements by WET [Erickson report]:

Depth to Groundwater at
HDF Monitoring Wells

| HDF Well Number | Depth Typical Groundwater * (Feet) |
|---|---|
| 1 | 8 |
| 2 | 10 |
| 3 | 10 |
| 4 | 24 |

* It does vary with rainfall events

That the depth to groundwater across the site would not be the same from place to place is axiomatic. Depths to groundwater will not be the same across the site (T. Nance, pers. com.).

Your reference to the historic land-use model described in the *Archaeological Inventory Survey Report* (AIS; Appendix 6 of the EIS) as a source that the site is a wetland is incorrect and inaccurate. The model was developed by the archaeologists to predict the probability of finding archaeological sites in a given zone. It is illogical to cite the model as a source, and the citation you provide is incorrect as it selects only the information that fits your assertion.: Your comment assumes the effluent ponds fall within Zone III; however the AIS states "Māhāʻulepū Ahupuaʻa contains all five zones, with *the survey area primarily occurring in Zone IV to the base of Zone V*" (emphasis added: page 47, Appendix G, EIS Volume 2).

HDF will comply with all regulatory requirements for siting of the effluent storage ponds. The EIS specifies the regulatory requirements in Section 3.3.2.4 *Effluent Storage Ponds*, and Figure 3.3-5 displays the 3,420-foot distance between the ponds and the public drinking water resources, and the 125-foot distance to the nearest on-site drainage ditch. Further, while the ponds' distances from water resources exceed the State of Hawaiʻi Department of Health *Guidelines for Livestock Management*, HDF has elected to line the ponds to protect against seepage into surrounding soil; the liner will meet the standards of the NRCS Practice Code 313.

Refer to EIS Sections 3.2 *Conservation Practices* and Section 4.17, *Surface Water Resources and Nearshore Marine Environment* for specific practices to be employed during dairy establishment and operations. Table 3.2-1 of the EIS lists specific NRCS Conservation Practices by Code Number and Code Name. These references are readily accessible on the internet. As stated in Section 3.2 of the EIS: "Conservation planning is a process that recognizes the art and science of natural resource management will never be complete or finished. As conditions and knowledge of the resources change, the methods to achieve natural resource and agricultural goals may be modified. On-going dialogue and guidance based on observations in the field are anticipated throughout project implementation and establishment."

Section 4.17.4, *Probable Impacts and Mitigation Measures* of the EIS also identifies the Stormwater Pollution Prevention Plan (SWPPP) developed for the site. The SWPPP is required for the NPDES construction permit and has been reviewed by DOH. It documents controls and best management practices (BMPs) to avoid, control, and trap potential erosion associated with construction activities. EIS Section 4.17.4 specifies the BMPs to be employed:





"Both management controls and structural controls will be implemented in the short-term. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; prohibiting leaking or poorly-maintained construction equipment and machinery; and keeping adjacent public, paved streets free of dirt and mud. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets."

The final three paragraphs in the EIS Section 4.17.4 identify the surface and ocean water quality monitoring program that has been established to provide feedback to the dairy management team regarding any changes in water quality.

**b. Dairy Site Requirements and Layout**

The Land Use Summary provided in Table 3.3-1 and described in Section 3.3.1 is correct, stating that the developed area "footprint" would occupy less than two percent of the total farm area. We have corrected the error in the summary provided in Section 1.2.

The logistics of rotating cows in and out of the milking parlor are explained in Chapter 3 of the EIS, specifically Section 3.4 *Herd Management*, and Section 3.5 *Pasture Management*. Sentences explaining the movement of cows between pasture and the milking parlor are highlighted here:

Cows will be managed in social groups known as "mobs", mimicking the natural social order of bovines. . . Cows will spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks and walkways will minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the milking facility; surfaces of the walkways and cow races will be topped with crushed limestone to provide a comfortable path under hoof. . ."

To assist the reader in understanding the rotational timing, we have added the following sentence to the Final EIS at the end of the first paragraph in Section 3.4:

> Each mob will be rotated among 18 different paddocks over an 18-day period, leaving an even application of manure throughout the pastures. Grass in each paddock is given an 18-day rest and regrowth cycle before being grazed again.

The varying depth to groundwater is addressed under issue 5a.

**c. Herd Size, Herd Management and Offsite Herd Management**

All impacts described in the EIS are for both the committed and contemplated herd sizes, as noted in the preceding response to issue 2. Chapter 4, Sections 4.15 through Table 4.27-1, identifies qualitative and quantitative impacts from the two different herd sizes. As stated in the introduction to Chapter 4 of the EIS:

"Sections 4.1 – 4.14 present resource conditions and probable impacts that will not differ between the herd sizes. Impacts that may change with dairy operations at different herd sizes begin with Section 4.15, Demographic and Economic Conditions. Probable impacts and mitigation from the committed herd size of up to 699 mature dairy cows are presented in Sections 4.15 through 4.20. Probable impacts and mitigation for the contemplated expansion of the herd potentially up to 2,000 mature dairy cows are presented in Sections 4.21 through 4.26."

A side-by-side comparison of the varying impacts is contained in Table 4.27-1.

Nutrients versus Waste: The comments related to the nutrient loading and waste from dairy cows illustrates a lack of acknowledgement that the pasture-based dairy system fundamentally differs from the poorly-managed conventional feedlot dairy that FOM continually espouses to be the future of HDF. Regulators at the State and national level recognize the value of manure as a source of natural fertilizer, as well as the ability of manure to increase organic matter in soils and improve carbon sequestration (EIS Section 4.3.2 *Long-Term Impacts and Mitigation – Soils*). HDF will employ management practices specifically designed to minimize environmental risk while utilizing 100 percent of manure on-site. HDF will cycle manure and wash water captured from the milking parlor and holding yard through aerated effluent ponds back to the fields as fertilizer. No manure storage or stacking will occur; the nutrient demands of the grass crop will be greater than that provided by the available manure and will, in fact, require additional commercial fertilizer to meet crop demand (EIS Appendix D, *Nutrient Balance Analysis*).

The statement "human waste, however, which must be treated" fails to recognize the discussion in the EIS (Section 4.16.2 *Potable Water*) regarding wastewater "treatment" in the Kōloa-Poʻipū area. Soil is relied upon as the "treatment" for a majority of the human sewage produced in the area. There is no county wastewater treatment in the South Kauaʻi region; Poʻipū is one of several communities on the island that rely on private wastewater systems and on-site disposal systems (OSDS). The larger private wastewater systems treat water which can be used for irrigation if it meets "R-1" County standards, with the remainder injected into the ground. OSDS include cesspools (essentially a hole in the ground that receives no treatment) and septic systems (which partially treat wastewater before sending it to a leach field to permeate the soil).

Approximately 120 injection wells discharge an estimated 1.4 MGD per day from private wastewater treatment systems in the area. An additional 1.6 MGD is estimated to be discharged from the 2,238 on-site disposal systems (OSDS) in the area, including 1,600 cesspools which put untreated waste into the ground (EIS Section 4.16.2 *Potable Water*).

The County of Kauaʻi uses an average daily standard to estimate current and future wastewater of 100 gallons per person per day (SSFM, 2016b). For the year 2035, with the projected increase in both residents and visitors to the South Kauaʻi region, the quantity of wastewater is projected to be more than double and to reach 2.58 million gallons per day (SSFM, 2016b).

For a comparison of wastewater production, the effluent ponds at HDF will capture approximately 19 gallons per cow per day. Of this quantity, manure will be just 1.36 gallons, with 17.4 gallons of potable water used to wash effluent from the milking parlor and holding yards to the effluent ponds (EIS Section 3.3.2.4). The HDF operation, then, produces 81 gallons less per day per capita of wastewater than the neighboring 100 gallons per day per capita. Further, the effluent is applied to the fields for uptake of nutrients by the grass crop. Table 3.3-2 in the EIS shows the total daily effluent input to the ponds for the 699 committed herd size is 13,226 gallons; for the possible contemplated herd size of up to 2,000 cows, the total daily effluent input to the ponds will be 37,985 gallons per day. The pastoral-grazing system proposed by HDF will use 100 percent of its effluent on site as fertilizer and to build organic matter within the soil and improve its structure (Section 4.3.2 of the EIS).

The weathered alluvium of Māhāʻulepū Valley shows a hydraulic conductivity on the order of 10.5 – 50 feet per day. This represents the rate of groundwater travel through soil. This is much slower than the rate typical of more permeable volcanic soils, such as those in Kōloa-Poʻipū (Section 4.3.1 of the EIS). Slower groundwater travel allows greater time for the remedial properties of soil and associated bacteria to denitrify nitrates and render potential contaminants inert.





Antibiotic Use: Unlike traditional confined dairy operations, HDF cows will be on pasture up to 22 hours a day, which enhances overall health of the animals and further reduces risk of illness and the need for antibiotics. There will be no use of sub-therapeutic, preventative, or growth promoting use of antibiotics, ionophores or hormones (such as rBST). Antibiotics will only be used to treat individual animals with life threatening situations and only after prescribed by veterinarians following all guidelines of the Animal Medicinal Drug Use Clarification Act (AMDUCA). Furthermore, HDF will follow the best animal welfare protocols, including vaccination protocols for all age classes to further prevent bacterial infection and to minimize the use of antibiotics on HDF. Antibiotics are costly, lead to wasted milk and mean a cow is unhealthy, which is not beneficial to the animals or operations. HDF will limit the use of antibiotics as much as possible.

All vaccines, antibiotics, ionophores and hormone therapy will be prescribed via a veterinarian – client – patient – relationship (VCPR). The AMDUCA provides veterinarians acting within the VCPR to provide options so that cows and calves can receive the medications and hormones they need when they need them. Animal History, disease incidence, disease risk, local prevalence, product cost, Federal Drug Administration (FDA) approval and route of administration all will be part of HDF-specific veterinary protocols to ensure best animal welfare with the least amount of pharmaceuticals. All vaccination and treatment protocols will follow FDA and AMDCU guidelines.

HDF will follow all regulatory guidelines when handling and discarding milk, urine and manure that may contain trace residue from treated animals. HDF estimates less than 5 percent of the herd may be treated for, at most, 10 days out of the year.

BMPs to be implemented, including the 35 foot setbacks from drainage ways, will additionally reduce the risk of any waste runoff that may include possible product residues. Further, within the paddocks, populations of microorganisms stimulated by additions of effluent are superactive and very effective in inactivating pharmaceuticals and additives due to the reduced half-life resulting from enhanced immobilization and degradation by the microbiological community.

Animal Mortality: HDF has adequately planned its cemetery site and incorporated Best Management Practices required to protect water resources surrounding the HDF site. The anticipated animal mortality rate for HDF is typically less than 2 percent for productive cows, with higher rates in young and stillborn calves, for a total of less than 5 percent for the herd. The animal cemetery is specifically located on the uphill side of the farm, in an area of relatively flat pasture. Site selection criteria for the cemetery paddock included protection from prevailing winds, and distanced more than 100 feet away from any drainageway, 200 feet from any natural watercourse, 300 feet from any well, and more than 20 feet from any buildings. Within the cemetery paddock, pits will be sited based on soil suitability and slope. An area of approximately 5,000 square feet is needed for the animal cemetery at the contemplated herd size of up to 2,000 mature dairy cows, which is a fraction of a 3- to 5-acre paddock.

A containment berm will be created around the pit area to prevent both run-off on to, and from, the cemetery site. Six pits, approximately 20- by 40-feet overall and 8- to 10-feet deep, are designed to accommodate carcasses of up to 150 cows and 360 calves or stillborn animals at the contemplated herd size. Individual pits within the area will be a minimum of 2-feet wide with a length appropriate to bury the carcass. Pits will be lined in accordance with NRCS Conservation Practice Standard, Animal Mortality Facility Code 316, to protect groundwater quality. Each animal carcass will be dusted on all sides with ground limestone. The bottom of each pit will be also dusted. Pits can be reused every 18 to 24 months, which is the typical time for a carcass to decompose.

Pit bottoms will be level, and carcasses will be placed in a single layer and covered with at least 2 feet of organic material. Multiple layers may be created with subsequent burials, or additional area within the cemetery paddock may be used as needed. Based on preliminary analysis, HDF does not anticipate encountering groundwater in the cemetery paddock area when excavating the pits. The paddock area will not be grazed.

HDF may also consider procuring and installing an incinerator to use for managing mortality on the farm. The incinerator would meet the appropriate guidance from NRCS Conservation Practice Standard – Animal Mortality Code 316 as well as State and EPA emissions regulations, to ensure no adverse air quality impact from the incinerator operations.

Offsite Herd Management: Management of the calves and dry cows is discussed in EIS Sections 3.7 *Offsite Herd Management by Kaua'i Ranchers* and Section 3.8 *Contemplated Herd Size*. Section 4.26.2 *Potential Secondary Effects* notes that cattle ranching on Kaua'i spans generations, and ranchers are stewards of the lands. Healthy lands raise healthy beef cattle. Local ranchers are experienced in animal welfare, and can collaborate with HDF to care for dairy cows during annual rest cycles and to raise calves until old enough to join the dairy herd. The availability of calves from a dairy such as HDF provides new animals to maintain or expand a beef herd. Each ranch will determine its capacity based on business and operational goals.

Section 4.20.2 *Potential Secondary Effects* documents anticipated offsite transportation as at most one truck trip per day for herd management to transport cows between HDF and the offsite ranches. For the contemplated herd size, Section 4.26.2 *Potential Secondary Effects* (Contemplated Herd Size) identifies two truck trips daily to transport cows between HDF and the offsite ranches.

Feed and Forage: Supplemental feed will vary based on analysis of the grass crop content. Forage trials on site have yielded data used for planning, and on-going analysis of future grass crop yields will continue to inform the dynamic nutrient balance analysis. Grass crop yields are anticipated to rise and thereby reduce the 30 percent supplemental feed initially planned for (EIS Section 3.5.3 *Forage Productivity*). Grain provided will be a mix of oats, wheat midds and other materials that provide starch to complement the grass, and supplemental nutrients to aid cow health and milk production will be a part of the feed provided in the milking parlor. As described in EIS Section 3.3.2 *Agricultural Infrastructure*, grain will be stored in two cone silos, and will be lifted into the silos from a delivery pit via a grainleg and dispensed into troughs in the milking parlor. Per best practices, any spilled feed will be removed to minimize attraction to birds and insects, and a rodent control program will be implemented. Local feed options will be sought for on-going operations, but initially feed shipments will come from the U.S. mainland.

**d. Pasture Management**

HDF met with DOH in March 2014 to determine construction activities that would require an NPDES permit, and was advised such a permit was needed for only construction of the dairy facilities themselves. Construction activities for the sole purpose of growing crops do not require an NPDES permit per HAR §11-55, Water Pollution Control, Appendix C. See previous response in section 2, above.

Reduced Runoff: Stormwater runoff from the site overall will be reduced by the thick Kikuyu vegetative thatch to be cultivated in the pastures, as well as increased surface infiltration of rainfall and irrigation due to improved soils from the addition of organic matter in the form of manure. The surface water and hydrologic analyses conducted for the EIS indicate it would take 0.8 inches of rain to create runoff. Based on the 30-year rainfall record for the area, such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Observations by the groundwater engineer on a date in August of 2016, and those of the HDF onsite manager since his tenure at the farm since 2013, are in accord.





Estimated peak flow of stormwater runoff will be reduced with the improved conditions proposed for the site: 80 acres of maintained drainageways, vegetated setbacks, and permeable path and roadways. Calculations show reduction in runoff, estimated in Māhā'ulepū Ditch immediately south of the project site where flows combine. Peak flow leaving the project site will be reduced by 257 cubic feet per second (cfs) for the 10-year storm event; for the 25-year storm event, reduced by 283 cfs; and for the 50-year storm event, reduced by nearly 300 cfs (Section 3.3.2.3 *Drainage Improvements*).

Setbacks to be Established: As stated in the response 4.a above, HDF will follow the NRCS Practice Standards and applicable guidance including *Guidelines for Livestock Management* (DOH, 2010). To protect water quality of surface water and downstream areas, two types of setbacks will be established. A physical setback to exclude cows from waterways and drainages will be created with paddock fencing set 35 feet back from the top of bank of drainage ways on site. Vegetation within the setbacks will be managed or restored as a filter strip to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality. The other setbacks restrict liquid effluent application near water sources, and are explained in Section 3.5.4.2, Nutrient Balance. Section 3.5.1 *Paddocks, Fencing and Setbacks* has been revised in the Final EIS to clarify the types of setbacks.

