SIERRA CLUB OF HAWAI'I
O'AHU GROUP

October 23, 2018

HHF Planners
Attn: Ron Sato
733 Bishop St., Suite 2590
Honolulu, Hawaii 96813

State of Hawaii
Land use Commission
Department of Business, Economic Development & Tourism
Attn: Scott Derrickson
PO Box 2359
Honolulu, Hawaii 96804

RE: Response to Draft Environmental Impact Statement for
Hawaiian Memorial Park Cemetery Expansion Project
Kaneohe District, Oahu, Hawaii, Tax Map Key: (1) 4-5-033: por. 001

Dear Land Use Commissioners and Administrators:

The O'ahu Group of the Sierra Club of Hawai'i is concerned that the proposed cemetery expansion at Hawaiian Memorial Park will adversely affect the survival of a population of endangered Blackline Hawaiian Damselflies that live in a mini-wetland on conservation land on the slopes of Oneawa Hills.

Figure 1: Blackline Hawaiian Damselfly -- Most common male morph recently discovered in Kāne'ohe

CONSERVTION STATUS

The Blackline Hawaiian Damselfly – Megalagrion nigrohamatum nigrolineatum -- was first described by RCL Perkins in 1899. It used to be widespread on O'ahu from sea level to the mountain tops, but their numbers crashed since the 1960's due to loss of habitat and invasive species. The damselflies were placed on the federal list of endangered species by Dan Polhemus in 2012. Today they are only found on O'ahu – at high elevations around 2,000 feet -- except for this newly found low elevation population in Kāne'ohe discovered by Liam Gray in 2016. See Exhibit A for an account of the discovery of the endangered damselflies and more close-up photos of the damselflies in Kāne'ohe.

PINAO IN HAWAIIAN CULTURE

Pinao is the Hawaiian word for dragonflies and damselflies. Pinao are specifically mentioned in the Kumulipo, the Hawaiian creation chant, on line 290 of the chant.

> *Puka kana keiki he Pinao, lele*
> *Out came its child a dragonfly, and flew*

Pinao was the name of the heiau where the Naha Stone – a huge heavy stone -- was located. It was prophesized that whoever overturned the Naha Stone would conquer all the islands. High ranking chiefs watched a young Kamehameha over turn the Naha Stone in 1775. There was a pillar at the entrance to the Pinao Heiau that was called the Pinao Stone. Both the Naha Stone and the Pinao Stone were moved to the Hilo Public Library in 1916 where they reside today.

Pinao is the name of a bay at Kalae – South Point – on Hawaii Island where a fishing village once stood. Both the bay and fishing village were named Pinao.

Pinapinao ānuenue -- is in the Pukui/Elbert Hawaiian Dictionary -- © 2003 edition. Pinapinao ānuenue is rainbow-eye damselfly (Megalagrion nigrohamatum nigrolineatum). Lit., rainbow damselfly.

DAMSELFIES IN POAMOHO STREAM

Since the damselfly population in Kāne'ohe is small – I never saw more than 8 individuals at a time, I ventured high into the Ko'olau Mountains see a more robust population of Blackline Hawaiian Damselflies at about 2,000 feet elevation. My goal was to get a better idea of the range colors and patterns the damselfly can assume.

I was pleased to find an actively breeding colony at Poamoho Stream. I was amazed to see that the thoraxes of Blackline Hawaiian Damselflies can assume a wide range of colors: red, orange, yellow, green, blue, and purple. Their eyes are colored independently from the body and can be bi-colored or tri-colored. The name pinapinao ānuenue – rainbow eye damselfly – is a most appropriate name for these beautifully colored damselflies.

