

Round-Leaved Chaff Flower
(*Achyranthes splendens* var. *rotundata*)
Habitat Conservation Plan
Kenai Industrial Park Project

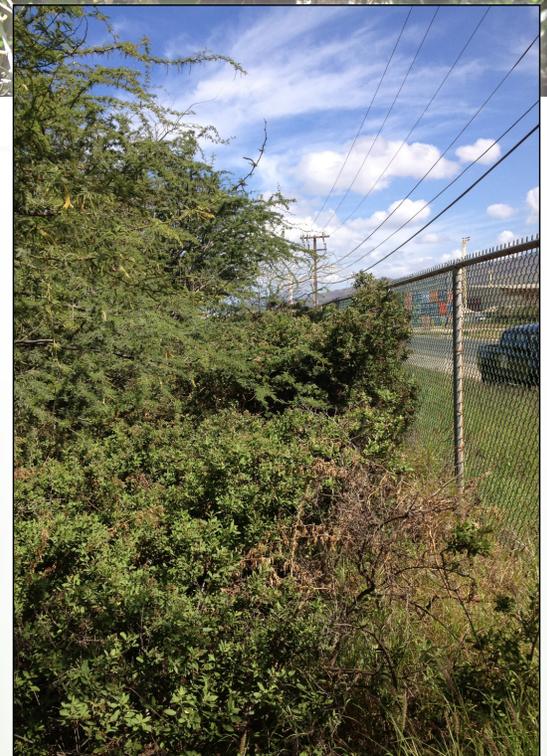


Prepared for:
Hawai'i Department of Land and Natural Resources

Applicant:
CIRI Land Development Company
2525 C Street, Suite 500
Anchorage, Alaska 99503

Initial draft prepared by:
AMEC Environment & Infrastructure, Inc.
23049 Ualena Street, Suite 1100
Honolulu, Hawai'i 96819

Revisions and final document produced by:
SWCA Environmental Consultants, Honolulu Office
Bishop Square: ASB Tower
1001 Bishop Street, Suite 2800
Honolulu, Hawai'i 96813



October 2013

**ROUND-LEAVED CHAFF FLOWER
(*ACHYRANTHES SPLENDENS* VAR. *ROTUNDATA*)
HABITAT CONSERVATION PLAN
KENAI INDUSTRIAL PARK PROJECT**

Prepared for:

Hawai'i Department of Land and Natural Resources

Applicant:

CIRI Land Development Company

2525 C Street, Suite 500

Anchorage, Alaska 99503

Draft Prepared by:

AMEC Environment & Infrastructure, Inc.

3049 Ualena Street, Suite 1100

Honolulu, Hawai'i 96819

Revisions and Final Document Produced by:

SWCA Environmental Consultants

Honolulu Office

Bishop Square: ASB Tower

1001 Bishop Street, Suite 2800

Honolulu, Hawai'i 96813

October 2013

CONTENTS

1. Introduction and Project Overview	1
1.1. Executive Summary	1
1.2. Applicant.....	3
1.3. Regulatory Context	3
1.3.1. HRS Chapter 195D	3
1.4. Project Description.....	5
1.4.1. Project Location and Description.....	5
1.4.2. Covered Activities.....	5
1.4.3. Purpose and Need for the Project.....	9
1.5. List of Preparers	9
2. Description of Habitat Conservation Plan.....	10
2.1. Purpose of This HCP	10
2.2. Scope and Term	10
3. Environmental Setting.....	11
3.1. Location, Vicinity, and Climate	11
3.2. Topography and Geology.....	11
3.3. Soils.....	12
3.4. Hydrology, Drainage and Water Resources.....	12
3.4.1. Surface Water.....	12
3.4.2. Flooding	12
3.4.3. Groundwater	12
3.5. Land Use Designations	13
3.6. Vegetation	13
3.6.1. Listed Plant Species	13
3.7. Fauna.....	18
3.7.1. Surveys Conducted	18
3.7.2. Non-Listed Species	18
3.7.3. Listed Species	18
4. Biological Goals and Objectives	19
5. Potential Impacts	20
5.1. Estimating Project-Related Impacts.....	20
5.2. Cumulative Impacts to Listed Species	20
6. Mitigation Measures.....	21
6.1. Selection of Mitigation Measures	21
6.2. Mitigation Measures	21
6.2.1. Proposed Mitigation Site Description	23
6.2.2. Mitigation Design	26
6.3. Maintenance	27
6.4. Schedule for Implementation	28
6.5. Consistency with Approved Recovery Plans	28
6.6. Measures of Success	29

6.7. Contingency measures	30
7. Implementation	31
7.1. HCP Administration.....	31
7.2. Monitoring and Reporting.....	31
7.2.1. Monitoring	31
7.2.2. Reporting.....	35
7.3. Adaptive Management	36
7.4. Funding	36
7.5. Changes in Conditions or Circumstances	36
7.6. Permit Duration.....	36
7.7. Revisions and Amendments.....	37
7.7.1. Minor Amendments	37
7.7.2. Major Amendments.....	37
7.8. Permit Transfer	38
8. Conclusion	39
9. Literature Cited	40