Acreage of the dairy takes into account space used for cow race, roads, drainage ways and vegetated buffers; see Section 3.3 *Dairy Site Requirements and Layout*:

**Table 3.3-1 Land Use Summary**

| Land Use | Acres |
|---|---|
| **Facilities** | |
| Dairy Buildings, Yard, Sheds, Road, Ponds | 9.7 |
| **Subtotal** | **9.7** |
| **Pasture** | |
| Paddocks | 469.9 |
| Cow Races, Farm Roads, Drainage Ways & Setbacks / Vegetated Buffers | 77.2 |
| **Subtotal** | **547.1** |
| **Total** | **556.8** |

The 35-foot vegetated buffers will be irrigated using the non-potable irrigation water source at HDF without effluent. The vegetation will be maintained to protect water quality and reduce overgrowth to maintain flow capacities of the drainage ways. Plant matter removed from the buffers will not be allowed to enter the drainage ways.

Specially designed springs are used in key areas of fencing to allow the pivot wheels to roll the fencing to the ground when crossing. Any manure picked up by the pivot wheel will be retained in the 35-foot vegetated buffer area (FEIS Section 3.5.4.1 *Irrigation*). The pivot system is equipped with a drop hose valve composed of a composite material, with small, low-maintenance sensors that are resistant to salty weather conditions. Solids from effluent are retained in the settling pond, and are filtered out of the effluent used for irrigation. Solids are not anticipated to reach the nozzles.

The pivot system is designed to effectively utilize water to irrigate the crops. GPS technology allows for accurate placement of irrigation, turning the spray off where programmed to avoid water resources. The irrigation nozzles are sized to deliver a droplet large enough to ensure water gets to the ground without

evaporating or being blown away. The overhead pivot will not be operated when wind speeds exceed the system specifications.

Soils Analyses: Dr. Russell Yost, Professor and Soil Scientist in the Department of Tropical Plant and Soil Science and the College of Tropical Agriculture and Human Resources at the University of Hawai'i Mānoa for over 30 years, has done extensive work with tropical grasses such as kikuyu. Dr. Yost's response to Dr. Shaw's evaluation of HDF's Draft EIS attached to your letter, follows.

> The Ka'ena and Kalihi soil series are poorly drained as indicated, however, Dr. Shaw apparently does not have experience with Kikuyu grass which forms an exceedingly thick thatch that is certain to attenuate, if not completely block, surface runoff. Further, as discussed in the soils and agronomic analysis included as EIS Appendix C (page 18): The designation of "poorly drained" is not an indication of low or poor infiltration, which refers to the ability of water and effluents to enter the soil surface. Said another way, soil "drainage" refers to the movement of water within or through the soil profile rather than entry through the soil surface. Additionally, "poorly drained" soils often exhibit anaerobic conditions, which are important in both the presence and movement of nutrients that can affect soil environmental health, most importantly nitrogen and its various soluble forms nitrate, nitrite, and ammonium.
>
> Dr. Shaw's concluding points are speculative and reveal his lack of experience with this C-4 tropical grass. Grass yield and nutrient uptake are from continuous on-site farm trials and are supported by data, analysis and use of scientific literature to show that kikuyu grass productivity will be among the highest in the world. Other data from Hawai'i also with the highly productive C4 grasses document world class, high levels of productivity are realistic (Valencia-Gica et al. 2012 data from Hawai'i).
>
> The Mears (1992) study cited, regarding the carrying capacity of kikuyu pastures, is a botanical report of the species and does not consider a carrying capacity that is highly managed and controlled using the high frequency, rotational, grazing system proposed by HDF.
>
> Dr. Shaw's concern about effects of hoof compaction fails to consider the thick thatch that kikuyu grass develops which greatly improves infiltration of applied water and effluents. Additionally, concerns about compaction do not acknowledge the rotational-grazing method, whereby animals are rotated on selected, small paddocks. Rotational-grazing has been shown to increase grass quality, animal health and productivity. The hypothesized "hoof action" is more than negated by the selection of the kikuyu grass that forms a thick, cushioning, thatch that will both reduce or mitigate soil compaction while at the same time increasing surface infiltration of irrigation or rainfall.

Improved Soil Infiltration and Attenuation: To state that poorly drained soils pose a high risk for surface runoff of herbicides or pesticides is incorrect. Dr. Yost notes that Dr. Shaw "does not seem to recognize is that with addition of the high levels of irrigation water and liquid effluent the surface soil will be energized microbiologically (EIS, Section 4.11). Stimulated populations of microorganisms are very effective in inactivating pharmaceuticals and additives due to the reduced half-time resulting from enhanced immobilization and degradation by the superactive microbiological community."

The EIS acknowledges that: "Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Such control would only be used when needed by those qualified to apply chemicals, and in accordance with authorized procedures and regulatory labeling requirements." (Section 4.11.2 *Probable Impacts and Mitigation Measures – Invertebrate Species and Pest Insects*).





Additionally the EIS states: "Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. . . A licensed veterinarian may prescribe use of antibiotics approved by the Food and Drug Administration (FDA) for treatment of illnesses. . . Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with sub-therapeutic, preventative, or growth promoting use of antibiotics, ionophores or bovine growth hormone, referred to as rBST or rBGH."

HDF believes the grass yield rate of 16.3 tons of DM per acre per year and the nutrient uptake rates of 64 pounds of nitrogen removed per ton of DM and 11.4 lbs. of phosphorus removed per ton of DM, as shown in the Nutrient Balance Analysis of the DEIS, are reasonable and realistic rates based upon the work and analytics performed by Farms n' Forages, CVAS, and Atlantic Dairy Consulting. Other data from Hawai'i also with the highly productive C4 grasses document world class, indicate high levels of productivity are realistic (Valencia-Gica et al. 2012 data from Hawai'i). The yield rates and nutrient uptake/removal rates provided are in accordance with NRCS guidance and provide a realistic projection of the yield production and nutrient uptake for a planned dairy operation. It is consistent with the requirements and processes of the NRCS – Nutrient Management Code 590, Nutrient Monitoring.

HDF will follow the NRCS Conservation Practice Standard for Nutrient Management, referred to as Standard 590. The timing and application of nutrients will correspond as closely as practical with plant uptake, soil properties and weather conditions. Soil testing, manure testing, and forage testing will be utilized to update and inform the nutrient management process for HDF. Tests will be performed annually at a minimum, and more frequently as needed to assist with nutrient management on the farm (EIS Section 3.5.4.2 *Nutrient Balance*).

Pivot Diameter: The information in the EIS about the irrigation pivot system has been corrected to reflect rotation of approximately 1,200-foot radius. The irrigation water and effluent application calculations were conducted using the 1,200-foot radius and are correct.

**e. Offsite milk processing**

Section 6.6 of the EIS discusses the alternative of milk processing by HDF. While it may be ideal for Hawai'i Dairy Farms to have an on-island milk-processing partner, it is logistically, financially and technically difficult to start such a business in conjunction with developing the first pasture-based dairy farm in the State. The most feasible and sustainable plan is to process HDF's milk with an existing provider on O'ahu or Hawai'i Island. In the future, on-island processing may be a more feasible option.

**f. Projected Costs**

Commitment to development of the dairy includes construction costs, equipment expenditures, personnel costs and operational expenses. Planning, permitting, and administrative support expenses round out the 2013 Ulupono Initiative cost estimate. The HDF projected costs in the Draft EIS remain the same in the Final EIS.

**g. Implementation and Permit Schedule**

As explained previously in this letter response, HDF used field-tested data based on ground-level trials and studies to prepare the EIS, which also improved elements of the WMP. HDF prepared a summary of the changes between the 2014 WMP and the Draft EIS for Wastewater Branch to highlight the refinements. On July 13, 2016, DOH Wastewater Branch acknowledged that its questions on the updates to the WMP had been addressed by HDF, and that WWB had no further comments at that time.

Pursuant to NRCS guidance, an NRCS Conservation Plan is a confidential document. However, relevant elements of the conservation plan, such BMPs and protective measures including setbacks from waterways, are described in the EIS. Therefore, the Conservation Plan is not part of the DEIS.

The State Historic Preservation Division (SHPD) accepted the Archaeological Inventory Survey (AIS) on December 19, 2016. The letter notes that SHPD concurs with the significance assessments and mitigation recommendations in the AIS; both the letter and the AIS are included in Appendix G. No further work is recommended for 14 plantation-era sites (50-30-10-2251 through 2262) within the project area. For two sites found in an area outside the HDF site surveyed at the request of SHPD, the agency stated that the current proposed project will not affect these two sites, an agricultural heiau and petroglyph boulders (50-30-10-2250 and 3094), and no further mitigation is recommended for this project. Appendix G contains the letter from SHPD.

**6. Environmental Setting, Potential Impacts, and Mitigation Measures**

The Final EIS includes refinements where warranted based on additional research or comments from reviewers. Refinements to the text are marked in the EIS document, and responses to your comments – and those of the technical reviewers appended to your letter – are addressed in the following section. The Final EIS thoroughly discloses and considers all potential impacts from the proposed dairy project.

**a. Climate**

Two official sources of rainfall were used to characterize conditions at the HDF site. Table 4.1-1 in the EIS shows average monthly rainfall data for a period of nearly 70 years, at a weather station sited at 100 feet elevation monitored by McBryde Sugar from the early sugar plantation years until the station was discontinued in 1983 (Giambelluca et al., 2013). The rainfall data was used in the Rainfall Atlas of Hawai'i as monthly maps to allow analysis of year-to-year variations statewide over the period between 1920 and 2007 (Frasier 2012 in Giambelluca et al., 2013). The second rainfall data station at the HDF site is Māhā'ulepū 941.1 station, sited at 80 feet elevation and monitored from 1905 to present by Grove Farm. Data from this station is reported to the NOAA National Climatic Data Center, and was used to calculate sizing of the effluent ponds using rainfall data for the most recent 30-year period, from January 1984 through December 2013, when planning for HDF began.

The DEIS at Section 4.1 *Climate* presents general indicators of wind speed as averages and ranges, based on detailed data from a one-year period. This data is presented as a wind rose (Figure 4.1-1); the figure legend provides detail on the frequency and strength of winds. For the odor and air quality modeling, true meteorological data over an entire year period was utilized to evaluate impacts. The *Air Emissions and Odor Evaluation Technical Report* (Appendix I of EIS Volume 2) utilized one year (2014) of AERMET-ready meteorological data obtained for the project site.

A discussion of global climate change and potential effects on HDF has been added to Section 4.1, *Climate*. Hawai'i's total annual average rainfall has decreased over the last century (Chu, 1995, Chu and Chen 2005 in: SOEST, 2014). Rain gauge stations across Hawaii have recorded a 27 percent decrease in high intensity rain events, while the frequency of low intensity rain events has increased (Timm et al., 2001; Chu et al., 2010 in: SOEST, 2014). Rainfall has become less intense for the western islands (O'ahu and Kaua'i) over the last 60 years, but more intense for the island of Hawai'i.

Natural variability in rainfall patterns make future climate predictions challenging. Climate models adapted for Hawai'i's topography have projected future rainfall results, which are thought to be more reliable for the wet season than for the dry season. Dry leeward sides of Kaua'i (such as Po'ipū), O'ahu, Maui and





Hawai'i Island exhibit the strongest drying trends. A trend toward drier than normal conditions is estimated to affect all climatically dry regions of the Hawaiian Islands during both seasons (Timm et al., 2014). Further information can be found in the Final EIS Section 4.1 *Climate*. Additional irrigation may be required to sustain the grass crop with drier site conditions.

Sea level rise predictions also vary by location and under different scenarios. Based on the best available science, a range of sea-level rise of 1 foot by 2050 and 3 feet by 2100 is a reasonable, and possibly conservative, target for Kaua'i and other Hawaiian Islands (Sea Grant and COK, 2014). Sea level rise will not directly impact the HDF site, and is not further discussed in this EIS.

**b. Topography and Soils**

Dr. Russell Yost, Professor and Soil Scientist in the Department of Tropical Plant and Soil Science and the College of Tropical Agriculture and Human Resources at the University of Hawai'i Mānoa, prepared the soils and agronomy technical report attached to the EIS as Appendix C. For nearly 30 years, Dr. Yost has primarily conducted research in Hawai'i and other tropical environments in 15 countries including South America, Southeast and East Asia, and Africa. This research has been on acid, weathered soils of the tropics similar to that in Kaua'i.

Within the Hawaiian Islands, Dr. Yost has conducted research on Kaua'i, Moloka'i, Hawai'i Island, and O'ahu. His research has included two projects that directly include recycling of the nutrients in dairy manure and lagoon effluents – one with Pacific Dairy, O'ahu, and one with Island Dairy on the Island of Hawai'i. These studies included work with C4 tropical grasses such as kikuyu and are described in the Valencia-Gica publications cited in his report. The concept of manure and nutrient recycling has been a theme of his dairy project research. It is unclear from Dr. Shaw's *Curriculum Vitae* what work he has conducted in semi-tropical soils or with kikuyu grass. The following responses were prepared by Dr. Yost following his review of the comments provided by Dr. Shaw, which are referenced in your letter. The complete response by Dr. Yost is attached to this letter and included in the EIS in Volume 4, Appendix5-A.

The Ka'ena and Kalihi soil series are poorly drained as indicated, however, Dr. Shaw apparently does not have experience with Kikuyu grass which forms an exceedingly thick thatch that is certain to attenuate, if not completely block, surface runoff. Further, as discussed in the soils and agronomic analysis included as EIS Appendix C (page 18): The designation of "poorly drained" is not an indication of low or poor infiltration, which refers to the ability of water and effluents to enter the soil surface. Said another way, soil "drainage" refers to the movement of water within or through the soil profile rather than entry through the soil surface. Additionally, "poorly drained" soils often exhibit anaerobic conditions, which are important in both the presence and movement of nutrients that can affect soil environmental health, most importantly nitrogen and its various soluble forms nitrate, nitrite, and ammonium.

Dr. Shaw's concern about effects of hoof compaction fails to consider the thick thatch that kikuyu grass develops which greatly improves infiltration of applied water and effluents. Additionally, Dr. Shaw's concerns about compaction do not acknowledge the rotational grazing method, whereby animals are rotated on selected, small paddocks. Rotational grazing has been shown to increase grass quality, animal health and productivity. The hypothesized "hoof action" is more than negated by the selection of the kikuyu grass that forms a thick, cushioning, thatch that will both reduce or mitigate soil compaction while at the same time increasing surface infiltration of irrigation or rainfall.

Another aspect that Dr. Shaw does not seem to recognize is that with the addition of high levels of irrigation water and liquid effluent, the surface soil will be energized microbiologically (EIS, Section 4.11). Nutrients that remain at the surface will actually enhance nutrient recycling, and enable more vigorous grass growth.

Dr. Shaw also seems unaware of the drastic changes in the surface occurring with the extensive thatch that characterizes kikuyu pastures.

**c. Land Use and Agricultural Setting**

Section 4.20.4 of the EIS addresses long-term impacts, including irreversible and irretrievable impacts, repeated in the following paragraphs:

The construction of the dairy facilities will occupy less than 10 acres, totaling less than 2 percent of the 557-acre site. The site could be modified for other uses in the future. Soil conditions and fertility will be improved through the addition of manure as organic matter, resulting in better growing conditions for future agricultural endeavors.

An irretrievable commitment of private fiscal resources, labor, construction materials and energy will be expended to implement the dairy. There will be a permanent commitment of private funds and resources to plan, design, construct and operate the facilities.

Use of the site for dairy operations does not preclude future conservation use outside of farm and ranch operations on private agricultural lands, as determined by the U.S. National Park Service in its 2006 to 2007 reconnaissance study.

**d. Visual and Aesthetic Resources**

The roadside views along the Kōloa Bypass Road to Poʻipū provide vistas of the rural landscape that remains from Kōloa's agricultural roots. The HDF site will be visible only to those traveling the private access roads accessing the privately-owned agricultural lands surrounding the HDF site.

The accusation that "scenic views will be dramatically diminished by the infusion of cow manure" is ridiculous for all the reasons contained in this response.

**e. Natural Hazards**

A full response to the comments prepared by Erickson and attached to your letter as Appendix 3 can be found in the Final EIS, Appendix 3-A (Volume 4). Erickson references rainfall amounts that are extremely high and erroneous. Rainfall quantities cited by Erickson do not correspond to those recorded nearby by NOAA Māhāʻulepū 941.1 station rain gauge. For instance, Erickson cites rainfall on 12/02/2013 as 11.3 inches; the NOAA rainfall gauge recorded 4.47 inches. For 8/25/2014, Erickson reported rainfall of 16.1 inches, while the NOAA rainfall gauge recorded a multi-day total over a 3-day weekend as 0.45 inches. Clearly, the rainfall data Erickson used was flawed. Therefore, all of Erickson's conclusions are similarly flawed and incorrect. As shown in the EIS Section 4.1 *Climate*, the average monthly annual rainfall for the site is approximately 50 inches per month, as recorded over a nearly 80-year period (1904 – 1983).