Figure 2: The most common male morph mates with a less common blue female morph at Poamoho Stream

Figure 3: The male has blue eyes in this pair and the female is green at Poamoho Stream

Figure 4: The male has tri-colored rainbow-eye while the female is purple at Poamoho Stream

Figure 5: The male's thorax is deep crimson while female' thorax is a yellow-orange at Poamoho Stream

DAMSELFLY HABITAT

The endangered Blackline Hawaiian Damselflies survive on the slopes of Oneawa Hills in Kāne'ohe because ground water seeps to the surface and creates a miniature wetland about 150 feet long by 15 feet wide. The damselflies lay their eggs in the water which hatch into nymphs and molt several times before becoming adults and completing their life cycle. Without this miniature wetland the population of damselflies would cease to exist.

The hydrological analysis indicates that the well at the head of the seep does not get its water from a deep underground aquifer. Instead the seep gets its water from the movement of shallow ground water that converge at the spot beneath the well from several directions.

WETLANDS DESIGNATION

According to the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA), *"Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."*

The 1987 Corps of Engineers Wetlands Delineation Manual and Regional Supplements defines criteria for determining whether an area is a wetland. Wetland hydrology, hydric soil, and hydrophytic vegetation indicators are used to determine whether an area is a wetland. Has the U.S. Army Corps of Engineers evaluated the damselfly habitat to determine whether the miniature wetland is a wetland as defined by the Corps and EPA?

GRADING

The proposed expansion involves grading the slopes of the Oneawa Hills on the western end of the site. Much of the western hillside would be excavated up to 40 feet in height and areas near the top of the hillside would be reduced up to 100 feet in height. The earth will be moved to fill low spots and to establish a consistent grade. A large volume of earth (57,287 cubic yards of soil and rocks) will be taken from high areas and moved into low areas and compacted to create the desired grade.

Since the seep is fed by the movement of shallow ground water, grading Oneawa Hills is likely to affect ground water supplies to the seep. Removing steep slopes and compacting the soil to build up low areas will undoubtedly affect the movement of shallow ground water when the slopes are redefined.

DEFORESTATION

The proposed expansion involves cutting down thousands of the trees on Oneawa Hills in the Kāwā Watershed. A significant part of the hillside will no longer be forested. Removal of trees will reduce the moisture transpired by the trees into the atmosphere which promotes cloud formation and rainfall.

Olelo Noe'au	Hahai no ka ua i ka ulu la'au
Traditional Hawaiian Proverb	The rain follows the forest

Hawaiians knew that forested slopes were crucial to attracting clouds and rain and memorialized that knowledge in a proverb.

Over the past 50 years rainfall on Oahu shows a declining trend. Deforestation of the trees on Oneawa Hills is likely to exacerbate this trend. It can be reasonably anticipated that reduced rainfall and decreased ground water supplies to the seep is a likely scenario when trees are cut down from the site.

RUN-OFF

The proposed expansion involves cutting down trees on the hillside and the planting lawn grass over about an 18-month period. A large volume of earth (57,287 cubic yards of soil and rocks) will be relocated in the process. Heavy rain during this period could send tons of mud and rocks flowing downslope to cover and destroy the damselfly habitat.

The mud and rocks would do further damage as they flowed into the Kāwā Stream and into Kāne'ohe Bay. Many coral reefs in Kaneohe Bay were killed in the 1950-60s when mud and silt from construction sites flowed into the bay and smothered the coral.

Even after the slope is established and grass grows on the lawn, muddy run-off would continue to threaten the site especially with extreme rain events happening at greater frequency and intensity. The 49 inches of rain of torrential rain on Kauai over a 24-hour period in April 2018 wasn't even a hurricane – just a big rain storm. Muddy run-off threatens to inundate, destroy or degrade the damselfly habitat. The retention ponds should be increased in size to accommodate more severe rainstorm.

RETAINING WALLS, RUN-OFF, and CANOPY

Figure 2.3 Preliminary Grading Cut and Fill Plan shows the location of three proposed retaining walls. The lowest of the three walls "Proposed Wall A" appears to be just 10-20 feet away from the miniature wetland.