FIGURES

Figure 1.1. Project location.....	6
Figure 1.2. Project site.....	7
Figure 1.3. Land use.....	8
Figure 3.1. Karst topography and sinkholes within the project site.....	11
Figure 3.2. Round-leaved chaff flower located within the project site.....	13
Figure 3.3. Documented round-leaved chaff flower occurrences on O‘ahu.....	17
Figure 6.1. Proposed mitigation site at the Kalaeloa Unit.....	22
Figure 6.2. Kalaeloa Unit, Pearl Harbor NWR, Designated Work Units.....	24

TABLES

Table 1.1. Summary of Mitigations Measures to Offset the Requested Take of Round-Leafed Chaff Flower.....	2
Table 6.1. Goals 2 and 4 from the Pearl Harbor NWR CCP.....	25
Table 7.1. Five-Year Maintenance and Monitoring Schedule.....	35
Table 7.2. Summary of reporting deliverables for the round-leaved chaff flower HCP.....	35

APPENDICES

Appendix A Self-Storage Conceptual Design Plan	
Appendix B Botanical Survey Reporting	
Appendix C Site Photographs	
Appendix D SWCA Survey Report	
Appendix E USFWS NWR Letter of Support	
Appendix F State of Hawaii Plant Permit and City/County of Honolulu approval for Seed Collection	
Appendix G HCP Implementation Schedule	
Appendix H KIP HCP Funding Matrix	

This page intentionally blank

ABBREVIATIONS

AMEC	AMEC Environment & Infrastructure, Inc.
amsl	above mean sea level
CCP	Comprehensive Conservation Plan
CIRI	Cook Inlet Region, Inc.
CLDC	CIRI Land Development Company
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
ESA	Endangered Species Act
ESRC	Endangered Species Recovery Committee
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HRPRG	Hawaiian Rare Plant Restoration Group
HRS	Hawai'i Revised Statutes
IPM	Integrated Pest Management
ITL	Incidental Take License
ITP	Incidental Take Permit
KIP	Kenai Industrial Park
NAS	Naval Air Station
NWR	National Wildlife Refuge
NRCS	Natural Resources Conservation Service
SWCA	SWCA Environmental Consultants, Inc.
WRCC	Western Regional Climate Center
USDA	U.S. Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

This page intentionally blank

1. INTRODUCTION AND PROJECT OVERVIEW

1.1. Executive Summary

This Habitat Conservation Plan (HCP) has been prepared pursuant to Chapter 195D (sections 4 and 21) of the Hawai'i Revised Statutes (HRS) for the incidental take of round-leaved chaff flower (*Achyranthes splendens* var. *rotundata*), a federal- and state-listed endangered species. The plan seeks to offset impacts to round-leaved chaff flower that would result from the proposed development by implementing measures that would protect and perpetuate the species as a whole. The plan provides a description of the development actions and minimization and mitigation strategies.

The entire 0.75-acre KIP project site is proposed to be developed as a 62-unit self-storage facility, or as otherwise permitted under the applicable zoning district. A conceptual development plan of the site is presented in Appendix A. The proposed development of the parcel would result in direct incidental take of three round-leaved chaff flower individuals and associated seed bank.

In order to offset impacts to round-leaved chaff flower from the development of the KIP project, CIRI Land Development Company (CLDC) proposes to conduct in-kind off-site mitigation in the form of habitat restoration and creation, and outplanting of round-leaved chaff flowers. The proposed off-site mitigation area is located on preserved lands of the Pearl Harbor National Wildlife Refuge (NWR) Kalaeloa Unit located approximately 2 miles from the project site. The Pearl Harbor NWR Kalaeloa Unit was created to recover and restore native Hawaiian plant species that once dominated the 'Ewa Plain. This area is considered one of the best examples of the remaining coastal plant ecosystem in the State.

This HCP outlines a mitigation strategy to create new populations of round-leaved chaff flower on the Kalaeloa Unit from the genetic stock (seeds and cuttings) of the three individuals that will be impacted as a result of the KIP project, as well as from an additional nearby seed source. The exact outplanting locations will be coordinated with NWR staff based on suitable habitat.

The intent of these activities is to 1) maintain genetic representation of the original population by growing cuttings and seeds in nurseries for outplanting efforts and placing seeds in a seed storage facility (Lyon Arboretum); and 2) to establish new wild populations within protected suitable habitat located on Pearl Harbor NWR Kalaeloa Unit.

The Applicant anticipates a 10-year permit term, throughout which this HCP would be in effect, but the term may be terminated early if all success criteria have been met. The provisions provided herein for adaptive management would allow flexibility and responsiveness to new information throughout the duration of the HCP.

Table 1.1. Summary of Mitigations Measures to Offset the Requested Take of Round-Leafed Chaff Flower.