See the previous response under "a. Climate" preceding regarding the two sets of rainfall data cited in the EIS and used in the *Nutrient Balance Analysis* (Appendix D) for dairy farm design. Additionally described in the preceding "Climate" response and in the EIS, climate change trends for Hawaiʻi are anticipated to be drier than normal conditions in all climatically dry regions of the Hawaiian Islands. The characterization of catastrophic run-off due to storm events is therefore overstated. Setbacks to protect surface water resources are explained elsewhere in this response. The thick thatch formed by Kikuyu grass grown as a primary forage crop will improve existing soil conditions, infiltration, and runoff retention. Irrigation with effluent will energize the surface soil microbiologically; stimulated populations of microorganisms are very





effective in inactivating additives due to the reduced half-time resulting from enhanced immobilization and degradation by the superactive microbiological community.

The comment questioning the decision not to evacuate the herd in the event of a natural disaster shows the commenter's lack of familiarity with conditions of an island state. Evacuation is not feasible, nor is it recommended by livestock extension services in the hurricane-prone U.S. South.

**f. Archaeological and Historic Resources**

As noted earlier in this response and as illustrated in Appendix G, SHPD accepted the Archaeological Inventory Survey (AIS) on December 19, 2016. The letter notes that SHPD concurs with the significance assessments and mitigation recommendations in the AIS; both the letter and the AIS are included in Appendix G. No further work is recommended for 14 plantation-era sites (50-30-10-2251 through 2262) within the project area. For two sites found in an area outside the HDF site surveyed at the request of SHPD, the agency stated that the current proposed project will not affect these two sites, an agricultural heiau and petroglyph boulders (50-30-10-2250 and 3094), and no further mitigation is recommended for this project.

Traditionally, Native Hawaiians would occasionally bury their ancestor's remains near or under their house sites. This occurred more frequently in later pre-Contact times but was not a wide spread practice. Native Hawaiians would also bury many of their ancestors (makaʻainana) near the coast, and there are numerous examples of such throughout the island chain. SCS understands these patterns. In Māhāʻulepū, the only potential house sites were associated with a cluster of LCA's along the eastern side of the valley. SCS performed specific testing in these locations to identify the presence/absence of cultural materials and burials. No cultural materials or burials were identified through extensive testing of subsurface content.

It is very unlikely that burials are present in the project area, given the project area location, land use through time, and the lack of findings during the archaeological survey. However, the State of Hawaii has rules which clearly address the inadvertent discovery of burials. HAR Title 13, Chapter 300 discusses Native Hawaiian burials as well as protocols when burials are encountered. Essentially, if remains are found and confirmed as human, all work in the area ceases and the SHPD is called to the site for further identification. The SHPD, in consultation with members of the Kauaʻi/Niʻihau Islands Burial Council, is tasked with making the determination to leave the burial in place or re-locate the burial. Neither the land owner nor the archaeologist determines the final disposition of the burial. The rules and procedures are very specific toward Native Hawaiian burials identified in Hawaiʻi and the applicant's representatives (SCS) are extremely familiar with these laws.

**g. Cultural Practices and Resources**

Based on the AIS and CIA technical reports, no significant cultural resources are located on the HDF site. During the AIS field work, no cultural materials were identified on the HDF site though extensive testing of subsurface content. SHPD determined in its December 19, 2016 letter that the current proposed project will not affect two pre-Contact sites found outside the HDF site, an agricultural heiau and petroglyph boulders (50-30-10-2250 and 3094). In its acceptance letter of the AIS, SHPD stated no further mitigation is recommended for the HDF project, though it recommends an archaeological inventory survey outside the HDF site in the vicinity of the identified sites prior to any future work in the area.

Access to adjacent properties will continue to be the responsibility of the land owner, Mahaulepu Farm, LLC. HDF has demonstrated through the EIS analyses that neighboring agricultural lands may experience odor periodically, and any down-gradient impacts to surface and groundwater will not impact native biota.

**h. Flora and Fauna**

The EIS fully considers the impact of a dairy on the area's flora and fauna. In addition to conducting a thoroughly appropriate site survey, the EIS evaluates possible down-gradient impacts including to critical habitat established by the U.S. Fish and Wildlife Service (USFWS) in the vicinity. The EIS states that there will be no impacts to the endangered native plant 'ohai (*Sesbania tomentosa*); the Final EIS further clarifies that the primary remaining natural population of 'ohai on Kaua'i is within Polihale State Park, with a single individual plant recently identified in a coastal area south-east of Polihale (USFWS, 2015). The plant is successfully cultivated from seed, and has been out-planted at appropriate sites throughout the state, including Makauwahi Cave Reserve (USFWS, 2010). So while the coastal area of Māhā'ulepū could provide appropriate habitat for this endangered plant, no naturally occurring population of the species is currently known to exist in the area. Regardless, activities of HDF will not impact the critical habitat established for this rare, native plant.

HDF is coordinating with the U.S. Fish and Wildlife Service and the State Department of Land and Natural Resources' Division of Forestry and Wildlife to employ management techniques so that farm operations will have no adverse impacts on any endangered species that may access the HDF site, especially Hawaiian waterbirds and nēnē. A Draft Endangered Species Awareness and Protection Plan (ESAPP) has been initiated in coordination with USFWS and DOFAW prior to dairy construction and operations, to ensure that dairy operations would not result in deleterious impacts to protected wildlife. The ESAPP will be completed through further discussion with the agencies; the current draft is appended to the Final EIS in Volume 2, Appendix L. The EIS identifies multiple design measures and best practices for the express purpose of protecting water resources (Section 3.5.1 *Paddocks, Fencing and Setbacks*; Section 4.17 *Surface Water Resources and Nearshore Marine Environment*). These protective measures include physical setbacks of 35-feet to keep cows and manure from ditches and drainageways; maintaining vegetation within those setbacks as filter strips on both sides of the drainageways will capture and retain nutrients for the growth of forage on site. It is important to recognize the food supply of the wholly saprophagic arthropods is organic matter derived from roots and other decaying plant debris. Nitrogenous and phosphoric nutrients will promote plant growth, so the impacts of nutrients - if any at all - can be expected to expand the food supply in the oligotrophic subterranean ecosystem.

As explained throughout this response to FOM's comments, no adverse impacts are anticipated down gradient of the HDF site. Additional responses to various technical reports appended to your letter are included as Appendices D-D and E-E in Volume 4 of the Final EIS.

Language in the Final EIS has been refined to acknowledge the protective measures HDF will take to ensure proposed activities do not result in deleterious impacts to endangered species in the vicinity. While there are almost no suitable roost trees within the dairy site, HDF will not disturb, remove or trim woody plants greater than 15 feet tall during the Hawaiian hoary bat pupping season. No effect to bats is expected from activities and operations of the dairy farm. The overflight of seabirds that could become disoriented by lights is an island-wide issue. Dark-sky compliant fixtures will be installed at HDF facilities and used in conjunction with best practices including no night construction, and all outdoor fixtures properly installed to meet dark sky requirements. See EIS Section 4.10.2 *Probable Impacts and Mitigation Measures – Fauna*.

**i. Invertebrate Species and Pest Insects**

EIS Section 4.11, *Invertebrate Species and Pest Insects* identifies minimization measures that will be established to reduce attraction from pest and predator species, and specifically list not leaving food for cattle exposed under the good housekeeping items. Feed will be stored in above-ground silos and properly managed; the accusation of decomposing, moldy or fermenting feed has no basis.





EIS Section 4.10 *Fauna*, documents elements of the predator control program, the terms of which are included in the Draft Endangered Species Awareness and Protection Plan being prepared in coordination with USFWS and DOFAW. The accusation that rotation of cows off- and on-site creates a risk for introduction of pests ignores that ranchers throughout the state and on Kaua'i share an interest in maintaining animal health and are enterprises that follow common sense and regulatory guidelines to prevent such introductions.

An Integrated Pest Management Plan is a composite of complementary parts. It is not rational to pull out individual components, suggest failure of one at a time, and then conclude that the whole system will fail. IPM works because each component reduces a part of the problem. They work together, with one unit working to pick up when or where another is not present. Chemical controls affect both beneficial and non-beneficial insects and will be used judiciously. Use of any chemicals will be conducted by a trained applicator, and all labeling requirements will be followed. The rotational, pasture-based model to be utilized by HDF disperses manure for rapid integration into grass and soils.

The following responses were provided by the HDF invertebrate expert, Dr. Steven L. Montgomery. Dr Montgomery has 48 years of field experience in Hawai'i environments from mountaintops to lava tubes, and he has conducted numerous biological surveys on all islands. Dr. Montgomery has discovered 30+ Hawaiian insects and rediscovered 'lost' species of insects, snails, and plants. He served 8 years as a Natural Area Reserve System Commissioner, four years as a Land Use Commissioner, and as a board member on several conservation citizen groups. It should be notes that the comments from Pacific Analytics are based on theoretical information, rather than an on-site evaluation. Dr. Montgomery conducted fieldwork on site and on adjacent property. Ms. Manning conducted archival research with resources at Bishop Museum, University of Hawai'i, and other repositories with applicable collections. The full response by Dr. Montgomery to the report by Pacific Analytics and contained in Appendix C of your letter, can be found in Appendix C-C.

It is important to note that not all nonnative species are considered invasive, only those that cause environmental or economic harm, or harm to human health or native. Dung beetles do not fall into these categories, and with few exceptions were purposefully introduced to benefit public health and the livestock industry by reducing manure-related pests. So while dung beetles are non-native, they are NOT invasive. No scholarly discussion of invasive species in Hawai'i mentions dung beetles. The beetles reduce manure related pests, and do not prey on or adversely affect any native species of plant or animal. They are not the only control, but part of an integrated system of multiple methods of control. They do not compete with or attack any native species.

Dung beetles are winter dormant in locations where the temperate drops dramatically in winter. Hawaii does not experience that level of temperature change in winter and the dormancy is NOT triggered. A review of collecting dates and scholarly publications that show the activity levels of dung beetles in locations such as Louisiana and Florida show year round activity. Practical ground truthing in Hawai'i: in February 2011, Dr. Montgomery and his team assisted with a week of filming in the fields of Hawai'i Island's Kohala Cloverleaf Dairy, where active dung beetles were seen.

The comments fail to acknowledge the field work documented as EIS Appendix B, which documents the adjacent cattle operation that moves beef cattle within that property and has a healthy, functioning population of dung beetles in the same soil types as the proposed dairy. Further, the dung does not need to be entirely consumed or buried, but tunneled, dried and variously disrupted as an intact, moist breeding site for the pest species. The beetles are one part of Integrated Pest Management, as are the other actors mentioned, such as birds scratching apart the pats and eating the pest larvae.

The range a fly can travel is also not the range a fly will travel. More realistic than any theoretical calculations of fly expansion is modern experience in the Islands. Parker Ranch has been upwind of the Mauna Kea Beach Hotel and two other coastal Kohala Resorts sited from Puakō to Waikoloa since they were built decades ago, and the lack of dung fly complaints arising from Parker Ranch is solid evidence that cattle flies overwhelmingly remain close to livestock habitats. EIS Appendix B entitled *Cattle Manure-related Insect Species and Biological Controls for the Hawaii Dairy Farms* describes the field work conducted for the study which observed that flies on manure did not come to baited insect traps or to food scraps left in the immediate vicinity, thus demonstrating manure as the preferred ecological niche (Montgomery, 2016).

**j. Noise and Light**

Dairy operations will generate noise in keeping with agricultural zoning of the parcel, whether the HDF site or a ranch off-site. Noise from dairy operations will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

The Final EIS clarifies there will be no night-time construction. HDF is coordinating with the U.S. Fish and Wildlife Service and the State of Hawai'i Division of Forestry and Wildlife on appropriate minimization and management actions to ensure dairy operations will not result in deleterious impacts to protected wildlife. All lighting on site will utilize 100 percent cutoff, fully shielded luminaires mounted high enough to be directed perpendicular to the ground. Any need for night-time lighting at HDF will not create off-site impacts.

**k. Public Services**

The environmental studies for HDF indicate no noticeable noise, dust, odors, flies, runoff or other nuisance impacts will extend to resort, commercial, residential or recreational areas. The economic analysis conducted by HDF's Hawai'i-based consultant has concluded there will be no adverse economic impacts due to nuisance issues from the dairy.

The EIS notes that despite the changing character of the Po'ipū area towards a resort town, Māhā'ulepū has a long history of agricultural use, as one of the first places in the island chain where sugarcane was commercially grown. In 2011, the State of Hawai'i Land Use Commission designated 1,533 acres of land (including 557 acres that make up the Hawai'i Dairy Farms project area) as "Important Agricultural Lands" under HRS Chapter 205 – Hawai'i's land use law. Per HRS Chapter 205, both State and County governments are responsible for promoting the long-term viability of agricultural use of conserved/protected Important Agricultural Lands. This designation is intended to increase the viability of agriculture through the expansion of the agriculture industry, increase job opportunities, and increase in food security for current and future generations.

**l. Demographic and Economic Conditions**

The economic analysis conducted by HDF's Hawai'i-based consultant has concluded there will be no adverse economic impacts due to nuisance issues from the dairy. Primary economic benefits include increased milk self-sufficiency, well-paying farm jobs, and preservation of the sites as a well-maintained green, open space. Additionally, the review of property values adjacent to beef cattle operations in the region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of $1,297,150 for a lot, to $2,893,100 for a lot with home. The conclusion is that clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. The ranching and rural ambience adds to the value.





The discussion of the Kaua'i economy in the EIS is focused on the island and the regional setting near the HDF site. Po'ipū is identified in the EIS as one of two major tourist and luxury home destinations on the island, with the largest inventory of hotel rooms, transient vacation rentals, and luxury vacation homes on the island (Section 4.15.1 *Existing Conditions – Demographic and Economic Conditions*). One of the HDF project objectives is to "Provide local farming employment and build the agricultural economy" (EIS Section 2.3 *Purpose and Need*), which supports a diversified economy that serves to benefit the community, while advancing food self-sufficiency for both the residents and visitors.

The statements of Kilpatrick, referred to in your letter, are based on research conducted on impacts from poorly managed mainland conventional feedlot dairy operations. Conventional dairies concentrate their milking cows in feed lots where the cows are fed grains, hay and/or silage. Correspondingly, a large volume of manure is generated in a small area, leading to waste management challenges. These types of operations can generate significant odors and other nuisances, which can extend beyond the property boundaries and affect nearby properties. The sustainable, pastoral rotational-grazing dairy farm proposed by HDF will utilize 100 percent of the manure as nutrients to grow the majority of the herd's feedstock on-site - pasture grass. The environmental studies for HDF indicate no noticeable noise, dust, odors, flies, runoff or other nuisance impacts will extend to resort, commercial, residential or recreational areas.

The full response to the comments by Kilpatrick is included as Appendix 4-A, and in Volume 4 of the FEIS.

**m. Groundwater Resources**

The comments of David J. Erickson attached to your letter contain numerous errors and mis-statements. Overall, very few details, facts, or scientific basis are provided to Erickson's assertion that contamination of groundwater and surface waters will occur, and simply assumes such contamination to be a complete fact. To the contrary, the groundwater analyses contained in the EIS was conducted by HDF's consulting groundwater engineer, who has more than 50 years of experience in water quality research and water resource engineering in Hawai'i. He is considered one of the foremost experts in the field. The EIS summarizes the accompanying technical report by Tom Nance Water Resource Engineering (TNWRE) in Appendix E, which describes the four studies that demonstrate that there is complete hydrologic separation of the shallow groundwater in valley's alluvial material from the confined groundwater in the underlying volcanics. Groundwater confined within the underlying volcanics is the source of drinking water.

EIS Figure 4.16-1 *Geology of Māhā'ulepū and Vicinity* displays the volcanic geological history of the area. Māhā'ulepū Valley has a unique geology from the surrounding Kōloa-Po'ipū area. Rather than the permeable karst lavas of the Kōloa volcanic series to the west, the Māhā'ulepū Valley floor is filled with alluvial material which generally extends about 60 feet under the surface. This material is highly weathered lava composed of dark brown to black silty clay and clayey silt. Research by the groundwater engineer on wells drilled in the early 1900s identified records of sticky red, brown, and purple clay layers from 75- to 300-foot depth on the HDF site. These layers are essentially impermeable and function as an aquiclude to separate shallow groundwater in the alluvium from the groundwater confined within the underlying volcanics.

Comments from Erickson are based on incorrect analyses regarding site conditions. His conclusions on ground water depth are false, as discussed earlier in this response. The rainfall amounts on which he relies for his comments are extremely high and unrealistic. Erickson characterizes the data as being from "an on-site rain gauge," referring to one installed by HDF in 2013 ("AgHub"). However, rain data presented in his report is not supported by NOAA and does not represent properly interpreted and converted Ag Hub data. HDF used rainfall from a NOAA rain gauge, also on site, at which rainfall has been monitored from 1905 to the present. Erickson's conclusion and statement regarding high daily rainfall amounts having occurred over a nearly two-year period as meeting or exceeding the rainfall expected of a 25-year 24-hour event, is incorrect. Therefore, the subsequent conclusions drawn by Erickson are likewise incorrect.