The walls are crucial to holding back soil relocated from grading the hill side. With "Proposed Wall A" being just 10-20 feet away there is zero margin of error to avert disaster should the system fail under extreme rainfall conditions and/or when plans go awry. With freak rain events becoming increasingly prevalent, it is reasonably foreseeable that a larger buffer is needed to preserve the miniature wetland.

The damselfly habitat is dark – many trees -- schefflera, strawberry guava, java plum and other introduced trees -- provide shade over the seep which keeps light levels low, prevents evaporation, and keeps humidity levels high. Under the existing plan "Proposed Wall A" is just 10-20 feet away with no tree canopy over that part of the habitat. There needs to be a canopy of trees for at least 100 feet (but preferably more) to maintain the low-light and high-humidity conditions at the miniature wetland.

GROUND WATER CONTAMINATION

The proposed expansion calls for conservation land in the Kāwā Watershed to be zoned urban so the land can be used as a cemetery. Cemeteries adversely affect ground water.

Modern human burials introduce formaldehyde and other toxic elements and chemicals into the environment. Mercury in dental fillings, pacemakers, esophageal tubes, and other medical products, can leach into groundwater as they decay. Unlike formaldehyde which breaks down more readily, mercury is stable and persists in the environment for long periods of time.

Toxic chemicals from coffins are also released into the groundwater including varnishes, sealers and preservatives and metal handles and ornaments used on wooden coffins. Many paints still contain lead, mercury, cadmium, and chromium. Arsenic is sometimes used as a pigment, a wood preservative and anti-fouling agent. Barium is sometimes used as a pigment and corrosion inhibitor.

All of these toxic chemicals, including pesticides, fertilizers, and weed killers used to maintain the lawn and shrubbery, soak into the earth and contaminate the ground water. Some of these compounds are toxic and known carcinogens to humans and wildlife.

Since shallow ground water emerges at the miniature wetland, it is foreseeable that toxic chemicals from the burial of humans will appear in the damselfly habitat. Additionally, there are 19 permits for wells in the area with a total permitted use of 10.312 mgd some of which are possibly used for drinking water by the community. The accumulation of tens of thousands of bodies and caskets has the potential to contaminate ground water resources for those who tap the Ko'olaupoko aquifer.

ADDITIONAL MEASURES TO MITIGATE ADVERSE AFFECTS

The Sierra Club commends Hawaiian Memorial Park for adjusting the original expansion plan to accommodate the damselfly habitat. The footprint of the expansion has been moved back to avoid grading the miniature wetland. However, the Sierra Club sees additional measures that could be implemented to enhance the ability of the damselflies to survive.

The damselflies chances for survival will be greatly improved if the landowner could install a long hose to artificially supply the habitat with clean water should something happen to disrupt the water flow or if the ground water became contaminated. A long hose is relatively inexpensive and can be deployed in under half a day to provide water. This would provide additional security to the habitat that water will always flow in the miniature wetland.

We do not completely understand or appreciate all the factors that resulted in the survival of this remnant population of endangered damselflies at this spot. In order to give the best chances for survival the goal should be to alter the habitat as little as possible. A canopy of trees shades the wetland, reduces evaporation, and keeps humidity levels high. Their chances for survival will be enhanced if the landowner left the canopy of trees intact over the wetland and for at least another 100 feet beyond the habitat before the trees are cut down.

A habitat management plan should be developed to address all the items and tasks that must be in place or performed to ensure the critical habitat for the damselflies remains intact over the long haul.

There is increasing consciousness about green burials -- ways of caring for the dead that lessen the environmental impact, reduce impact on water quality, and reduce carbon emissions. Green burials involve the use of non-toxic and biodegradable materials, for caskets, shrouds, and urns, and the use of fungi to breakdown toxic chemicals in the human body before releasing them into the environment. It would be ideal if green burials could be offered to reduce adverse impacts to water quality. Green burials are still in its infancy and the Sierra Club would like to see Hawaiian Memorial Park become a pioneer and leader in promoting green burials to the public.