Mitigation at Pearl Harbor NWR, Kalaeloa Unit	
1.	Collection of seeds from plants on-site and from a second, off-site population. <ol style="list-style-type: none">Seeds have been collected and are stored at Lyon Arboretum.
2.	Propagation of round-leaved chaff flower from these seeds at Hui Ku Maoli Ola native plant nursery.
3.	Outplanting of no fewer than 120 round-leaved chaff flower plants at the Kalaeloa Unit of Pearl Harbor NWR in areas not currently occupied by this species. <ol style="list-style-type: none">Individuals will be tagged and documented with submeter global positioning system (GPS).Outplanting will occur in work units 1, 2, and/or 5 of the Kalaeloa Unit (Figure 6.2).All initial outplanting will occur within the first wet season after approval of incidental take license (ICL).All plants will be planted within one season.Site preparation consists of removal of all nonnative vegetation, followed by irrigation to stimulate germination of seedbank. If a large number of native plants germinate, subsequent weeding will be done by hand, otherwise using herbicide. This reduces the nonnative seedbank.Plants will be planted in four plots of 30 plants, with minimum spacing of 4 feet.A minimum of 120 plants will be established by Year 5.There will be recruitment of seedlings that survive through the dry season.At least 25% of the planted lineages will produce seed by Year 5.The number of seedlings recruited into the mature age class will be greater than the mortality rate of existing adult plants over a five-year period, with a minimum recruitment of 25% of the number of outplanted individuals over a five-year period;
4.	Management of the outplanted population for five years: <ol style="list-style-type: none">Outplanted individuals will be watered every other day for 1 month, then once a week for 1 month. Irrigation system will remain in place for 5 years, in case of severe drought events.Removal of nonnative species from the outplanting area.<ol style="list-style-type: none">No mature kiawe by Year 5.Less than 25% cover of nonnative herbaceous species.Weeding will be scheduled twice a month for the first 6 months after planting, then once a month.Replacement of nonnative species with compatible native plant species.<ol style="list-style-type: none">Native plant cover will be greater than 25% by Year 5.Maintenance of two-foot vegetation-free buffer around outplants.
5.	Monitoring for five years or until mitigation goals have been met. Monitoring consists of baseline monitoring, horticultural monitoring, botanical monitoring, and photo documentation.
6.	USFWS will assume maintenance responsibility after Year 5 or once mitigation goals have been met.
Contingency Measures	
1.	If survivorship falls below goal within Year 1, planting of additional individuals in separate area at the Kalaeloa Unit.
2.	If success criteria are not met within five years, an additional outplanting site will be identified either within the Kalaeloa Unit of the Pearl Harbor NWR or at an alternative site. In absence of such site, additional compensation measures will be implemented.
3.	Other adjustments as appropriate adaptive management measures (Section 7.3)

1.2. Applicant

CLDC is a wholly owned subsidiary of CIRI. CIRI is an Alaska Native corporation. It is one of 12 Alaska-based regional corporations established by the Alaska Native Claims Settlement Act of 1971 to benefit Alaska Natives who had ties to the Cook Inlet Region (CIR). The company is owned by more than 7,300 Alaska Native shareholders of Athabascan and Southeast Indian, Inupiat, Yup'ik, Alutiiq, and Aleut descent.

CLDC is a real-estate development, investment, and property management company with a commercial real-estate portfolio located primarily in Alaska, Texas, California, and Hawai'i. CLDC is a certified Minority Business Enterprise. CLDC's holdings include all major commercial real-estate asset classes.

Contact:

Dave Pfeifer
Vice President, Real Estate
Cook Inlet Region, Inc. (CIRI)
2525 C Street, Ste. 500
Anchorage, AK 99503
Ph: (907) 263-5110 / Fax: (907) 263-5190

1.3. Regulatory Context

1.3.1. HRS Chapter 195D

HRS section 195D-4 states that any endangered or threatened species of fish or wildlife recognized by the Endangered Species Act (ESA) shall be so deemed by State statute. Like the ESA, HRS Chapter 195D prohibits the unauthorized "take" of such endangered or threatened species [Section 195D-4(e)]. Prohibitions apply to any threatened and endangered species of aquatic life, wildlife, and land plant [section 195D-4(e)].

Under section 195D-4(g), the Board of Land and Natural Resources (BLNR), after consultation with the State's Endangered Species Recovery Committee (ESRC), may issue a temporary incidental take license (ITL) to allow a take otherwise prohibited if the take is incidental to the carrying out of an otherwise lawful activity. To qualify for an ITL, the following conditions must be met:

The applicant to the maximum extent practicable will minimize and mitigate the impacts of the take through a habitat conservation plan (HCP).

- The applicant guarantees that adequate funding for the HCP will be provided.
- The applicant posts a bond, provides an irrevocable letter of credit, insurance, or surety bond, or provides other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provides other means approved by BLNR, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take.
- The plan increases the likelihood that the species will survive and recover.
- The plan takes into consideration the full range of the species on the island so that cumulative impacts associated with the take can be adequately assessed.

- The activity permitted and facilitated by the license to take a species does not involve the use of submerged lands, mining or blasting.
- The cumulative impact of the activity, which is permitted and facilitated by the license, provides net environmental benefits.
- The take is not likely to cause the loss of genetic representation of an affected population of any endangered, threatened, proposed or candidate plant species.