The *Nutrient Balance Analysis* (Appendix D, EIS Volume 2) based the general irrigation need on annual rainfall data verified by two reputable sources: the NOAA Māhāʻulepū 941.1 station, and the Rainfall Atlas of Hawaiʻi. The latter utilized data from a station sited at 100 feet elevation that was monitored from the early sugar plantation years until its use was discontinued in 1983. Per management practices, no effluent application will occur two day prior, during, and two days after of a significant rain event (EIS Section 4.17.4). Soils will not be saturated on a regular basis with irrigation as effluent as charged by Erickson. HDF will not irrigate in excess of the agronomic need of the crop. Further, runoff will be attenuated by the thick kikuyu thatch created by the establishment of "good" pasture conditions as indicated above.

Finally, it is clear that Erickson chose to ignore data in Appendix E of the EIS that demonstrate hydrologic separation of the two groundwater bodies. Data presented in Figures 20 and 21 of Appendix E show no response in the HDF-4 monitor well in response to pumping the Kauaʻi County Department of Water (DOW) "Well F" at 1,200 gallons per minute (GPM). HDF-4 is significantly closer to DOW's Well F (630 feet) than is HDF-2 to the Well 14 Battery (1,300 feet). The pumping rate of DOW's Well F at 1,200 GPM is also substantially greater than the 825 GPM pumping rate of the Well 14 Battery. If a hydrologic connection between the two groundwater bodies actually existed, it would be far more likely to have been demonstrated in HDF-4 in response to the pumping of DOW's Well F.

Appendix 3-A attached to this letter and contained in Volume 4 of the Final EIS contain a full discussion of the inaccuracies of Erickson's report.

**n. Surface Water Resources and Nearshore Marine Environment**

Your comments regarding soils and compaction are addressed previously in this response under "d. Pasture Management." In fact, improvements to infiltration and drainage will be a beneficial result of the pastoral rotational-grazing dairy; the calculated reduction in stormwater runoff over the long-term from the site is also shown in the preceding response regarding Pasture Management.

The Final EIS clearly states that HAR §11-54 does not classify for protection any flowing inland waters within the Māhāʻulepū Watershed, thus the waters fall into Class 2. The State policy to protect Class 2 waters for recreational use and for the protection and propagation of fish and wildlife includes ". . .waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class" (emphasis added). HDF maintains that the technical analyses conducted for the EIS adequately discloses potential impacts to waters. Setbacks, timing and placement of nutrients, the increased capacity for the effluent ponds and additional safeguards have all been designed into HDF operations as protection for the site and surrounding lands and waters.

HDF acknowledges the photos submitted by you and others showing people walking near and wading the stream. The EIS states what is contained in the Sanitary Survey by DOH Clean Water Branch: ". . . that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of





water. . ." The accompanying photos in the Sanitary Survey show the ditch in the vicinity of, and above, the bridge. Photos provided by commenters to the DEIS show people on the beach, as well as people crossing the channel on foot nearest the beach at a point also utilized by a commercial horse-back riding operation during its twice-daily trail rides. The stream itself is not utilized for recreational purposes; the beach is.

The response to the change in technical terms between the EISPN and the Draft EIS is provided under "2" at the beginning of this response. The best practices, established by NRCS and the State DOH to protect water resources from livestock operations, are incorporated into the pasture design and explained throughout this response and the EIS. The statement that EIS failed to account for irrigation water that will not be fully absorbed is based on the incorrect analyses by Erickson (see previous response).

To address the comments to the Draft EIS, HDF engaged MRCI to survey the marine biotic community structure and provide baseline documentation of existing conditions. The typical weather and sea conditions in the area are characterized as a high energy environment due to frequent tradewinds and long-period ocean swell, which rapidly mix the water column. This translates to rough water conditions considered dangerous for human recreation and during periods of exceptionally calm wind and waves. The survey was conducted during such a period in November 2016, to allow for safety as well as for visibility within the water.

The open coastal exposure to long-period south swells and tradewind-generated seas are reflected in the survey findings. There is essentially no biotic community structure in the areas where the ditch water flow meets the ocean. A semi-embayment created seaward of a submerged basaltic shelf is bounded by distinct shallow dikes that focus wave energy. Within the central area of this semi-embayment are expansive sand flats. Biotopes – areas of uniform environmental conditions that provide a living place for a specific assemblage of plants and animals - were documented and described for the Māhāʻulepū area in a marine biotic assessment report and included in the Final EIS in Appendix F-1 (Volume 2).

The hardy pioneering coral *Pocillopora meandrina* occurs throughout the nearshore zone with a hard bottom. Areas with a hard bottom and sheltered from wave effects had a 10- to 20-percent cover consisting of additional common coral species (*Porites lobata* and *P. compressa*, and *Montipora patula* and *M. capitate*). A well-established coral community was identified in a small area sheltered from destructive waves by a protective lava extrusion approximately 0.3 miles south of the ditch terminus. The corals within this area are composed of the most common components of most Hawaiian reefs. Due to the distance from the discharge point (approximately 2,000 feet, or 0.3 mile), nutrient or biological inputs from the ditch would be diluted to background marine levels and create no impact.

Further, MRCI addresses the effect of elevated nutrients on corals in its report, included in *A Baseline Assessment of Marine Biotic Community Structure off Mahaulepu, Kauai, Hawaii* (Appendix F-1, Volume 2 of the EIS). MRCI reviewed published scientific research related to potential effect of nutrient subsidies on reef corals. MRCI notes Kinsey (1991) observed that it is incorrect to jump from the observation that coral reefs do well under low nutrient conditions to the conclusion that coral reefs require low nutrient environments. Atkinson and Falter (2003) state that "It is widely believed that any nutrient input to coral reefs is deleterious. This conclusion . . . is simply incorrect." Experiments at Waikīkī Aquarium and at the Great Barrier Reef in Australia show corals flourish in high nutrient environments. Empirical example that demonstrates the inaccuracy of the assumption that elevated nutrients always result in negative effects to corals is the coral colonization on the sewage discharge diffusers at outfalls on Oʻahu. The outfalls are located in a mixed marine environment similar to that off Māhāʻulepū.

Given the low-level and infrequent inputs of nutrients to the marine environment from HDF, the project will not contribute to global marine acidification. Plankton or benthic algal blooms are also often associated with nutrients. The Great Barrier Reef experiment showed nutrient enrichment is not a sole or major cause of shifts in algal abundance. Benthic algal blooms on Maui that occurred during the 1990's have not returned for the last decade, indicating that nutrient input is not the sole causal factor (Dollar and Andrews 1997).

**o. Roadways and Traffic**

HDF accounts for the additional vehicular trips that will result from long-term operations at the dairy in EIS sections 4.18.2 and 4.24.2. Both the types and number of vehicular trips are identified, to and from HDF, along county and state roads in the area for both the committed herd size of 699 mature dairy cows, and the contemplated herd size of up to 2,000 mature dairy cows. Vehicles include milk trucks, initially one truck every two days at the committed herd size and increasing to two per day at the contemplated herd size; delivery trucks for sand and feed initially three truck loads per week, increasing to four to five per week at the larger contemplated herd size. A farm truck with stock trailer to move animals to and from off-site ranches is initially anticipated at less than one per day, increasing to two daily trips with the contemplated herd size. Employees, veterinarians, inspectors, and vendors are also included in the daily trip counts.

At the committed herd size of 699 cows, 12 vehicle trips per day would result from HDF operations over the long-term. A summary of all regional traffic with projections to 2035 is shown in Table 4.18-1 of the EIS; HDF trips would increase projected traffic by less than one-twentieth of one percent (0.17 percent). For HDF operations at the contemplated herd size of up to 2,000 mature dairy cows, additional vehicular trips are projected at 11 more per day than at the committed herd size. The projected trips totaling 23 vehicles per day would include employees and delivery vehicles, and represents an increase in the regional traffic of less than one-third of one percent (approximately 0.30 percent).

**p. Air Quality, Odor, and Greenhouse Gases**

To address claims that HDF would emit quantities of ammonia and hydrogen sulfide that require reporting under the Emergency Planning and Community Right-to-Know Act (EPCRA), HDF re-engaged its air quality expert to look specifically at potential emissions. The EPCRA rule is designed to help emergency responders be aware of hazardous chemicals in an area, and applies to farm emissions of ammonia and hydrogen sulfide even though they originate from natural processes associated with animal digestion and manure decomposition.

The EPA requires emissions reporting if the dairy has 700 or more mature dairy cows and ammonia or hydrogen sulfide exceed 100 pounds per day. The rule (40 CFRI.355 2008) further states that animals residing primarily outside of an enclosed structure and graze on pasture are not counted towards the reportable quantity, unless the waste is consolidated into a storage unit. Therefore, HDF at the committed herd size is not required to report, and for the contemplated herd size, only emissions from the buildings including the milking parlor and calf sheds, and manure transferred to the effluent ponds, would be counted towards the reporting threshold.

The potential quantities of ammonia and hydrogen sulfide from the contemplated herd size of up to 2,000 mature dairy cows were calculated. Additionally, emissions from effluent applied from the ponds to the fields were also calculated. The total ammonia emission was estimated at 87 pounds per day, and hydrogen sulfide emissions are estimated at 9 pounds per day. Neither quantity reaches the required reporting





threshold of 100 pounds per day established under EPCRA. These findings are included in the Final EIS in Section 4.13.2 *Probable Impacts and Mitigation Measures – Hazardous Substances*.

In response to the EIS, Exponent prepared an odor report for Goodsill Anderson Quinn & Stifel LLP on behalf of Kawailoa Development LLP, contained in comments to the EIS and reproduced in Volume 5 as Appendix B. The Exponent report assumed both irrigation and slurry would be applied simultaneously, which is incorrect. In addition, the threshold of odor detection used by Exponent was inappropriate. Exponent concurred with the emission methods and results presented by Arcadis that quantify odor from the effluent ponds and the dairy facility buildings. The air emission components of the Arcadis May 2016 report were not commented on by Exponent.

HDF considered other comments provided by Exponent to the odor modeling contained in the Draft EIS. Based on Exponent's report, HDF's odor consultant, Arcadis, refined the odor model to depict different irrigation dilutions depending on field conditions, and adapted manure odor data used by Exponent. The revised model for HDF is contained in Volume 2, Appendix I of the EIS. The Arcadis response to the Exponent odor report is Appendix B-B of Volume 5. Results of the revised odor report show that any odor, which may be detectable by 50 percent of the sensitive population just 44 hours of each year under the worst case scenario of no winds, remains on adjacent agricultural lands and does not extend to resort, commercial, residential or recreational areas. The Final EIS contains updated maps depicting the modeled extent of odor.

**7. Response to Consistency with Government Plans and Policies**

Chapter 5 of the EIS is dedicated to describing the HDF compatibility with land use plans and policies. The Final EIS includes refinements to the tables in Chapter 5, which are marked to note any changes made.

**8. The Alternatives Analysis**

The No Action Alternative in the Final EIS is described as continuing use for animal grazing, as it was prior to the HDF lease. The site was utilized for beef cattle grazing when HDF was awarded the lease. Also within the valley is a tenant growing taro and utilizes a herd of approximately 80 sheep to control existing grasses and shrubs outside of the taro lo'i to maintain the site through grazing.

The beef cattle herd size prior to the HDF lease was below the potential stocking rate of two to four animals per acre, and the No Action alternative allows for that probable level of use.

As an alternative to the No Action alternative, the EIS included an Agricultural Park and Processing Center (EIS Section 6.2.2). This alternative is described as it was previously pursued by the landowner, with the result that Haraguchi Taro Farm was established on the site. Potential impacts are described, but the alternative is not advanced for further evaluation as it does not meet the purpose and need of the proposed action.

The process undertaken to consider steps to reverse the declining dairy industry in Hawai'i included Ulupono Initiative, with Finistere Ventures, Grove Farm, Kamehameha Schools, and Maui Land & Pineapple. The group collaborated to conduct grass trials on four islands to identify lands capable of producing nutritious forage for dairy cows. Additional operational needs for a pasture-based dairy were identified. Only two sites, both on the island of Kaua'i and both owned by Grove Farm, met most of the site requirements related to forage and operational needs.

In response to comments on the Draft EIS, Ulupono Initiative again searched for agriculturally-zoned land with potential long-term availability that may have become available in the past few years. Approximately 1,300 acres of Mahaulepu Farm property on Kaua'i in the Māhā'ulepū area were recently vacated by Pioneer Seed Company. These fields are closer to resorts and residences, and do not provide further benefit to the project or community than the HDF site evaluated in this EIS. Alexander & Baldwin announced in January 2016 that Maui lands in sugarcane will be transitioned to diversified agriculture in the future. However, water rights and access for diversified agriculture must be settled through a forthcoming process, and water availability is currently unknown. Thus, Ulupono Initiative, which conducted the research, is unaware of any new property meeting the requirements for a pasture-based dairy that has become available since its initial evaluation.

Under HRS 343, an action is defined as "any program or project to be initiated by any agency or applicant." Preparation of environmental disclosure documents are based on the action proposed. There is no requirement to explore any and all uses of a parcel for any and all purposes. The project purpose and need are defined in Section 2.3: The HDF project purpose is to establish a sustainable, pastoral rotational-grazing dairy farm that will increase current local milk production, bolster Hawai'i's declining dairy industry, and reduce reliance on imported milk from the mainland United States.

**9. Agencies and Parties Consulted**

Prior to undertaking the EIS process, HDF had engaged technical guidance from DOH, the Hawai'i State Department of Agriculture, NRCS, the local West Kaua'i Soil and Water Conservation District, the County of Kaua'i and various community groups. While an agricultural project on agricultural lands implemented and operated with private funds does not require environmental disclosure, HDF responded to community concerns by agreeing to prepare an EIS. This EIS was prepared in accordance with HAR §11-200, implementing HRS 343. The EIS Preparation Notice was published in January 2015, to notify members of the public that an EIS would be prepared for the project.

During the 30-day consultation period for the EIS Preparation Notice, HDF held a public scoping meeting in Kōloa that was open to all. More than 115 people attended, representing the local agricultural community, special interest groups, resort and timeshare properties, and individuals. The purpose of the scoping meeting was to identify issues of concern to be considered and addressed in the EIS. Representatives from HDF and its consultant firm recorded issues and questions posed by the meeting attendees. HDF provided comment sheets so that individuals could submit written comments at that time or could return the sheet by the response deadline. Following publication of a Draft EIS by the Office of Environmental Quality Control in the Environmental Notice issue of June 8, 2016, the requisite 45-day public review period ensued. All comments received were responded to prior to the publication of the Draft EIS on June 8, 2016.

HDF has conscientiously designed the dairy to minimize impacts to soil and water resources using best management practices. The rotational-grazing dairy system utilizes 100 percent of all manure on-site as natural fertilizer to grow grass. This cost-effective method reduces imported fertilizer and feed, and minimizes potential impacts to the environment. HDF reflects a viable approach to apply use of Important Agricultural Lands to agricultural self-sufficiency and food production. HDF represents a continued commitment by the landowner to support farming and local food production, and to aid in the resurrection of Hawai'i's dairy industry.





Your comment, along with this response, will become part of the public record and will be published in the Final EIS. A copy of the Final EIS is included on a compact disc with this letter. When published, the Final EIS will be available on the OEQC website which you can access using the following URL, and search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAI.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai'i Dairy Farms
Hawai'i State Department of Health,
Environmental Planning Office

# 2-A

## GEOLOGY/HYDROLOGY/GROUNDWATER RESPONSES

**Memo**
**To: HDF Team**
**From: Tom Nance Water Resource Engineering**

September 26, 2016

Response to Comments in
**"Comments on Hawaii Dairy Farms Draft Environmental Impact Statement"**
by Charles T. Blay

The comments by Dr. Blay lack any quantitative specifics, but his description of the Koloa volcanics as being porous and permeable and among the reasons that make HDF a "high risk endeavor" is very misleading and needs correction. The entire HDF site lies on the poorly permeable alluvium which covers the floor of Mahaulepu Valley. Water infiltration occurring on the HDF site will go into the underlying groundwater in the alluvium. Latter stage volcanics, referred to as the Koloa series volcanics, were erupted from three puu's located to the southwest of the HDF site. How these volcanics are interfingered with and/or displaced the previously deposited alluvium in the area makai of the HDF site is not known. Groundwater in the alluvium beneath the HDF site will continually move in the makai direction to ultimate discharge into the marine environment. In this movement, the groundwater will move from the alluvium into the intervening Koloa volcanics before its discharge into the marine environment.