CLOSING

The Sierra Club places high priority on the survival of this population of Blackline Hawaiian Damselflies into the future. Pinapinao ānuenue -- rainbow-eye damselflies – are beautiful insects that come in a spectacular array of colors and patterns. These damselflies are unique to the natural and cultural history of the Hawaiian Islands and are found only on O'ahu. These damselflies are biological treasures that deserve to be preserved for future generations. Please consider these special creatures as you decide this matter.

Sincerely,

Nathan Yuen

Nathan Yuen
Conservation Chair
Sierra Club of Hawaii

EXHIBIT A

Discovery of
Blackline Hawaiian Damselflies
in Kaneohe

January 22, 2018

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HHF Planners
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With a copy to:

Mr. Scott Derrickson
State of Hawaii
Land Use Commission
Department of Business, Economic Development and Tourism
PO Box 2359
Honolulu, HI 96804

Project: Docket Number: A17-804
Hawaiian Memorial Park Cemetery Project
Kane'ohe District, O'ahu, Hawaii
(1) 4-5-033: por.001 (Private Property)

Dear Sir or Madam:

I am responding to the Environmental Impact Statement Preparation Notice by Hawaiian Memorial Park.

I work as an accountant for an engineering consulting firm during the week but on the weekends I become an amateur naturalist, hiker, and photographer. For the past 20 years I have been venturing to remote parts of our islands to photograph the native plants and animals of the Hawaiian Islands many of which are rare or endangered. I have a blog – HawaiianForest.Com – which documents some of the rarest species on the planet.

I served as a commissioner for the State of Hawaii's Natural Area Reserves System (NARS) Commission administered by the Department of Land and Natural Resources from 2013 to 2017. I currently serve as Conservation Chair for the Sierra Club of Hawaii Executive Committee. I am also a member of the Hawaiian Entomological Society.

In this matter, I am acting on my personal behalf as a private citizen. I was involved in the initial discovery and confirmation of the population of Blackline Hawaiian Damselflies — Megalagrion nigrohamatum nigrolineatum – on conservation land owned by Hawaiian Memorial Park.

My friend Patrick Shea was a candidate for State House of Representatives District 49 in the 2016 election. In June 2016, Patrick met Liam Gray while canvassing the homes on Ohaha Street. Liam told Patrick that he discovered a previously unknown population of endangered Blackline Hawaiian Damselflies in the backyard of Ernest and Bettye Harris on Ohaha Place who live adjacent to the land owned by Hawaiian Memorial Park. Patrick asked whether I could confirm the find and made arrangements for Liam to take us to the site.

On June 26, 2016, Liam Gray took me and several windward residents – Patrick Shea, Grant Yoshimori, Caitlyn Yoshimori, Rich McCreedy, and Julie McCreedy – to see the endangered damselflies. I was surprised to see these damselflies in Kāneʻohe. I had previously only seen this species of damselflies in native forests and streams above 2,000 feet elevation in the Koʻolau Mountain. I did not expect to see them at this low elevation in Kāneʻohe under alien trees – scheflera, albezia, strawberry guava, and other non-native vegetation.

The Pukui/ Elbert Hawaiian dictionary has an intriguing entry for this damselfly — pinapinao ānuenue — the rainbow-eye damselfly.

This is the most common morph for males — it has big round eyes that are red, green, and yellow, a orange-yellow-black thorax, and a segmented abdomen with a red tip.