Section 195D-4(i) directs the Hawai'i Department of Land and Natural Resources (DLNR) to work cooperatively with federal agencies in concurrently processing HCPs, ITLs and federal incidental take permits (ITPs). Section 195D-21 deals specifically with HCPs and its provisions are similar to those in federal regulations. HCPs submitted in support of an ITL application must do the following:

- Identify the geographic area encompassed by the plan; the ecosystems, natural communities, or habitat types within the plan area that are the focus of the plan; and the endangered, threatened, proposed, and candidate species known or reasonably expected to be present in those ecosystems, natural communities, or habitat types in the plan area.
- Describe the activities contemplated to be undertaken within the plan area with sufficient detail to allow DLNR to evaluate the impact of the activities on the particular ecosystems, natural communities, or habitat types within the plan area that are the focus of the plan.
- Identify the steps that will be taken to minimize and mitigate all negative impacts, including, without limitation, the impact of any authorized incidental take, with consideration of the full range of the species on the island so that cumulative impacts associated with the take can be adequately assessed; and the funding that will be available to implement those steps.
- Identify the measures or actions to be undertaken; a schedule for implementation of the measures or actions; and an adequate funding source to ensure that the actions or measures are undertaken in accordance with the schedule.
- Be consistent with the goals and objectives of any approved recovery plan for any endangered species or threatened species known or reasonably expected to occur in the ecosystems, natural communities, or habitat types in the plan area.;
- Provide reasonable certainty that the ecosystems, natural communities, or habitat types will be maintained in the plan area throughout the life of the plan.
- Contain objective, measurable goals; timeframes within which the goals are to be achieved; provisions for monitoring; and provisions for evaluating progress in achieving the goals quantitatively and qualitatively.

Provide for an adaptive management strategy that specifies the actions to be taken periodically if the plan is not achieving its goals. Section 195D-25 provides for the creation of the ESRC, which is composed of biological experts, representatives of relevant federal and state agencies (i.e., USFWS, U.S. Geological Survey [USGS], DLNR), and appropriate governmental and nongovernmental members to serve as a consultant to the DLNR and the BLNR on matters relating to endangered, threatened, proposed, and candidate species.

Duties of the ESRC include reviewing all applications for HCPs, safe-harbor agreements, and ITLs and making recommendations to DLNR and the BLNR on whether they should be approved, amended, or rejected; reviewing all existing HCPs, safe-harbor agreements, and ITLs annually to ensure compliance and making recommendations for any necessary changes; and considering and recommending appropriate incentives to encourage landowners to voluntarily engage in efforts that restore and conserve endangered,

threatened, proposed, and candidate species. Hence, the ESRC plays a significant role in the HCP planning process. The Applicant presented a draft HCP to the ESRC on June 28, 2012, and on March 8, 2013, and on July 24, 2013 received ESRC recommendation for approval by the Land Board. A site visit with ESRC was conducted on June 27, 2012.

1.4. Project Description

1.4.1. Project Location and Description

The proposed Kenai Industrial Park (KIP) site is an undeveloped 0.75-acre parcel located at Lot No. 23 Malakole Street in Kapolei, on the Island of O’ahu, Hawai’i, TMK 9-1-074:023 (Figures 1.1 and 1.2). Kapolei is an unincorporated community in Honolulu County and is the second urban center on the Island of O’ahu, next to Honolulu.

The KIP site (subsequently referred to as the “project site”) is located just west of Honolulu and a short distance off the Interstate H1. The KIP is adjacent to the Campbell Industrial Park. Campbell Industrial Park is the largest industrial park in Hawai’i comprised of approximately 1,380 acres of nearly 250 industrial and commercial businesses (Figure 1.3). The project site is bounded by Kaiholo Street on the south, Awakumoku Street on the west, and Malakole Street on the east. It is part of the approximately 70-acre Camp Malakole Military Reservation, which was declared as surplus U.S. property by the federal government in 1983 and subsequently purchased by CIRL.

CLDC proposes to sell or develop the entire 0.75-acre parcel for industrial purposes similar to the land use located in the bordering parcels of the subdivision, as allowed under the applicable zoning district. Appendix A provides a conceptual development plan for a 62-unit storage facility on the site. Construction of the project would likely occur as soon as practicable, after all permits and authorizations have been obtained.

1.4.2. Covered Activities

This HCP and associated State incidental take authorization, to be issued by DLNR, will cover and provide authorization for incidental take of one covered species, the round-leaved chaff flower, resulting from the following activities, which will occur as part of the project. These are subject to any requirements or restrictions described in this HCP or the incidental take authorization documents:

- Clearing and grubbing the entire site
- Grading the entire site
- Installing drainage conveyance structures
- Installing of facility foundations and driveways
- Constructing storage structures and office facility
- Constructing protective security fencing
- Implementation the conservation measures outlined in this HCP