The moderately to poorly permeable Koloa lavas are more permeable than the alluvium beneath the HDF site. This means that the groundwater movement through the Koloa volcanics will be somewhat faster than the groundwater's movement through the alluvium. This will otherwise be of no consequence to the groundwater ultimately discharging into the marine environment. However, Dr. Blay's characterization of the Koloa volcanics as porous and permeable, thereby making the dairy farm at Mahaulepu a "high risk endeavor" is simply not correct. The permeability of the Koloa volcanics is more accurately characterized as moderate to poorly permeable. Its permeability coefficient is typically one to two orders of magnitude less than the older Waimea volcanics. That is why all of the successful moderate to high capacity supply wells in the near vicinity of Mahaulepu tap into the older, Waimea volcanics. None draw from the moderate to poorly permeable Koloa volcanics.



September 26, 2016

Responses to Comments in
**"Comments on Hawaii Dairy Farm's Draft Environmental Impact Statement"**
by Water and Environmental Technologies (WET)

1. WET Repeatedly and Incorrectly States the Depth to Groundwater is 2 to 4 Feet Across the HDF Site.

The depth to groundwater in the alluvium which covers the HDF site has been measured several times at all four HDF monitoring wells. To my knowledge it has not been measured at any other location. Based on these measurements, the actual depths from ground level to the groundwater below are as tabulated below. They are substantially greater than the incorrect statements by WET:

| HDF Well Number | Depth Typical Groundwater * (Feet) |
|---|---|
| 1 | 8 |
| 2 | 10 |
| 3 | 10 |
| 4 | 24 |

* It does vary with rainfall events

What these actual depths mean is that on a seasonal basis, groundwater in the alluvium is likely to discharge into the main, mauka-to-makai drainageways at the upper end of the HDF site but is not likely to occur at the lower end of the site. This is how it is described in Appendix E of the DEIS.

2. WET Comments on the Hydrologic Separation of Groundwater in the Alluvium from Groundwater in the Volcanics at Depth.

WET cites Figures 19 and 24 in Appendix E of the DEIS as indicating that a response occurred in the groundwater in the alluvium as a result of pumping one of the Well 14 Battery wells which tap groundwater in the volcanics at depth below the alluvium (page 10 of the WET comments). Figure 19 in Appendix E is a graphic representation of the recorded water level in the HDF-2 monitoring well before, during, and following the pumping of one of the Well 14 Battery wells. The HDF-2 well is 1300 feet away from the Well 14 Battery. Its recorded water level does show changes in water level trends, but they are definitely not in response to pumping the Well 14 Battery. There is a slight downward trend in the HDF-2 level starting about two hours and 10 minutes after pumping the Well 14 Battery was initiated, far too long a delay to be in response to that pumping. There is also a

leveling off of that trend, starting 15 minutes prior to the end of pumping, also obviously not a change prompted by the subsequent end of pumping.

That the recording of HDF-2 did not respond to pumping Well 14 is also shown conclusively in the recording of the HDF-1 monitor well (Figure 18 in Appendix E of the DEIS), the results of which were ignored by WET. This well is just 190 feet from the pumped Well 14 Battery well. Due to its proximity relative to the 1300-foot distance of HDF-2, HDF-1 would have a far greater response to the pumping from the Well 14 Battery, if such a response actually occurred. There was a response to pumping, but it was a build up due to disposal of water on the compressible alluvium. If there is actually a hydrologic connection between the two groundwater bodies, a drawdown due to pumping would have been superimposed on the build up due to disposal. No such drawdown occurred. Instead, the trend of water level in HDF-1, other than for the build up due to disposal, is essentially the same as in the more distant HDF-2 well.

Also cited by the WET as showing a connection between the two groundwater bodies, Figure 24 is a graphic representation of the recorded water level in the abandoned pump sump of the original Well 14 Battery. The ponded water in the sump is about three (3) feet deep at the center, with the balance of the 60-foot deep pump sump being filled with mud in the 88 years since it was abandoned. The recording does show a varying water level during and for several days following the pumping of the Well 14 Battery well, but the variations are definitely not in response to this pumping. The first change in the sump level occurs three hours after the start of pumping, an implausibly long delay for a response due to an essentially adjacent pumping well. Other changes occurred long after the pumping creased, also with no causal link to the end of pumping. As accurately described in Appendix E of the DEIS, the ponded water in the sump has no hydrologic connection to either groundwater in the alluvium (its level is significantly lower) or to groundwater in the volcanics at depth (its level is considerably higher).

To complete the response to the erroneous WET comment on the hydrologic connection between the aquifers, it should be noted that WET chose to ignore other data in Appendix E of the DEIS which demonstrate the hydrologic separation of the two groundwater bodies. These include Figures 20 and 21 which show no response in the HDF-4 monitor well in response to pumping Kauai DOW's Well F at 1200 GPM. HDF-4 is significantly closer to DOW's Well F (630 feet) than is HDF-2 to the Well 14 Battery (1300 feet). The pumping rate of DOW's Well F at 1200 GPM is also substantially greater than the 825 GPM pumping rate of the Well 14 Battery. If a hydrologic connection between the two groundwater bodies actually existed, it would be far more likely to have been demonstrated in HDF-4 in response to the pumping of DOW's Well F.





SWMM Model Results

Although specifics of model parameters and calculation methods were not provided in the Exponent report, the following comments on the model results are appropriate. Using the results of the modeling of existing conditions (Figure 7 on page 18 of the Exponent report) applied over the Hawaii Dairy Farm (HDF) site's 557 acres, the SWMM model results described below unrealistically portray conditions at the dairy farm site at present and when the dairy farm is into production:

- Rainfall data used in the SWMM model was from a gage in Lihue, not Mahaulepu. The 1,102 million gallons (MG) per year of precipitation is equivalent to 72.86 inches per year over the HDF's site of 557 acres. Rain gage 941.1 is located at the makai end of the HDF site. The last time the annual rainfall was that high was in 1957, some 59 years ago. The modeled rainfall rate is unrealistically high.
- Surface runoff from the HDF site is depicted as 861 MG per year, some 2.4 times greater than runoff from offsite. The reality is a total of 1770 acres is tributary to the Waiopili Stream channel leaving the HDF site, 1213 acres of which are offsite and most of which is steeply sloping lands with far greater runoff potential than the relatively flat HDF site. Surface runoff from offsite is actually substantially greater than from onsite. The SWMM modeled surface runoff from the HDF site, amounting to 78 percent of the rainfall, is far higher than would ever occur.
- On page 15 of the Exponent report, it indicates that an annual grass reference evapotranspiration (ET) rate of 100.47 inches was used for the SWMM model, to which a crop factor for Guinea grass of 0.85 was applied, indicating that the annual plant ET would be about 85.4 inches. However, in the model results presented on Figure 7, ET is shown as 203 MG per year, equivalent to just 13.42 inches over the 557 acre HDF site. This is a completely unrealistic result. If ET was actually that low, there would be little or no vegetative growth occurring on the site.

The same unrealistic characterization is also apparent in the SWMM model of the HDF site under "project" conditions (Figure 8 on page 19 of the Exponent report). The most glaring of these is the input of rainfall at 1102 MG/year (72.86 inches/year) and irrigation at 1034 MG/year (68.37 inches/year). That total of 141.23 inches per year would have the site as a perpetual mud bog and the total is more than three times greater than the Kikuyu grass' ET. Obviously, there is no way the HDF project would apply

that much irrigation in an extremely wet year. This result is a completely unrealistic misrepresentation of how conditions will be when the HDF site is in operation.

Report's Comment 1: Appendix E of the DEIS employed flawed rainfall data

The period of daily rainfall of the Mahaulepu gage (No. 941.1) that was used for Appendix E of the DEIS is from January 1, 1984 through December 31, 2013, a period of 10,957 days. The available record is for 10,597 of these days, with 360 days of missing record. However, statistics of this available record closely match the Online Rainfall Atlas of Hawaii (2013) by Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delparte. Based on this, the available rainfall records of Station 941.1 were taken to be a reasonable representation of this site's actual rainfall.

Report's Comment 2: Appendix E of the DEIS failed to use a calibrated hydrology model to evaluate site hydrology.

It is true that Appendix E does not use a calibrated hydrology model because parameter values required for such modeling simply do not exist. For this situation, estimates of runoff and groundwater recharge in Appendix E relied on prior hydrologic budget analyses by the USGS throughout the state and on the sustainable yields adopted by the State CWRM which incorporate hydrologic budget analyses. These are considered to provide reasonable approximations of annual average conditions at the HDF site. It is of interest to note that the SWMM model done by Exponent was admittedly not calibrated and had a number of other limitations (page 16 of the Exponent report), all of which resulted in entirely unrealistic results.

Report's Comment 3: Appendix E of the DEIS incorrectly assumes that 15% of rainfall on flat areas and 30% of rainfall on steeper areas will end up as runoff.

The runoff assumptions in Appendix E are based on long term, average conditions and they are in accord with observations of the HDF onsite manager (Jim Garmatz) since his tenure at the farm since 2013. In contrast, the SWMM model results have 78% of total precipitation on the flat areas becoming runoff, are absurdly unrealistic result.

Report's Comment 4: Appendix E of the DEIS incorrectly assumes that runoff would occur only on days when rainfall exceeds 0.8 inches.

The assumption that runoff would occur when rainfall equals or exceeds 0.8 inches is supported in three ways. First, application of the NRCS curve number method indicates that it would take that much





rainfall to create runoff. Second, observations by the author of Appendix E supports this. On August 2, 2016, the onsite meteorological station measured 0.52 inches over a short (less than 2-hour period). The adjacent 8-inch manually read rain gage indicated that rainfall over the same period was 0.9 inches. Both mauka-to-makai drainageways were carefully examined during and immediately following the rainfall. No runoff from the fields into these drainage ways was observed. Third, observations by Jim Garmatz, onsite HDF manager, are instructive. He has seen days in August 2016 with an inch or more of rainfall with no resulting runoff.

Report's Comment 5: Appendix E of the DEIS fails to consider important hydrologic processes.

It is true that Appendix E evaluated hydrologic processes on an average annual basis. The SWMM model analysis did consider daily processes but with unrealistic rainfall and other assumed parameter values. Results of Appendix E of the DEIS are realistic. The SWMM model results are completely unrealistic.

Report's Comment 6: The DEIS hydrologic analysis did not analyze the drainage network at the HDF site.

The analysis in Appendix E of the DEIS did consider drainage of the 1213 acres surrounding the HDF site which are tributary to the drainage network which crosses the 557 acre HDF site. In comparison, the SWMM model results have far more runoff from the flat 557-acre HDF site than from the mostly steep surrounding 1213 acres, a completely unrealistic result.

Report's Comment 7: Site soils are expected to be saturated, or nearly saturated, much of the time.

In view of the daily observations by HDF manager Jim Garmatz, this is a complete misrepresentation of actual conditions. HDF has added four more rain gages across its site to account for the significant viability of rainfall from one location to the other. Irrigation applications will be guided by these rain gages to maximize grass growth and avoid saturated conditions.

# 3-A

## RESPONSE TO COMMENT LETTER, APPENDIX 3, COMMENTS OF DAVID J. ERICKSON, WATER & ENVIRONMENTAL TECHNOLOGIES

# MEMORANDUM

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| | | | |
|---|---|---|---|
| **TO:** | HDF Project Team | | |
| **ATTENTION:** | | | |
| **DATE:** | December 21, 2016 | | |
| **PROJECT:** | Hawaii Dairy Farms EIS | **PROJECT NO:** | 212061-04 |
| **E-MAIL/ FAX:** | | **NO. OF PAGES:** | |
| **SUBJECT:** | **Response to Comment Letter, Appendix 3, Comments of David J. Erickson, Water & Environmental Technologies, (Not Dated).**<br>Hawai'i Dairy Farms<br>Draft Environmental Impact Statement | | |

The following responses incorporate research done by Group 70 and our associated technical consultants.

**Section 1 – Avoiding Adverse Impacts. <u>Once the fertilizer and manure contaminate ground water beneath the facility, the contaminated ground water will seep and drain into the on-site ditches that were designed specifically for that purpose</u>**

The comment bases its adverse impact on an assumption that the manure contamination to groundwater from the proposed dairy will be a fact, and ignores the details of the pasture grasses, such as the dense thatch, nutrient uptake, and high microbial activity in the soils, as well as best management practices (BMPs) that are specific to the farm such as setbacks and vegetated buffers. Such factors and the BMPs which will be implemented will reduce, if not completely contain, manure and fertilizer nutrients from leaving the farm:

1. The kikuyu grass is highly productive and extremely effective in the tropics. The grasses are known to produce yields in excess of 20 tons of Dry Matter (DM) per acre per year, ensuring high levels of nutrient uptake from both manure and fertilizer sources. Nutrient loss to groundwater is not expected.

2. *The Kikuyu grass forms a dense, thick thatch that totally alters soil susceptibility to compaction, infiltration is greatly improved and runoff is minimized if not essentially prevented (Yost).*

3. *With the addition of high levels of water and effluent the surface soil will be energized microbiologically and stimulated populations of microorganisms are very effective in inactivating pharmaceuticals and additives due to the reduced half-time resulting from enhanced immobilization and degradation by the superactive microbiological community (Yost).*

4. 35-foot vegetation setbacks from drainage ditches on site (in accordance with NRCS Conservation Practice Standards and guidance to protect water quality), on-site retention facilities adjacent to



cow raceways, and application of effluent matching the crop demand and ensuring no over-application of effluent are BMPs that HDF intends to contain all nutrients on site during typical dairy operations and under typical weather conditions.

The comment also fails to understand the original intention of the on-site agricultural ditches within the existing field and the proposed pasture area. The on-site agricultural ditches were used to divert water to the fields for sugarcane crop irrigation, while the main drainage ways and ditches that pass through the HDF site were developed to convey water from the upslope valley areas beyond the HDF site. On-site surface waters conveyed through the agricultural ditches were not directed directly to the main drainage ways as the purpose and intent of the agricultural ditches was to utilize that surface water for crop growth. The comment incorrectly assumes all ditches were used to drain surface waters <u>away</u> from the crops – thereby reducing the available natural sources of water to the fields.

35-foot setbacks from the water ways and agricultural ditches to remain (some will be removed and smoothed as part of providing a level and uniform pasture) will also be established and also ensure that nutrient losses are prevented.

Overall, the comments provide very little details, facts, or scientific basis to the assertion that contamination of groundwater and surface waters will occur, and simply assumes such contamination to be a complete fact. Best management practices and operational management of the farm will reduce and prevent contamination and are not taken into account in any of the comments. Refer to Appendix E, Groundwater and Surface Water Analysis and Appendix F, Surface Water Quality and Marine Assessment, of the FEIS for further discussion and analysis rejecting the assertion of this comment.

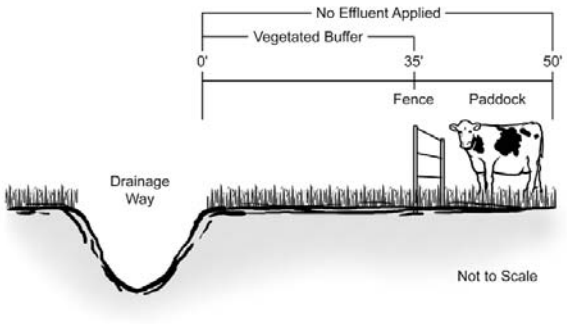
**Section 2 – Discrepancies and Inconsistencies in the DEIS. <u>First, the document alternates between a 35' and a 50' setback between ditches and waterways and areas where the cows are active (pens and raceways). No technical justification for either setback is provided. It appears that the analysis in the appendices was completed using one set of numbers, then the text was changed to reflect a second set of criteria. Based on our on-site observation, setbacks and other best management practices to prevent stormwater runoff issues are not being practiced during construction, so I am not convinced they will be put into use in the future. It is also unclear whether the "buffered" area will be mowed or irrigated, or how the integrity of this supposedly fenced area will be maintained if a pivot arm must regularly pass through.</u>**

The commenter misunderstands the description of setbacks in the DEIS and fails to reference appropriate standards, from both the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) and State of Hawai'i standards, practices, and guidance. The main drainage ways within the HDF property have two setbacks:

1. A physical setback of 35'. No grazing dairy animal is physically allowed within 35' of the drainage ways on the HDF site (fenced off). In addition, these 35' areas will be vegetated to protect water quality within the drainage ways. Refer to: Natural Resources Conservation Service (NRCS) Pacific Islands Area. November 2012. *Conservation Practice Standard - Riparian Herbaceous Cover Code 390*. Field Office Technical Guide (FOTG) Section IV.

2. An setback of 50' for liquid effluent application. No application with effluent is allowed within 50' of the drainage ways on the HDF site. Irrigation with non-potable water (i.e. water from Waita Reservoir only) may occur within the 50' setback and 35' vegetated setback to allow for proper vegetation growth, as needed. Refer to: State of Hawai'i Department of Health (DOH). January 19 2010. *Guidelines for Livestock Management*. Prepared in collaboration with the University of Hawai'i at Mānoa, Cooperative Extension Service, College of Tropical Agriculture and Human Resources,

West Maui Soil & Water Conservation District, USDA – Natural Resource Conservation Service, U.S. Environmental Protection Agency – Region 9. Appendix Page A.4, #2.