I have taken many photos of these damselflies at the low elevation site in Kāneʻohe. There are multiple morphs (color patterns) for both male and female damselflies. One of the morphs has a

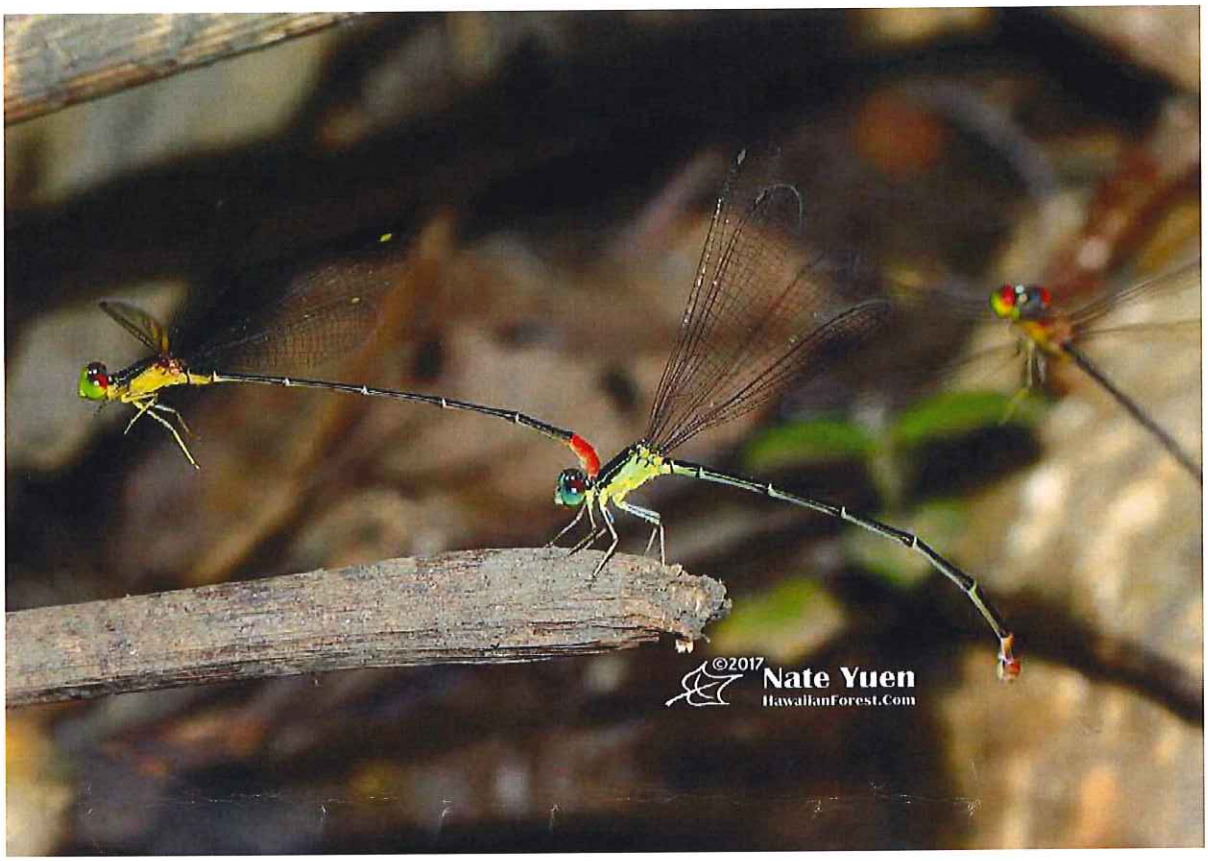
three colored-eye. The name pinapinao ānuenue — the rainbow-eye damselfly – is appropriate for this colorful insect.

This is the most common female morph – the eyes are red on top and blue on the bottom.

I contacted Hawaiian damselfly expert Dan Polhemus at the US Fish & Wildlife Service and brought him to the site. He did the research to get this and several other damselfly species listed as endangered species. Dan Polhemus confirmed that this was a previously unknown population of Blackline Hawaiian Damselflies — Megalagrion nigrohamatum nigrolineatum. Dan was also surprised to see these damselflies at this low elevation. He said that this species is endemic only to O'ahu and once inhabited the streams and wetlands throughout the island at all elevations. But they are rare today with less than 1,000 estimated to remain.

Blackline Hawaiian Damselflies are on the federal list of endangered species. Loss of habitat and predation by invasive species are the biggest reasons for their decline. Today they are found at high elevations in the Ko'olau Mountains except for this population in Kāne'ohe. For some reason this population managed to survive at low elevation.