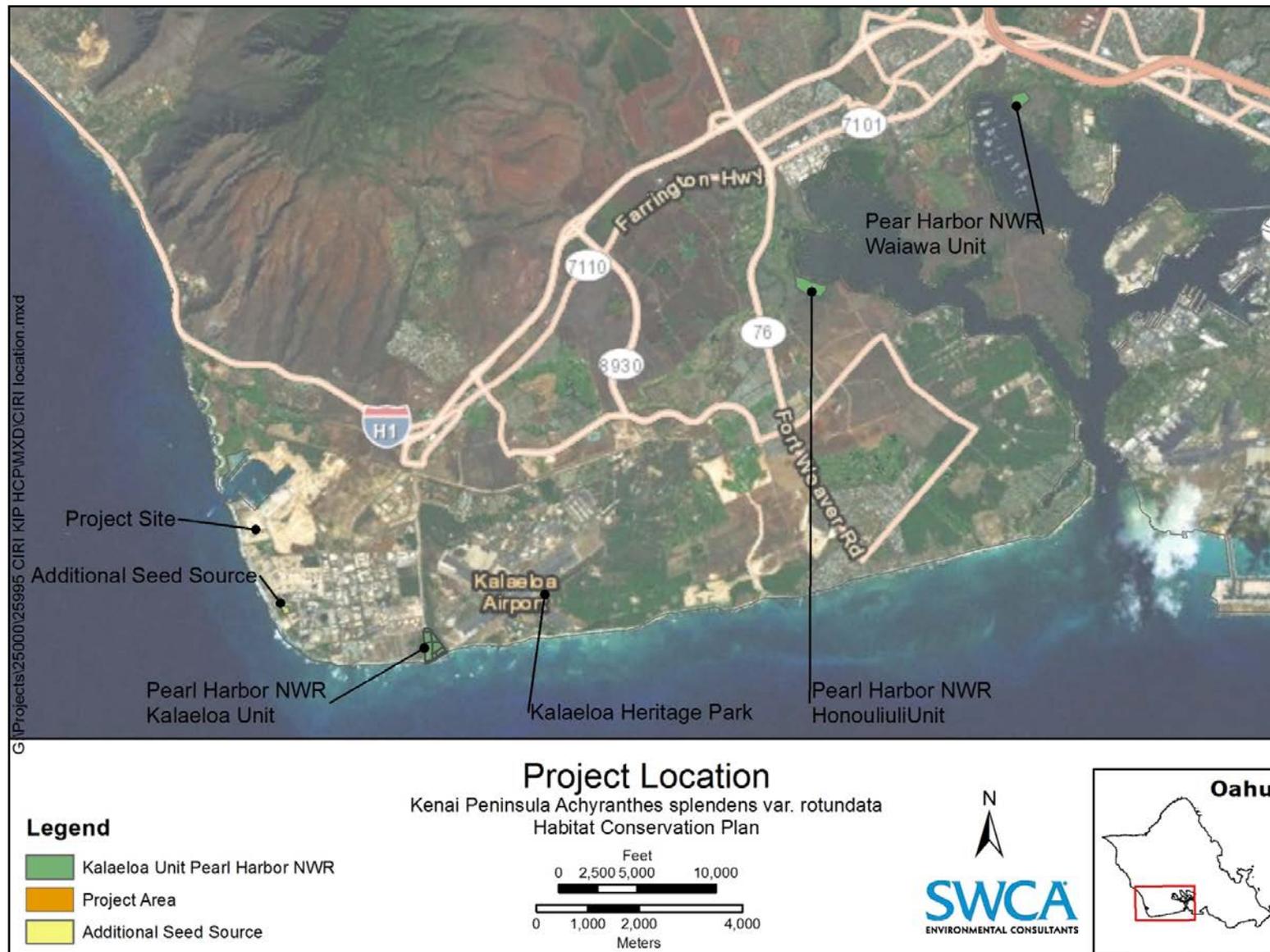


Figure 1.1. Project location.



Figure 1.2. Project site.