The 35' vegetated buffers will not be regularly mowed but will be maintained to protect water quality and reduce overgrowth to maintain flow capacities of the drainage ways. Plant matter removed from the buffers will not be disposed of directly into the water resource. Fences will be provided and designed with openings that allow the pivot wheels to pass through the fence but not allow livestock through.

No construction activities have occurred within the areas near the ditch, with the exception of the installation of the pivot bridges beyond the top of bank of the ditch. Outside of the installation of the center pivot system, some water troughs, and the grass field trials, HDF's manager has been maintaining the existing guinea grass in a 35'-wide buffer in preparation for construction beginning on the farm. There is no reason to install the herbaceous riparian vegetated cover per NRCS Conservation Practice Standard Code 390 prior to even having animals on the farm. The comment is highly biased on this erroneous "assumption" to state that HDF would not install BMP's or setbacks because visual observation of an inactive farm site does not "convince" the commenter that all appropriate standards, codes, and permits will be followed once the farm begins construction and operations.

**Section 2 – Discrepancies and Inconsistencies in the DEIS. Text of the document states that the irrigation pivots are 1000' in diameter (pg. 3-25); however, all figures show approximately 2400' diameter and direct measurement from air photos show about 1600' radius. Obviously, this discrepancy directly effects irrigation water and dairy wastewater application calculations**

The radius of the pivots will be approximately 1,200 feet; this clarification has been made in Section 3 of the EIS. The irrigation water, effluent application, and nutrient balance analysis have utilized an approximately 1,200-foot radius in its calculations and are consistent with the figures.

**Section 2 – Discrepancies and Inconsistencies in the DEIS. Third, the DEIS states that of all the nitrogen and phosphorous that the Dairy waste will contain, only "2% of the nitrogen and 1% of the Phosphorous will be discharged to surface water" (TNRWE pg. 43).This is referred to as a "first order approximation" and there is no technical justification for the statement. It does not appear to be based on any actual or empirical data and, most like represents a gross underestimate of what will be discharged from the Dairy given the**



**inadequate storm water design information and a misrepresentation of ground water conditions at the site.**

Refer to the responses to the Groundwater and Geology comments in Volume 4, Appendix 2 – A.

**Section 2 – Discrepancies and Inconsistencies in the DEIS. Unfortunately, ground water is very shallow in the area excavated for the storage pond and it is impossible to maintain the integrity of a liner if the wastewater level is below the ground water table.**

A geotechnical investigation and report consisting of borings in the location of the proposed dairy facility and effluent ponds was completed by Hirata and Associates in 2014. No groundwater was encountered within the 15-foot borings. While the groundwater does vary based upon season, the commenter mischaracterizes the groundwater as "very shallow". No groundwater was encountered in the investigation's borings, within nearly the entire 17-foot depth proposed for the effluent ponds per the geotechnical borings at the time of the investigation.

Depth to groundwater is not the same across the site (Nance, pers. comm.). Test trenches for the archeological report were completed in the central section of the site, which encountered groundwater between 3 and 6 feet below surface level, but not in the area of the proposed effluent ponds. Water levels at the four groundwater monitoring wells developed by HDF are documented at 8 to 24 feet below ground level (Nance, 2016). Findings of the groundwater and surface water analysis summarized in EIS Section 4.16 *Groundwater Resources* (included as Appendix E) states: "The groundwater and surface water study provides insight to the depth of the groundwater in the alluvial layer. Toward the inland end of the property (wells HDF-1 and 2), groundwater levels are about 80 feet AMSL. The level drops rapidly going makai, to 68 feet AMSL at HDF-4, and to 49 feet at HDF-3. In general, the movement of groundwater in the alluvium is from mauka to makai with ultimate discharge into the marine environment. . ." That the depth to groundwater across the site would not be the same from place to place is axiomatic.

**Section 2 – Discrepancies and Inconsistencies in the DEIS. Perhaps, most importantly, Group 70 completed the Nutrient Balance based on precipitation probability stating that "having more than a week of consecutive rain is very unusual for the Maha'ulepu Valley with this only occurring 5 times in the last 30 years". Coincidentally, during the monitoring period there were two 3-day events, one 11-day event and one 7-day event. This directly conflicts with Group 70's statement and statistic of only 5 seven day events in the last 35 years.**

The "discrepancy" and "inconsistency" pointed out by the commenter is based upon collected rainfall data from two different data collection devices (rain gauges) and are not expected to be exactly the same. The rainfall data included in Tom Nance's monitoring event graph, to which the commenter refers, is based upon rainfall data collected by HDF's Ag Hub rain gauge system on the proposed project's site. However, HDF's Nutrient Balance Analysis is based upon rainfall data collected by a National Oceanic and Atmospheric Administration (NOAA) rain gauge, also on the proposed project's site. Both are acceptable sources of analyzing rainfall patterns on the project site. Due to the nature of rain gauges, two sets of collected data from two different rain gauges, in different locations (albeit minimal distances apart) will never be exactly the same. Also, the times at which the rain gauges are read and recorded can also affect how daily rainfall amounts are presented (over different 24-hour periods).

With respect to the supposed "discrepancies" in the periods of continuous rainfall, the commenter again makes inferences which are contradictory or not applicable to the intent of the presented data in the Nutrient Balance Analysis. The consecutive days of rainfall noted in the Nutrient Balance Analysis is used for sizing of the effluent ponds in determining a reasonable storage period. HDF has elected to provide a pond size to account for 30 days of storage of effluent, though that is not required by any regulation. NRCS Conservation Practice Standard 313 – Waste Storage Facility requires a period of "[the] maximum length of time anticipated between emptying events". The State of Hawai'i Department of Health's *Guidelines for Livestock Management* (2010) note that "storage is

the temporary (emphasis added) containment of waste… The storage period should be determined by the utilization schedule." HDF intends to use effluent from the ponds every 4 days on average. However, the storage period is extended as it includes potential days of consecutive heavy rainfall when utilization of effluent from the ponds could be lower (application occurring at intervals greater than 4 days).

The periods of insignificant recorded rainfall do not define the storage period. Within the monitoring period the commenter references, recorded rainfall by the Ag Hub system indicates that measurements of rain on some days are as small as 0.02 inches, quite insignificant for any agricultural operation, sizing of the storage ponds, or a hydrologic and hydraulic assessment of the project's infrastructure, and cannot be considered a rain "event". A rain event, in lay terms, is a 1-hour, 6-hour, 24-hour event that occurs with some intensity (inches per hour). Rain of insignificant amounts cannot be strewn together to be called a "rain event", and is not material for the purpose of sizing of the waste effluent ponds or the irrigation operation.

Additionally, the comment points out one occurrence of a "supposed" 7 day event in 2015, which was not even within the Nutrient Balance Analysis' table's time frame.

Refer to the NOAA Mahaulepu rain gauge data shown below for the days in question. "No Data" means that data was not collected in the manually-read gauge, usually occurring over the weekends or holidays, corresponding to a Multi-Day Precipitation Record (MDPR). Tom Nance used a different rain gauge, with daily rainfall recorded from the HDF AG Hub Station in inches. Generally, the rainfall data points match the record or rainfall in Tom Nance's hydrology study.

| Date | NOAA Rainfall (in) | AG HUB Rainfall (in) |
|---|---|---|
| 20151117 | 0 | 0 |
| 20151118 | 0.08 | 0.05 |
| 20151119 | 0 | 0 |
| 20151120 | MDPR | 2.46 |
| 20151121 | MDPR | 1.57 |
| 20151122 | MDPR | 0.20 |
| 20151123 | MDPR = 4.48 | 0 |
| 20151124 | 0 | 0 |
| 20151125 | 0 | 0 |
| 20151126 | MDPR | 0.03 |
| 20151127 | MDPR | 0.65 |
| 20151128 | MDPR | 0.20 |
| 20151129 | MDPR | 0.04 |
| 20151130 | MDPR = 0.70 | 0.36 |
| 20151201 | 0.14 | 0.27 |
| 20151202 | 0.31 | 0.16 |
| 20151203 | 0.26 | 0.34 |
| 20151204 | 0.09 | 0 |
| 20151205 | MDPR | 0 |
| 20151206 | MDPR | 0.10 |
| 20151207 | MDPR = 0.12 | 0 |
| 20151208 | 0 | 0 |
| 20151209 | 0.02 | 0.03 |
| 20151210 | 0.10 | 0.15 |
| 20151211 | 0.03 | 0.02 |
| 20151212 | MDPR | 0 |
| 20151213 | MDPR | 0 |
| 20151214 | MDPR = 0 | 0 |



| | | |
|---|---|---|
| 20151215 | 0 | 0.50 |
| 20151216 | 0.71 | 0 |
| 20151217 | 0 | 0.06 |
| 20151218 | 0.35 | 0.46 |
| 20151219 | MDPR | 0.16 |
| 20151220 | MDPR | 0.20 |
| 20151221 | MDPR = 0.43 | 0.11 |
| 20151222 | 0.10 | 0.14 |
| 20151223 | 0.17 | 0.20 |
| 20151224 | 0.02 | 0 |
| 20151215 | MDPR | 0.26 |
| 20151216 | MDPR | 0.43 |
| 20151217 | MDPR | 0.08 |
| 20151228 | MDPR = 0.83 | 0.07 |

* Note that the NOAA gauge is typically read at 6:00 am in the morning.

** Note that the Ag Hub data is continuously recorded throughout the day (tipping bucket measurements). No adjustment is made for recorded data in consecutive intervals or if rainfall is spread out throughout the 24-hour time period.

The data still points to the fact that having more than 7 days of consecutive recorded rainfall of significance is very unusual at the project site. Data between the NOAA gauge and Ag Hub system are relatively consistent and show a corresponding relationship, even though each gauge records slightly different values of rainfall, are located in different but relatively close locations on the project site, and are collected at different times of the day (different 24-hour period).

Regarding the other specified data points indicated in the comment, rainfall in these amounts is significantly wrong. Below are the Ag Hub readings for those dates, compared to the supposed rainfall readings from the commenter.

| Date | AG HUB Rainfall (in) | Commenter Rainfall (in) |
|---|---|---|
| 20121204 | 0 | 9.2 |
| 20130127 | 1.88 | 9.1 |
| 20131201 | 2.86 | 11.3 |
| 20140823 | 0.12 | 16.1 |
| 20151120 | 2.46 | 14 |

Rainfall amounts indicated by the commenter are extremely high and unrealistic. The relationships between the rainfall data indicated by the commenter do not seem to correspond to the relationships of the Ag Hub data. The comment, indicating such large daily rainfall amounts occurred in a less than 2 year period, nearly meeting or exceeding the rainfall expected of a 25-year 24-hour event, is incorrect.

**Section 3 – The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. If the soil and crop growth is managed with additional irrigation water, cattle grazing and routine cattle movement will become a problem with the clay type soils present on all the Dairy property. If the soil is kept at field capacity or above through precipitation with additional irrigation, it will quickly turn to deep mud with cattle walking through the gates to be milked twice a day. This will result in both damage to the grass crop and impacts to stormwater and runoff from the site.**

Kikuyu forms a thick thatch that essentially reduces compaction and absorbs and can attenuate runoff. Refer to Appendix C, Soils & Agronomy Analysis prepared by Dr. Russell Yost, further discussing the impact of the Kikuyu thatch in reducing and attenuating runoff. Conditions under good pasture management with a thick Kikuyu thatch

are expected to improve runoff retention, increase "times of concentration" for runoff flows allowing for greater infiltration and absorption by the thatch, and thereby reduce peak flows from rainfall that lands on the pasture. Irrigation is not considered a factor in peak runoff calculations, especially if HDF has agreed to not irrigate the fields with effluent within 2 days of forecasted rain and 2 days following. HDF will not apply irrigation, including adjustments for precipitation, past the agronomic need of the crop. Table 12 in the NBA shows that even in the winter months, rainfall does not meet the irrigation demand of the crop.

**Section 3 – The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. Cows do not and cannot be trained to strategically place manure evenly throughout the paddocks. As a result, an engineering calculation that assumes even manure distribution is in error. Even if the manure was spread with a drag, it would be concentrated near the gate or water troughs where the cows wait to go to the parlor or other areas where the cows may tend to congregate.**

HDF is following all appropriate USDA – NRCS and DOH standards, practices, and guidelines, which allow for livestock as-excreted manure in addition to land application of manure on agricultural facilities for the use in growing crops. If not for the assumption that over a period of time, manure application is spread relatively evenly over the paddock and not concentrated in one spot, virtually every livestock or ranching operation would have flawed nutrient balance calculations with respect to accounting for nutrients from as-excreted manure.

**Section 3 - The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. Ground Water Quality Scenario.**

Discharges from the pasture will contain minimal (less than 2 percent) nutrient content as all of the nutrients are required to support a high-yielding grass crop for forage for the cows. Large drainage ditches will be buffered with 35' wide vegetation setbacks and liquid effluent will not be applied within 50' of the drainage way. HDF will apply irrigation, in conjunction with precise rainfall data, via irrigation pivots that can control application rates such that it does not apply irrigation beyond the agronomic need of the crop. With these operational and best management practices in place, discharges will be limited if not completely avoided.

**Section 3 - The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. Surface Water Quality Scenario.**

In addition to the 35' wide vegetative setbacks and 50' wide effluent application setback, kikuyu grass produces a thick thatch that absorbs nutrients and prevents or reduces surface water flow. Runoff will be minimized. Retention systems alongside raised cow raceways will keep low flows with nutrients on the farm site. Animal waste will quickly be broken down and absorbed by the crop and microbial activity, thus removing the "waste" and recycling the nutrients into useful fertilizer. 38 million to 109 million pounds of manure will be reused, on an annual basis, in a beneficial way for crop use and milk production.

**Section 3 - The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. Soil Nutrient Scenario.**

HDF will not apply nutrients past the plant uptake requirements and agronomic need. In both the committed scenario of 699 mature dairy cows and contemplated scenario of up to 2,000 mature dairy cows, at a grass yield of 16.3 tons of DM per acre per year, there is simply not enough nitrogen nutrient from manure sources (as-excreted, liquid effluent, slurry applied) and a slight excess of phosphorus only in the 2,000 mature dairy cow scenario. HDF will not apply excess phosphorus because the herd size would be increased incrementally, to ensure no over-application of nutrients. Ultimately, commercial fertilizers will still be required. Nutrients are broken down quickly and absorbed by the crop. Cows are rotated so over-application of nutrients does not occur.



**Section 3. - The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. Currently, ground water discharges to surface water across the site and water quality degradation are evident through the monitoring we completed and concurred by a statement from Mr. Dollar "As water flows through the HDF site, it appears that nutrient concentrations are augmented by input from drainage of surface water that contains some leachate from surrounding lands." (Appendix F pg. 6). If we add the waste leached from an addition of dairy waste and chemical fertilizer to the soil, this input or contamination will greatly increase.**

Nutrients are provided by nutrient contributions from surrounding lands, where there is no management of manure from wild animals, decaying organic matter from trees and leaves, and other sources of nutrients. HDF will improve conditions by managing the pastures, creating a thick Kikuyu grass thatch to control runoff and nutrient flow through the environment, and control animals through set rotations. Nutrients will be taken up by the pasture and will not be added past the agronomic need of the crop. This is all expected to increase soil health, improve runoff conditions, and control nutrient pass through.

**Section 3. - The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. The ground water and surface water data collected as part of the EIS provide clear and direct evidence that: 1. The current ditch system was designed to transmit storm water off the property quickly and efficiently to prevent ponding and crop damage, and 2. The ditch system drains the shallow ground water table to prevent saturation of the crop roots, which would result in poor growth. These two characteristics, while good for crop farming, are detrimental to a rest-rotation scenario with the waste from 699-2000 dairy cows on the property. The ditches were designed to remove any ponded water to prevent the crops from overwatering and to drop the ground water table below the root depth to prevent plant mortality by constantly or continuously saturated roots. Either condition is not conducive to proper agricultural production.**

The addition of irrigation and effluent, within the agronomic need of the crop, will ensure that nutrients do not pass through the root zone and are taken up by the crop, the ground is not saturated, and runoff is minimized. Application of effluent from up to 2,000 cows can be supported by the thick kikuyu thatch formed on the fields.

Also, the main drainage ways and ditches (not the agricultural field ditches) are meant to move groundwater seepage and surface runoff to the ocean, just as any natural stream would do in a valley. The main drainage ways and ditches are specifically excluded from the farm by both physical setbacks (fencing), and effluent application limitations (setback). Best management practices are included to minimize impacts to surface water quality.