This population of damselflies exists because of a seep – a small fresh water spring – that trickles down a shallow ravine and creates a miniature wetland where they breed. This habitat is crucial to the survival of this remnant population of low-elevation rainbow-eye damselflies. If the habitat is destroyed or otherwise adversely affected, this population of damselflies will likely cease to exist.



A rival male darts in to interrupt a pair of mating rainbow-eye damselflies.

The proposed cemetery expansion is likely to adversely affect this population of damselflies. It is my understanding that Hawaiian Memorial Park is required to develop a habitat conservation plan to protect these endangered insects. The plan would need to address several issues important to the continuation of this unique population of damselflies.

Of greatest concern is that the proposed cemetery expansion could disrupt the ground water hydrology of the area and cause the seep to stop flowing. The damselfly population cannot survive without water flowing in their habitat.

Another big concern is run-off from the construction or operation of the expanded cemetery could destroy the habitat or introduce fertilizers/pesticides that harm the damselflies. Also studies have shown that the decomposition of human bodies could introduce arsenic and other toxins into the ground water adversely affecting water quality in the seep.

It is also important to establish a sufficient buffer between the expanded cemetery and the damselfly habitat so they continue to exist and breed at the seep without disruption and interference by humans.

After the female is fertilized the pair fly to water where she curls her abdomen and lays eggs in the seep.

The discovery of this previously unknown population of low elevation Blackline Hawaiian Damselflies in Kāne'ohe is a remarkable and significant find. Rainbow damselflies are an endangered species found only on O'ahu and are unique to the natural history and heritage of Kāne'ohe. The low elevation habitat for these damselflies needs to be protected to ensure their survival into the future.

Thank you for this opportunity to protect these damselflies. I would appreciate being places on your distribution list so I can participate in this proceeding though the various stages of the process.

Sincerely,

Nathan Yuen

EXHIBIT B

Sources

EXHIBIT B
SOURCES

Kumulipo A Hawaiian Creation Chant
Edited and translated by Martha Warren Beckwith (University of Chicago Press, 1951)
Interlinearization by David Stampe
http://www.kauainenehcp.com/uploads/8/1/8/0/81802884/kumulipo-text.pdf

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The Story of the Naha Stone
HokuLoa Blog, Posted on December 13, 2015
https://nupepa-hawaii.com/2015/12/13/on-the-moving-of-the-na-ha-stone-to-hilo-library-100-years-ago-and-its-history-5-of-6-1915/#more-20162

Naha Stone is Moved
http://ulukau.org/elib/collect/elibrary/index/assoc/D0.dir/doc112.pdf

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Pinao Bay and Fishing Village at Kalae, South Point, Hawaii Island
South Point Resources Management
https://dhhl.hawaii.gov/wp-content/uploads/2015/07/South-Point-Pre-Final-Plan_092916_w-cover-app_low-res.pdf

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Rainfall Changes in Hawai During the Last Century
Henry F. Diaz1, Pao-Shin Chu, and Jon K. Eischeid1
Climate Diagnostics Center, NOAA, Boulder, CO
Department of Meteorology, University of Hawaii at Manoa, Honolulu, HI
https://ams.confex.com/ams/pdfpapers/84210.pdf

Changes in Precipitation Extremes in the Hawaiian Islands in a Warming Climate
Pao-Shin Chu, Ying Ruan Chen, and Thoas A. Schroeder
Department of Meteorology, School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, Honolulu, Hawai
http://www.soest.hawaii.edu/MET/Hsco/Paper/2010JCLI3484.pdf

Is a Green Burial Right for You?
By Chris Raymond, VeryWellHealth
https://www.verywellhealth.com/what-is-a-green-burial-1131911

What is Green Burial?
Green Burial Council
https://greenburialcouncil.org/home/what-is-green-burial/