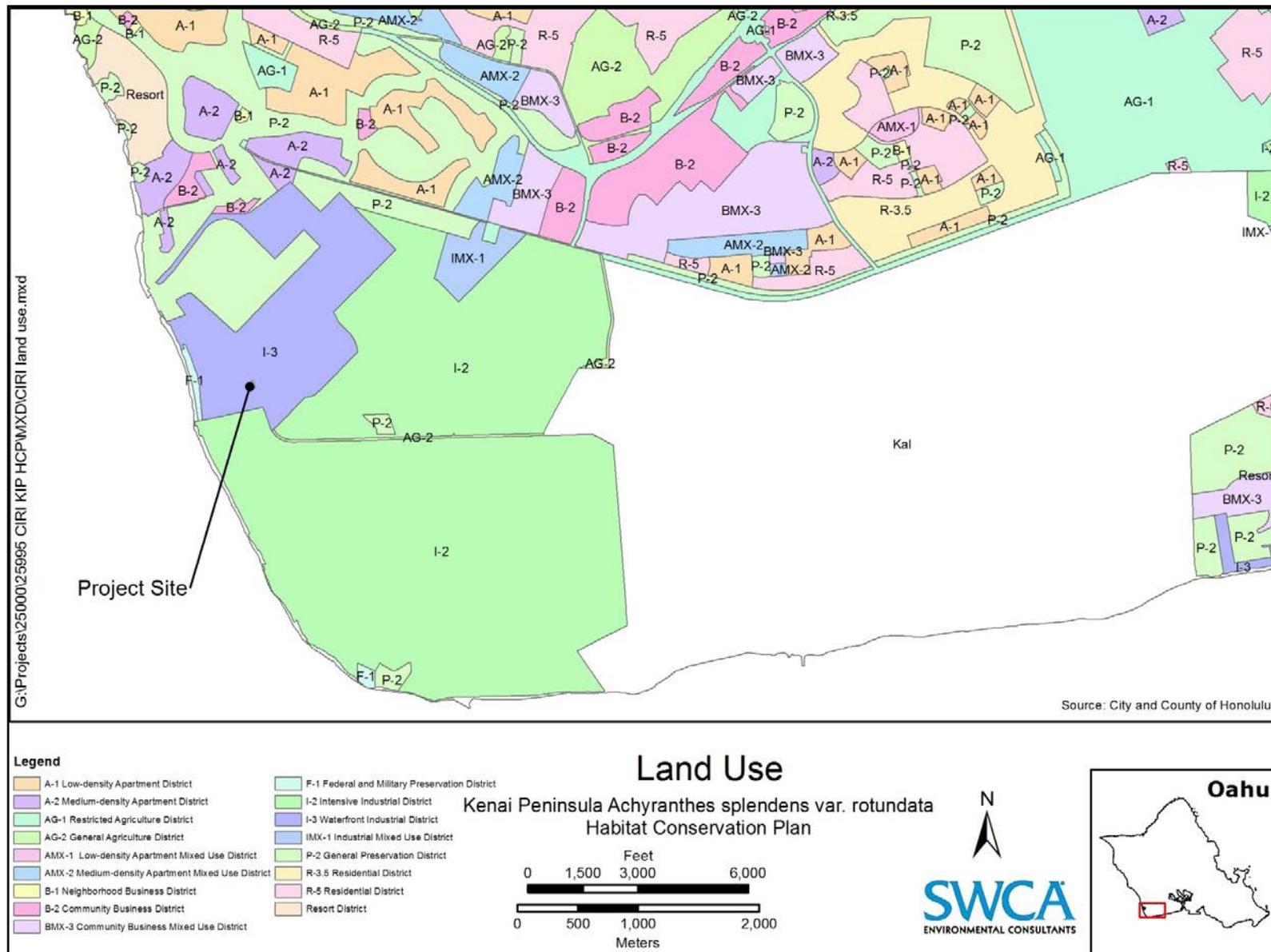


Figure 1.3. Land use.

1.4.3. Purpose and Need for the Project

CLDC proposes to sell or develop the 0.75-acre (0.30 ha) parcel in the KIP for industrial use consistent with the parcel's land-use designation under the City and County of Honolulu land-use ordinance. The proposed development of the parcel as an industrial use facility would meet the 'Ewa Development Plan goal to continue expansion of the industrial uses in the Barbers Point Industrial Area, which includes Campbell Industrial Park, Barbers Point Deep Draft Harbor, KIP, and Kapolei Business Park. The 'Ewa Development Plan indicates that this area should continue to grow as one of O'ahu's and the State's most important industrial areas (City and County of Honolulu, Department of Planning and Permitting 2000). Similarly, the proposed project would be consistent with O'ahu General Plan Policy 3 (City and County of Honolulu, Department of Planning and Permitting 2002), which encourages the continued development of Barbers Point as a major industrial center.

In addition, the proposed implementation of the Round-leaved Chaff Flower HCP by CLDC would be necessary to offset the adverse and unavoidable impacts of the proposed project on three federally and state-endangered round-leaved chaff flower individuals, which would be removed during construction. The successful implementation of the HCP would meet goals 2 and 4 of the Pearl Harbor NWR Comprehensive Conservation Plan (CCP) (USFWS 2010), as the mitigation would restore and protect coastal coralline plain habitat at the Kalaeloa Unit, as well as provide interpretive and education opportunities to enhance public understanding of and appreciation for the natural and cultural resources of the Pearl Harbor NWR.

The implementation of the HCP is necessary to facilitate the long-term conservation of the round-leaved chaff flower. The population trend for this species on the KIP project site has been negative; over 100 individuals have been extirpated from the 0.75-acre (0.30 ha) site since 1985. No management activities for the plant occur at KIP and the project site is isolated by surrounding industrial land uses. In contrast, the overall population trend for the round-leaved chaff flower at the Kalaeloa Unit has been positive following the implementation of restoration activities. These activities included the introduction of 100 round-leaved chaff flower individuals and removal of non-native species. Successful implementation of the HCP would build upon these restoration activities and contribute to the ongoing recovery of this species (USFWS 1994).

1.5. List of Preparers

Jaap Eijzenga, M.S., Wildlife Ecologist, SWCA Environmental Consultants, Inc. (SWCA)
Tiffany Thair, M.S., Botanist, SWCA

Halleh Paymard, B.S., Botanist, AMEC Environment and Infrastructure, Inc. (AMEC)
Nicholas Meisinger, B.S., Environmental Analyst, AMEC
Morgan Aagesen, B.A., GIS Technician, AMEC.