**Section 3 - The Analysis In The DEIS And Its Appendices Is Flawed, And Reveals Many Problems With The Proposal. Various Comments**

1. Manure will be used for nutrient sources for crop production. 109 million pounds of manure per year sounds like a large number but it is not a cumulative statistic. In fact, the manure itself is not enough to support crop growth after being broken down into its nutrients by microbial activity.
2. Refer to additional responses by HDF with respect to specific types of antibiotics or pharmaceuticals. *With the addition of high levels of water and effluent the surface soil will be energized microbiologically and stimulated populations of microorganisms are very effective in inactivating pharmaceuticals and additives due to the reduced half-time resulting from enhanced immobilization and degradation by the superactive microbiological community (Yost).*
3. Claims that multiple large turbid discharges are occurring at the project site are based on unrealistically high and excessive precipitation amounts, and are erroneous.
4. Refer to previous responses noting that the rain data used in the WET report is erroneous and not supported by NOAA or properly interpreted and converted Ag Hub data.

5. Refer to the DOH Sanitary Survey. HDF assumes that the possible sources of contamination are not singular and many of the sources indicated in the survey cumulatively add to the high bacterial count in Waiopili Ditch. A very large population of feral animals is possible but not the sole source of contamination that would be required to see those levels.
6. Refer to previous responses noting ground saturation, drainage ditches on site, and nutrient travel to groundwater through the existing ditches on site.

**Section 4 – Stormwater Specific Comments. [Appendix K –Hydrologic Assessment] lists best management practices (BMPs) that may be implemented to control storm water runoff but does not provide locations, size requirements, or any other design details about how the BMPs will be implemented. These details should be disclosed and properly factored in to an evaluation of the BMPs' ability to mitigate or prevent impacts.**

HDF will establish BMP's per applicable NRCS Conservation Practice Codes. Details about the codes are readily available online. Sizing and design requirements are included in the codes. Much of the design requirements are based upon empirical evidence and analysis provided by NRCS.

**Section 4 – Stormwater Specific Comments. These site-specific data indicate that actual 24-hour precipitation totals at the site routinely exceed the design storm events HDF intends to use for storm water infrastructure design.**

The DEIS and Appendix K utilizes accurate precipitation data from the NOAA rain gage data located on the HDF project site. The interpreted data used in the WET report is erroneous and such events are simply unrealistic.

**Section 4 – Stormwater Specific Comments. First, the use of the term "sheet flow" to describe runoff at the site is inappropriate and may result in underestimating peak flows in drainage ditches conveying stormwater offsite. The steep terrain surrounding the site had numerous small rills, and the network of drainage ditches on the site indicate that sheet flow does not occur at the site, and rather runoff begins as shallow concentrated flow in small rills, followed by open channel flow in drainage ditches until it discharges to the ocean.**

Refer to Tables 3 and 5 of the Appendix K, regarding the Time of Concentration calculations.

Both tables include estimations for sheet flow in the uplands, to shallow concentrated flows (in small rills as the comment indicates), to open channel flow in the ditches and stream. The commenter simply did not refer to these tables to realize that the flow patterns are taken into account in the assessment.

**Section 4 – Stormwater Specific Comments. The Assessment does not provide any peak flow vs. capacity calculations for these cutoff ditches and therefore does not demonstrate that they capture the majority of storm water running on to the property.**

Runoff was conservatively estimated as though the older and previously not-maintained off-site ditches (cutoff ditches used for irrigation purposes) on the uphill side of the HDF site were unable to divert any flow from running onto the site from the steep slopes. This conservative estimation allows HDF to plan for worst-case scenarios in terms of the amount of run-on into the HDF site from upslope areas.

The off-site ditches remain under the control of the landowner. If the off-site ditches are maintained as planned (and as agreed by the landowner), any run-on towards the site that may be intercepted by the ditch, will continue to be conveyed in the existing drainageways through and around the farm area, to downstream of the project site, and not through the paddocks. Therefore the potential for surface runoff through and from the paddocks is significantly reduced. This will reduce the amount of potential nutrient discharge through surface runoff, which is



why the estimation of nutrient loss through surface runoff, utilized in the water quality assessments in the DEIS, is minimal from the farm site. Most of the rainfall will remain on-site and percolate for use by the crop.

**Section 4.1 – Grading and Topography Comments. This section states that "no grading activities have occurred on site thus far." However, I observed several areas of grading during my site inspection.**

The commenter does not identify the areas in which the alleged grading activities have occurred. HDF maintains no grading activities have occurred on site. Based upon the EPA's and DOH's interpretation of applicable regulations, activities for the purpose of growing crops, including the installation of pivot bridges and ditch crossings, harrowing and harvesting of pasture or crops, and installation of the pivots is not considered the disturbance of land and therefore not "grading" under applicable NPDES regulations.

**Section 4.1 – Grading and Topography Comments. The Assessment states that soils at the HDF site are severely nutrient deficient, and that the addition of cow manure will actually reduce the quantity and improve the quality of storm water running off the site by establishing grasses used for cow feed. This is contrary to observations I made and data I collected during WETs site inspection. First, our soil test results of eight soil samples collected throughout the site (see Exhibit B) show that significant nutrients are available in the soil, largely in the form of organic nitrogen. Limited nitrate and phosphorus are present within the upper 1 foot of soil simply because the extremely robust vegetation present at the site takes up these nutrients as soon as they become available from decomposing organic matter.**

Refer to Dr. Yost's response to WET's soil test data of the farm in Volume 4, Appendix 5 – A. WET's own soil test data supports HDF assertion and laboratory analysis that soils in Mahaulepu at HDF's site are deficient in nutrients. In summary, WET's soil analysis does not measure the levels of nutrient cations on the exchange complex and thus is not adequate data on which to base the claim of high nutrient content. In particular, the Kjeldahl nitrogen in WET's sample are relatively low while other levels of soil organic nitrogen, while apparently high, are not readily plant available. Plant phosphorus indicates nutrient phosphorus as less than 1 mg/L with only one sample of 11 mg/L, which is well below the target level of 25 to 50 mg/L for long term crops. WET also does not show phosphorus sorption which is a measure of the long term tendency for soils to sorb and retain phosphorus, which is extremely high in these soil types.

**Section 4.1 – Grading and Topography Comments. With regard to storm water quality and quantity, it is true that establishing grasses on an otherwise disturbed or thinly vegetated of land can improve storm water quality and quantity. However, I personally observed that the entire site already supports extremely dense vegetation with grasses up to ten feet high in uncultivated areas of the property. The only areas that exhibit bare soils or are lacking in the dense native grasses are those that have been disturbed by construction activities in preparation for the HDF Dairy.**

The establishment of a uniform and thick kikuyu grass thatch over the property is a better condition of pasture field than the non-uniform, non-maintained, various species of vegetation currently located on the farm site:

Existing Conditions: Tall grasses, clumps of plant mass (shown when mowed), non-uniform

Proposed Conditions: Tall grasses, uniform plant mass, thick thatch

**Section 4.1 – Grading and Topography Comments.** **<u>In fact, since the pastures will be irrigated under the proposed dairy plan, the soils comprising the pastures will be saturated more often than at present. This will even further increase the quantity of runoff leaving the site.</u>**

HDF notes in its NBA that it will not irrigate within 2 days and after 2 days of a significant rain event, allowing the pasture to dry. The soils will not be saturated on a regular basis with irrigation as effluent and irrigation will be applied not to exceed the agronomic need of the crop. Runoff will be attenuated by the thick kikuyu thatch created by the establishment of "good" pasture conditions as indicated above.

**Section 4.1 – Grading and Topography Comments.** **<u>Also ignored in Section 4.4 are the proposed gravel race ways that will traverse the site in every direction to allow milking cows to travel from farm paddocks to the milking parlor twice per day. These will be similar to gravel roads, will likely be almost completely impervious to infiltration, and will contribute some amount of sediment to storm water, thus further increasing the quantity and further decreasing the quality of runoff.</u>**



While true that the gravel roads will have higher impervious characteristics than pasture, it hardly means they are completely impervious to infiltration. Also, the area of raceways and roadways will increase runoff immediately downhill of the raceways but runoff will be managed and directed towards the pasture such that it can be retained behind the retention areas adjacent to raised gravel raceways. The runoff will then be infiltrated on the pastures and absorbed by the crop. The area of the raceways is small compared to the areas of the pasture and no downstream impact of a small increase in higher impermeability gravel raceways is expected.

# 4-A

## RESPONSE TO ECONOMIC SECTIONS COMMENTS

*Plasch Econ Pacific LLC*
**Bruce Steven Plasch, Ph.D., President**

ECONOMIC CONSULTING: Economic Development • Land Economics • Feasibility & Valuations • Benefits & Impacts

August 24, 2016

**Re:** Hawai‘i Dairy Farms, Draft Environmental Impact Statement, Economic Sections (**DEIS**),

Response to Comments by:

- Lisa A. Bail, Goodsill Anderson Quinn & Stifel, Letter of July 25, 2016
- Berkeley Research Group (“**BRG”**), “Assessment of Economic Impacts of the Proposed Hawai‘i Dairy Farms Facility,” July 2016.
- Sarah A. Matsumoto and Charles M. Tebbutt, Law Offices of Charles M. Tebbutt, PlC., lettter of July 25, 2016
- John A. Kilpatrick, Ph.D., MAI, FRICS, “Economic and Valuation Impacts of a Proposed Concentrated Animal Operation on Kaua‘i.” July 2016.

## 1. Economic Impacts of Nuisances

Comments on Economic Impacts

Bail, BRG, Matsumoto and Tebbutt, and Kilpatrick assert that the economic impacts of nuisances from the Dairy were not addressed in the DEIS Appendix J, and/or assert large adverse economic impacts from nuisances.

Responses to Comments

The economic impacts from nuisances were addressed in Appendix J. The impacts were not omitted, discounted, or assumed away. The finding was no significant adverse economic impacts, a finding based on environmental studies that indicate no significant nuisance impacts affecting resort, commercial, residential or recreational areas.

The following information was provided in Appendix J:

— HDF vs. Traditional Dairies

The planned Hawai‘i Dairy Farms (“**HDF**” or “**Dairy**”) will be the first in Hawai‘i to employ rotational pasture-grazing. Benefits of pasture grazing includes but are not limited to improved grass growth, even deposits of manure for fertilization, and reduced erosion and runoff. Also, the Dairy will feature

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modern facilities and practices, and will comply with all applicable Federal and State environmental standards.

In contrast to the Dairy’s rotational pasture-grazing approach, traditional dairies concentrate their milking cows in feed lots where the cows feed on grains, hay and/or silage. Correspondingly, a large volume of manure is generated in a small area, leading to waste-management challenges. These types of operations can generate significant odors and other nuisance impacts (flies, dust, noise, runoff, etc.) which can extend beyond the property boundaries of a dairy, thereby affecting nearby and downwind properties. In turn, nuisance impacts can have adverse economic impacts on affected neighbors, including but not limited to a loss in property values, reduced tourism, reduced sales and employment, and reduced tax revenues.

— Nuisance Impacts

The environmental studies for the Dairy indicate that no noticeable noise, dust, odors, flies, runoff, or other nuisance impacts will extend to resort, commercial, residential or recreational areas. Noticeable nuisance impacts occurring outside the Dairy property will be limited to the abutting farm and ranch lands which are owned by Māhā‘ulepū Farm, lessor of the Dairy property. These abutting lands are designated Important Agricultural Lands, so they will remain in agriculture for the foreseeable future.

— Economic Impacts of Nuisances

In view of the lack of nuisance impacts on resort, commercial, residential or recreational areas, the Dairy will not adversely affect:

- Guests of resorts in the Kōloa-Po‘ipū region.
- Recreational activities in the region.
- The regional economy (number of visitors, visitor expenditures, retail sales, employment, incomes, etc.)
- Residents when at home in the region.
- Property sales in the region (single-family homes, condominiums, second homes, time-share units, etc.).
- Values of properties in the region.
- County or State taxes derived from residents, resorts, or commercial activities in the region.

The comments by Matsumoto and Tebbutt, and Kilpatrick about the adverse economic impacts of the dairy appear to be based on nuisance parameters and footprints of typical dairies found on the mainland, not on those of the planned Dairy which will be a modern facility that uses rotational pasture-grazing.

**2. Size of the Dairy**

Comment, Bail, p. 1, §I, ¶1

"This Dairy project is large, and in Hawai‘i, without precedent. As of January 2015, there were a total of 2,200 milk cows in multiple locations throughout the entire state. … With HDF's planned operation of up to 2,000 cows, the state-wide number will nearly double, …"

Response

Bail's figures are correct but, from a historic perspective, she is incorrect about her assertions that the Dairy would represents a large increase in milk cows and that such a large number of milk cows is without precedent.

As stated, the Dairy will "nearly double" the number of milk cows in Hawai‘i. But this is only because 20 of 22 dairies closed since 1984 ("Statistics of Hawaiian Agriculture," annual). In 1984, about 12,100 cows produced all of the milk consumed in Hawai‘i ("Statistics of Hawaiian Agriculture," annual). In that year, Hawai‘i had about 1.23 million residents and visitors versus a current *de facto* population of about 1.58 million people ("Hawaii Data Book" annual). If Hawai‘i were still self-sufficient in milk, an additional 2,000 milk cows would amount to a 13% increase in the number of milk cows [2,000 ÷ (12,100 × 1.58/1.23)].

In addition to milk cows, Hawai‘i has a large number of beef cows: about 80,000 milk and beef cows in 2012 ("Hawai‘i Farm Facts" ). Thus, 2,000 additional cows amounts to an increase of only 2.5% of the inventory.

Also, Hawai‘i has a precedent of a large concentrations of milk cows. In 1994, Wai‘anae had a cluster of dairies with an estimated 5,400 milk cows (derived from "Decision Analysts Hawai‘i, inc., "Wai‘anae Planning District, O‘ahu: Agricultural Resources and Activities," November 1997; and "Statistics of Hawaiian Agriculture," annual). Adding beef cattle, pigs, poultry, sheep and goats, the Wai‘anae District had over 670,000 animals—about 17 animals per person. Many residents were unaware of the extent of the livestock activity within their community, even though most livestock operations were within a mile of residential communities along the coast.

**3. Odors, Po‘ipū Bay Golf Course**

Comment, Bail, p. 38, §L, ¶3

"… HDF falsely asserts that there is 'a slight odor when the reclaimed water is sprayed, which is more noticeable at the first three holes because of the higher concentration of reclaimed water. The irrigation of effluent within the recreational area also creates an odor close to the resort.' DEIS at 4-85, Appendix J at III-12. Putting aside the highly subjective nature of the assertion, the assertion is not correct. Kawailoa has not received any complaints from hotel guests or workers related to odors from irrigation. Moreover, there is no reason why the first three holes would smell any differently than the other holes. The underlying premise of the assertion is false since the first ten holes utilize the same water as the first three holes."



Response

The full statement from Appendix J, p. III-12 is as follows:

> "Reclaimed wastewater is used for irrigating farmlands and golf courses throughout Hawai‘i, including golf courses in Po‘ipū. In 2013, the Limticao Consulting Group reported that the Po‘ipū Bay Resort Golf Course, which is the golf course for the Grand Hyatt Kaua‘i, uses a mix of 20% to 40% R-2 rated wastewater. However, a mix of up to 60% wastewater is used on the first three holes, resulting in a slight odor during spraying. For the Dairy, the mix will be less than 8%."

The information is from an authoritative report: "2013 Update of the Hawai‘i Water Reuse Survey and Report," July 2013. It was prepared by The Limtiaco Consulting Group for the State of Hawai‘i, Department of Land and Natural Resources.

As indicated above, Bail reports that "Kawailoa has not received any complaints from hotel guests or workers related to odors from irrigation." This reinforces the fact that, if properly managed, reclaimed wastewater can be used to irrigate grasses in close proximity to resort areas without adversely affecting tourism or the regional economy. In contrast to the abutting golf course, the Dairy will be much farther away—about 1.5 miles from the Grand Hyatt Kaua‘i to the nearest paddock.

**4. Distance of Nuisance Impacts**

Comment, BRG, p. 3, ¶4

"The current DEIS fails to address [tourism] impacts adequately even though HDF recognizes that nuisances from the facility might reach properties 3 miles away." (Appendix J of DEIS, at p. III-8.)

Response

This comment has two inaccuracies. First, the adverse economic impacts of nuisances are addressed adequately as explained above.

Second, Appendix J does not contain a statement to the effect that "HDF recognizes that nuisances from the facility [i.e., the proposed Dairy] might reach properties 3 miles away." The relevant Subsection 7.a addresses the impacts on home property values caused by nuisances of some mainland livestock operations, and explicitly states that the findings do not apply to the planned Dairy. Nuisance impacts of the Dairy will not extend

to nearby residential (or resort) properties. Relevant portions of this subsection are as follows (Appendix J, pp. III-8 and 9):

**7. NUISANCE ISSUES AND IMPACTS**

**a. Impacts of Concentrated Animal Feeding Operations on Property Values**

A number of mainland studies have addressed the impact of large concentrated animal feeding operations ("**CAFOs**") on property values of nearby homes (see listing in References). These operations, which are often called feedlots, confine a large number of animals—hogs, chickens, sheep, or cows—in a small area. Correspondingly, a large volume of manure is generated in a small area, leading to waste-management challenges.