2. DESCRIPTION OF HABITAT CONSERVATION PLAN

2.1. Purpose of This HCP

Construction and operation activities for industrial purposes at the proposed project site is expected to result in the incidental take of round-leaved chaff flower individuals over the life of the project. The round-leaved chaff flower is protected under the ESA, as amended, and under HRS Chapter 195D. Because of the documented presence of this species at or near the proposed facility and the anticipated take in connection with construction and operation of the proposed project, the Applicant has filed an application for an ITL pursuant to HRS Chapter 195-D. This HCP has been prepared to fulfill application requirements for this permit. Upon issuance of the ITL, the Applicant will be authorized for incidental take of round-leaved chaff flower in connection with the otherwise lawful construction and operation of the proposed project.

The purpose of this HCP is to address the following:

1. To make the most supportable determinations as to the potential impact that the development could have on the listed species;
2. To discuss alternatives to the proposed development and its design, in terms of these impacts;
3. To propose appropriate efforts to minimize, mitigate, and monitor these potential impacts to the maximum extent practicable;
4. To ensure funding for the completion of these efforts; and
5. To provide for adaptive management and adjustment of the above measures as determined during implementation of the HCP.

2.2. Scope and Term

This HCP seeks to offset the potential impact of the proposed development on the round-leaved chaff flower with measures that protect and provide a net benefit to the species island-wide and statewide. The Applicant anticipates a 10-year permit term, throughout which this HCP would be in effect, but the term may be terminated early if all success criteria have been met. The provisions provided herein for adaptive management would allow flexibility and responsiveness to new information throughout the duration of the HCP.

3. ENVIRONMENTAL SETTING

3.1. Location, Vicinity, and Climate

The project site is located on the leeward physiographic zone of O‘ahu. This geographic location results in lower rainfall, larger drainage basins, and fewer intermittent streams than windward regions, which are more exposed to trade winds. During the dry season, day temperatures are between 87°F and 89°F and night temperatures range between 72°F (22°C) and 76°F (24°C). Wet season temperatures are slightly lower, with day temps ranging between 76°F (24°C) and 78°F (26°C). The difference between day and night temperatures varies by 15-20°F. Average relative humidity in the region varies between 58% and 60%. Compared to windward areas, the leeward areas in the southern and western portion of the island experience decreased winds, less rain, and are subject to southerly Kona storms (USFWS 2010).

Data collected at the Campbell Industrial Park weather station (Station 510248) between 1971 and 2010 reported a minimum monthly average of 72.9°F in January and a maximum of 81.8°F in August (Western Regional Climate Center [WRCC] 2011). The mean annual precipitation in the area is approximately 19.8 inches, with winter months receiving the most rainfall (WRCC 2011).

3.2. Topography and Geology

The elevation of the project site is approximately 3 feet (0.9 m) above mean sea level (amsl). The surrounding area is approximately 3 feet (0.9 m) higher in elevation than the project site. The project site terrain consists of karst topography with numerous eroded solution sinkholes.

The KIP site is located on the coastal ‘Ewa Plain, which encompasses the southwestern portion of the Island of O‘ahu (Figure 1.1). The ‘Ewa Plain was formed by sea level changes during the Pleistocene era roughly two to three million years ago. This area is underlain by a broad platform of elevated limestone reef material and partially covered by accumulated alluvium from the mountains. The raised coralline limestone within the ‘Ewa Plain was partially caused by upward seafloor warping and tilting of the larger islands of Maui and Hawai‘i (USFWS 2010).

Karst topography and solution sinkholes or anchialine pools are characteristic of the ‘Ewa Plain. Sinkholes are a type of karstic structure that is formed by the dissolution of the consolidated and cemented hard limestone (Figure 3.1). Sinkholes in hard limestone are openings into the hypogeal water table and often contain anchialine ponds in Hawai‘i. Typically, these sinkholes are bell-shaped in profile; the surface opening is often approximately 3 feet (0.9 m) in diameter, with the interior usually increasing to two or three times that. Sinkholes within the ‘Ewa Plain have been found to contain innumerable bones of extinct Hawaiian bird species and endemic crustacean species (Ziegler 2002).



Figure 3.1. Karst topography and sinkholes within the project site.

3.3. Soils

Soils within the project site are classified as coral outcrop by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) (NRCS 2011). Coral outcrop is comprised of coral or cemented calcareous sand and can be found on O'ahu between 0 and 100 feet (0-30 m) in elevation. It is geographically associated with Jaucas, Kea'au, and Mokulē'ia soils. A red thin friable layer of soil material can be found within the cracks, crevices, and depressions of the coral outcrop. Nonnative vegetation typically grows within soils mapped as coral outcrop (USDA 1972).

3.4. Hydrology, Drainage and Water Resources

3.4.1. Surface Water

Hydrologic processes in Hawai'i are highly dependent on the climatic and geological features and stream flow is influenced by rainfall and wind patterns. Annual average rainfall on O'ahu's leeward coast is less than 20 inches (Department of General Planning City and County of Honolulu 1990). The majority of perennial streams on O'ahu are located in the windward side, which produces a larger amount of orographic precipitation compared to the leeward side. These streams on the leeward side of the Ko'olau Range are generally sustained by leakage from high-level dike compartments as well as from springs and seeps (City and County of Honolulu 1990).