Most CAFOs generate significant odors and other nuisance impacts (flies, dust, noise, runoff, etc.) that can extend beyond the CAFO property boundaries, thereby affecting nearby and downwind properties. Usually, but not always, property values of homes near CAFOs are lower than those of similar homes that are not affected by nuisance impacts of CAFOs. Relevant findings of the various studies, some of which are contradictory, include the following:

— Distance

- Significantly lower home values can be limited to less than 1 mile from a CAFO, but some studies have found that lower values can extend beyond 3 miles.

— …

The above findings about the impacts of CAFOs on home values do <u>not</u> apply to the proposed Dairy for the following reasons:

— The HDF pasture system differs from a conventional dairy where cows are confined to barns. Instead of storing manure in lagoons and feeding silage (fomented vegetation) as forage, the Dairy will use rotational pasture-grazing where the animals are dispersed over a large expanse of grassland.

— Home values will not be affected because no noticeable odors, noise, flies, dust, runoff, or other nuisance impacts from the operation will extend to residential areas (see Subsections 7.c and 7.d). Instead, any noticeable nuisance impacts occurring beyond the Dairy property will be limited to the abutting farm and ranch lands which are owned by Māhā‘ulepū Farm, lessor of the Dairy property.



**5. Odors, Assumptions for Economic Findings, BRG, p. 8**

<u>Comment</u>

"….The DEIS assumes away the potential impacts by claiming that "[c]onsiderable distances will separate the Dairy from the resorts, commercial areas, homes and recreational areas."

<u>Response</u>

This statement is false. Economic impacts are <u>not</u> assumed away based on distances separating the Dairy from resort, commercial, residential or recreational areas. Instead, economic impacts are based on the environmental studies for the Dairy. These studies indicate that the Dairy will have no noticeable noise, dust, odors, flies, runoff, or other nuisance impacts that extend to resort, commercial, residential or recreational areas. Noticeable nuisance impacts occurring outside the Dairy property will be limited to the abutting farm and ranch lands which are owned by Māhā‘ulepū Farm, lessor of the Dairy property. Consequently, the Dairy will have no adverse economic impacts related to nuisances.

# 5-A

## Response To Comments On Hawai'i Dairy Farms Draft Environmental Impact Statement Technical Reports (Soils Related) Including B. Shaw, CH2MHILL, WET

To: Group 70 International
From: Russell Yost, Ph.D.
Professor of Soil Science
Department of Tropical Plant and Soil Sciences
University of Hawai'i at Manoa

Date: October 24, 2016

Subject: Comments on Hawai'i Dairy Farms Draft Environmental Impact Statement Technical Reports

Following are my responses to comments made regarding soils, crop yields, and nutrient balance issues specific to the Hawai'i Dairy Farms site proposed for Māhā'ulepū Valley, Kaua'i.

I have been doing research, teaching, and consulting in my current position as Professor and Soil Scientist in the Department of Tropical Plant and Soil Science and the College of Tropical Agriculture and Human Resources, Honolulu, Hawai'i for just over 30 years. During this time I have primarily conducted research in Hawai'i and in tropical environments in 15 countries overseas including S. America, SE and East Asia, and Africa. This research has been on acid, weathered soils of the tropics similar to that in Kaua'i. I have conducted research on Kaua'i, Moloka'i, Hawai'i Island, and O'ahu in Hawai'i. This includes two projects that directly include recycling of the nutrients in dairy manure and lagoon effluents – one with Pacific Dairy, O'ahu, and one with Island Dairy on the Island of Hawai'i. These studies included work with C4 tropical grasses such as kikuyu and are described indicated in the Valencia-Gica publications. The concept of manure and nutrient recycling has been a theme of my dairy project research.

**Replies to B. Shaw report (Tebbutt, Appendix 5):**

- Paragraph 3:
  - The Ka'ena and Kalihi soil series are poorly drained as indicated, however, the Dr. Shaw apparently does not have experience with Kikuyu grass which forms an exceedingly thick thatch that certain to attenuate, if not completely block, surface runoff. Further, as discussed in the soils and agronomic analysis included as EIS Appendix C (page 18): The designation of "poorly drained" is not an indication of low or poor infiltration, which refers to the ability of water and effluents to enter the soil surface. Said another way, soil "drainage" refers to the movement of water within or through the soil profile rather than entry through the soil surface. Additionally, "poorly drained" soils often exhibit anaerobic conditions, which are important in both the presence and movement of nutrients that can affect soil environmental health, most importantly nitrogen and its various soluble forms nitrate, nitrite, and ammonium.
    Grass utilization of the applied water and evaporative losses must also be considered and will be adjusted / managed according to the dynamic water balance-driven, synchronized irrigation system.

- Paragraph 4
  - The Mears (1992) study cited is a botanical report of the species and does not consider a carrying capacity that is highly managed and controlled using the high frequency, rotational, grazing system proposed by HDF.



- Paragraphs 5, 6
  - Dr. Shaw's concern about effects of hoof compaction fails to consider the thick thatch that kikuyu grass develops which greatly improves infiltration of applied water and effluents.
  - Additionally, Dr. Shaw's concerns about compaction do not acknowledge the rotational grazing method, whereby animals are rotated on selected, small paddocks. Rotational grazing has been shown to increase grass quality, animal health and productivity. The hypothesized "hoof action" is more than negated by the selection of the kikuyu grass that forms a thick, cushioning, thatch that will both reduce or mitigate soil compaction while at the same time increasing surface infiltration of irrigation or rainfall.
  - Section 3.3.2.2 describes the livestock water distribution system including raised, concrete troughs placed on a stable crushed rock base.
  - EIS Section 3.5.2 describes the cow walkway design features to address runoff. Walkways will be topped with crushed limestone, elevated above pasture grade, with slightly crowned surfaces to ensure drainage to either side of the walkway, with swales roughly 12-inches in depth parallel to each raceway.
- Paragraph 8
  - Dr. Shaw's concerns about nutrient accumulation at the soil surface are unfounded. Nutrients that remain at the surface will actually enhance nutrient recycling, and enable more vigorous grass growth. Dr. Shaw also seems unaware of the drastic changes in the surface occurring with the extensive thatch that characterizes kikuyu pastures.
- Paragraph 9
  - Another aspect that Dr. Shaw does not seem to recognize is that with the addition of high levels of irrigation water and liquid effluent the surface soil will be energized microbiologically (EIS, Section 4.11). Stimulated populations of microorganisms are very effective in inactivating pharmaceuticals and additives due to the reduced half-time resulting from enhanced immobilization and degradation by the superactive microbiological community.
  - Dr. Shaw does not recognize that in the soils component of the DEIS, two vastly different types of soils are described and it is emphasized that the long term management of the effluent applications will likely differ between the two (refer to "Conclusions and Recommendations" in EIS Appendix C). The nutrient dynamics and differences between the two soil types will be managed during the dynamic adjustment of management which will be developed when actual stocking rate and grass establishment is known.
- Paragraph 12
  - HDF will monitor nutrients in keeping with technical and regulatory guidance, including NRCS Nutrient Management Conservation Practice Standard Code 590 (soil, manure and tissue sampling) and nutrient and chemical constituents per Department of Health water quality standards.

- Paragraph 13
  - Dr. Shaw's concluding points are speculative and reveal his lack of experience with this C-4 tropical grass. Grass yield and nutrient uptake are from continuous on-site farm trials and are supported by data, analysis and use of scientific literature to show that kikuyu grass productivity will be among the highest in the world. Other data from Hawaii also with the highly productive C4 grasses document world class, high levels of productivity are realistic (Valencia-Gica et al. 2012 data from Hawai`i).
  - Dr. Shaw's concern about runoff on poorly drained soils indicates that he doesn't recognize that the kikuyu grass forms a dense, thick thatch which totally alters soil susceptibility to compaction. Infiltration is greatly improved and runoff is minimized if not essentially prevented.
  - Dr. Shaw also fails to notice that the management recommendations are dynamic and will be adjusted with nutrient monitoring at the actual stocking rate and as pastures are established and mature.

**Replies to CH2M Hill report (Goodsill letter Appendix H):**

- Reply to Comment 13 The nutrient balance…
  - The soils report, Appendix C of the DEIS clearly states that there are two widely differing soil groups on the dairy and that the dynamic management of these two soil types will require specific, unique monitoring and management designed to take advantage of the desirable properties of each and the limitations of each. The statement also indicates that there are two recognized stages of performance of the dairy -- an initial stage in which the pasture is being established and the herd developed and the second that represents the finely-tuned dynamic management of the herd size and productivity in relation to the pasture growth and productivity. This we've called the "Monitoring and adaptive nutrient management" or the second stage of bringing the dairy into an optimal state of productivity and efficiency.
- Reply to Comment 15
  - Problem with missing data.
    - The data from the station represent the best available data. It would be foolhardy to ignore the best data available to evaluate the precipitation. The best recognized estimates are now routinely inferred from the true data using modern methods of statistical inference.
- Reply to Comment 23
  - Grass yield and nutrient uptake are from continuous on-site farm trials and are supported by data, analysis and use of scientific literature to show that kikuyu grass productivity will be among the highest in the world. Other data from Hawai`i also with the highly productive C4 grasses document world class, high levels of productivity are realistic (Valencia-Gica et al. 2012 data from Hawai`i).



**Replies to Friends of Mahaulepu (Tebbutt) comments on Draft EIS:**

- Page 11 -Compaction due to hoof action: It is apparent that the author of the Tebbutt letter does not have experience or understand rotational grazing technology, whereby animals are rotated on selected, small paddocks that have been shown to increase grass quality, animal health and productivity. The hypothesized "hoof action" is more than negated by the selection of the kikuyu grass that forms a thick, cushioning, thatch that will both reduce or mitigate soil compaction while at the same time increasing surface infiltration of irrigation or rainfall.
- Page 15 - Dominant soils: The *Soils Baseline Nutrient Status* report (Yost and Krueger, 2016) attached as EIS Appendix C describes two sharply contrasting soils that comprise the dairy, and indicates that dairy and nutrient management will likely differ on the major categories of soils. The management strategies for such soils are well-known and will be implemented on a dynamic basis during both the startup and maintenance phases of the dairy.
- Page 15 – Animal density: The letter again claims carrying capacity is over-stated based on data from non-rotational, non-intensive pasture systems. As indicated in the HDF *Nutrient Balance Analysis* (Appendix D of the EIS), the rotational grazing system will provide substantially higher production while maintaining higher quality of soil and pasture health. The development of improved soil health and biological activity that occur when organic inputs, such as soluble carbon, are provided to a pasture grass system are substantial, and markedly increase biological activity and the pastures' ability to effectively utilize the nutrient components of manure thus obtaining a higher standard of soil and environmental health.
- Pages 15-16 – Differences in Soils: The Tebbutt letter does not acknowledge the discussion of widely differing types of soils in the proposed area (EIS Appendix C). Specific management of each of the soil types is highlighted, discussed and considered for both the initial startup phase and the dynamic maintenance phase of the dairy. Specific monitoring and management of these soil types will ensure sustainable productivity and health. The letter continues to repeat inaccurate statements about runoff resulting from precipitation and fails to acknowledge the marked increase in infiltration rate provided by the thick grass thatch.
- Page 19 - Topography and Soils: The Tebbutt letter repeats claims already addressed in the reply to the Shaw report. It also attempts to contradict the dramatic improvement of soil health and organic matter status resulting from manure application and the provision of nutrients and carbon-sources that the microorganisms utilize. The claim that benefits only accrue when manures are incorporated through tillage makes it clear that Shaw misunderstands the soil - biological system, which is built up and enhanced with manure and effluent application. The interface of soil and atmosphere is the zone of maximum potential biological activity and this high level of activity will be stimulated by the application of manures and effluents that will percolate into the surface organic layers.

**Replies to WET Comments on Hawai'i Dairy Farms' Draft Environmental Impact Statement: Section 4.1 Grading and Topography**

Paragraph 2. Soil Analysis results.

I disagree with the WET report comments and conclusions regarding the soil nutrient levels. The WET soils sample analyses do not contain analyses of the exchangeable nutrient cations calcium, magnesium, potassium and sodium, which are necessary to assess soil salinity. Their report only contains measures of calcium, magnesium, potassium and sodium in the saturated paste soil solution. Their saturated paste analysis is only designed to assess soil salinity and sodicity, not soil nutrient status such as the cation exchange capacity, which is needed to calculate the exchangeable sodium percentage. The analysis conducted by my team resulting in the findings included in the EIS and its Appendix C does permit the assessment of both nutrient status of calcium, magnesium, and sodium as well as the levels of nitrogen and phosphorus.

The conclusion in the WET report that the soils are rich and well constituted with nutrients is incorrect both because it is not based on the accepted methods of assessing soil nutrient status and because the interpretation of their analysis was not correct. The nutrient levels reported in their 8 samples actually confirms our data that indicates extremely low levels of nutrients. The analysis in Appendix C of the EIS provides a more complete and thorough assessment of both nutrient status and salinity. We, therefore, disagree with the WET analysis results and conclusions for the following reasons:

- The use of saturated paste to measure soil nutrient status is not appropriate to measure plant availability and soil cation status. It does not measure the levels of nutrient cations on the exchange complex and thus is not adequate data on which to base the claim of high nutrient content.
- The key nutrients that are of concern with effluents and manures – nitrogen and phosphorus as measured by the amounts of ammonium and nitrate were extremely low. The Kjeldahl nitrogen levels varying from 0.14 to 0.3 % (estimate of organic N) were, as expected, relatively low in these typically highly weathered soils of the tropics. These levels of soil organic nitrogen, while apparently are high, are not due to the typical characteristics of soils of the tropics that have high levels of organic carbon and nitrogen, but rather that carbon and nitrogen are not readily plant available.
- The measures of plant available phosphorus, the Olsen phosphorus method, indicates levels of the nutrient phosphorus as low as < 1 with only one sample of 11 mg/L. These levels are well below the target level of 25 to 50 for long term crops while higher target levels are given for short term crops and vegetables.
- More importantly the WET soil analysis does not show phosphorus sorption which is a measure of the long term tendency for the soils to sorb and retain phosphorus. The soil capacity to sorb extremely large amounts of the nutrient phosphorus, we know, from existing soils data is extremely high in these soils.

Continuing on paragraph 2 the WET report agrees that levels of plant available nitrogen and phosphorus are low in the soil samples analyzed. They go on to speculate, incorrectly, that such low levels are due to "robust vegetation." The authors do not recognize and apparently do not have experience with highly weathered soils of the tropics where levels of nitrogen and phosphorus are low, but more importantly the soils have an extremely high capacity to sorb and remove phosphorus from solution and thus from contact with storm runoff, a characteristic of great importance in the dynamic, adaptive management strategies planned for the Hawai'i Dairy Farm.



Paragraph 3 The WET report also incorrectly described the extremely dense vegetation as native. In fact, the grasses are not native grasses, but instead are the invasive species *Megathyrsus maximus* (locally called guinea grass). The noted abundance of this vegetation, without significant nutrient or water input, illustrates the high potential productivity of the pasture if a C4 grass such as kikuyu is managed well.

# 27-A

## Response To Archaeological Comments By Deirdre Encarnacion, M.A.

To: Group 70 International
From: Michael F. Dega, Ph.D.
Project Manager
Scientific Consultant Services, Inc.
Date: September 6, 2016

Subject: Comments by Deirdre Encarnacion, M.A.

Traditionally, Native Hawaiians would occasionally bury their ancestor's remains near or under their house sites. This occurred more frequently in later pre-Contact times but was not a wide spread practice. Native Hawaiians would also bury many of their ancestors (maka`ainana) near the coast, and there numerous examples of such throughout the island chain. SCS understands these patterns. In Mahaulepu, the only potential house sites were associated with a cluster of LCA's along the eastern side of the valley. SCS performed specific testing in these locations to identify the presence/absence of cultural materials and burials. No cultural materials or burials were identified through extensive testing of subsurface contents.

It is very unlikely that burials are present in the project area, given the project area location, land use through time, and the lack of findings during the archaeological survey. However, the State of Hawaii has rules which clearly address the inadvertent discovery of burials. Chapter 300 discusses Native Hawaiian burials as well as protocols when burials are encountered. Essentially, if remains are found and confirmed as human, all work in the area ceases and the SHPD is called to the site for further identification. The SHPD, in consultation with members of the Kauai/Niihau Islands Burial Council, is tasked with making the determination to leave the burial in place or re-locate the burial. Neither the land owner nor the archaeologist determines the final disposition of the burial. The rules and procedures are very specific toward Native Hawaiian burials identified in Hawaii and the applicant's representatives (SCS) are extremely familiar with these laws.