The KIP project site is located in the Waimanalo Gulch sub watershed (Hydrologic Unit Code [HUC] 200600000506) and the Kalaeloa Unit mitigation parcel is located in the Kaloi Gulch subwatershed (HUC 200600000401). There are no perennial streams, drainages, or significant surface water features within the boundaries of the project site or the Kalaeloa Unit. A canal ditch, which occurs approximately 0.75 mile (1.2 km) to the east, is the nearest designated surface water feature (USEPA 2012); however, there is another unnamed artificial drainage immediately adjacent to the unit, which may serve as an industrial discharge point for the Campbell Industrial Park. Similarly, a drainage ditch occurs to the northeast of the KIP approximately 0.65 mile (1 km) to the northeast of the project site.

3.4.2. Flooding

Both the KIP project site and the Kalaeloa Unit mitigation parcel are located in Zone D on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) (Panel 15003C0304G and 15003C0316G, effective January 19, 2011). Flood hazard has not been determined for these areas; however, the potential for significant flooding may still exist. Flood elevations have been determined for the areas immediately adjacent to the west and south of the Kalaeloa Unit mitigation parcel. The canal to the east is located in Zone AE and has a flood elevation of approximately 6 feet (1.8 m). Additionally, the coastal area to the south of the unit is located in Zone VE, which is subject to velocity (i.e., wave) hazards, and has a base flood elevation of approximately 9 feet (2.7 m).

3.4.3. Groundwater

O'ahu has a vast amount of groundwater, divided into seven major areas, which supplies most of the domestic water supply (Oki et al. 1999). Volcanic rocks ranging in age from Pliocene to Holocene, make up most of O'ahu and compose the most important aquifers. Quaternary-age consolidated sedimentary deposits, which are principally coralline limestone, form productive aquifers in the lowlands and near shore areas, but generally contain brackish water or saltwater and are not suitable for drinking. Water levels in the freshwater lens of the southeastern O'ahu area generally are less than 10 feet (3 m) above sea level near the western boundary; however, the levels decrease to the east. Water levels in the southern

O`ahu groundwater area generally range from approximately 25 to 30 feet above sea level inland to approximately 15 to 20 feet (4.6 – 6.1 m) above sea level near the shore where the water is under artesian pressure because it is confined by caprock. (Oki et al. 1999).

The KIP project site as well as the Kalaeloa Unit mitigation parcel are located within the southern O`ahu ground-water areas. Water levels in this area near the shore generally range from approximately 15 to 20 feet (4.6 – 6.1 m) above sea level; the water confined by caprock, which impedes the seaward movement of fresh ground water. Withdrawals from this groundwater area are greater than those throughout any other groundwater area in O`ahu. Withdrawals reached their maximum during the period between 1971 and 1980; however, the volume of annual withdrawal has since decreased as sugarcane is no longer cultivated on the island. In addition to withdrawals, an unknown quantity of groundwater is discharged into the ocean by natural mechanisms such as submarine springs and seeps (Oki et al. 1999).

3.5. Land Use Designations

The KIP site is located within the northwestern portion of Campbell Industrial Park, which is southwest of the Kapolei city center. Campbell Industrial Park is the largest industrial park in Hawai`i comprised of approximately 1,380 acres (558 ha) of nearly 250 industrial and commercial businesses (Figure 1.3). Land use within the project site is designated as I-3 Waterfront Industrial (Figure 1.3; City of Kapolei 2010).

3.6. Vegetation

Botanical surveys of the project site have been conducted by Whistler (1985), Morden & Associates (2005, 2007, and 2008), and SWCA (2013). The primary vegetation community within the project site consists of the dry coastal shrubland community. The dominant overstory species within the site is nonnative kiawe (*Prosopis pallida*), a federally listed noxious species of mesquite tree. Sourbush (*Pluchea carolinensis*) occurs along the northeast side of the parcel and nonnative grasses such as buffelgrass (*Cenchrus ciliaris*) and Guinea grass (*Urochloa maximum*) are present along the northwest and southwest portions of the site. Pickleweed (*Batis maritima*), a succulent-leaf shrub common to saline soils and brackish water, is also common within the understory of the southeast portion of the property (Morden & Associates 2008, SWCA 2013). SWCA (2013) identified 20 introduced plant species during their survey of the site in April 2013, in addition to round-leaved chaff flower, which was the only native species found at the project site.



Figure 3.2. Round-leaved chaff flower located within the project site.

3.6.1. Listed Plant Species

Only one federally and state listed plant species—the round-leaved chaff flower—has been observed within the project site. This plant was listed as endangered by the USFWS in 1986. A draft recovery plan for the species was published in 1994. Detailed information on this species is provided below.

3.6.1.1. SPECIES DESCRIPTION

Round-leaved chaff flower or `Ewa hinahina is a shrub in the Amaranth family (Amaranthaceae) that grows to a height of 2–6 feet (0.6 – 1.8 m). The elliptic leaves of this species have dense, light-colored hairs that produce a silvery color (Figure 3.2). The tiny flowers are closely spaced on long, unbranched

spikes. The shrub is distinguished from the other variety of this species (*A. splendens* var. *splendens*) by shorter sepals and bracts; its sepals measure 0.26 to 0.35 inch (0.66 – 0.89 cm) long and bracteoles have a length of 0.14 to 0.2 inch (0.36 – 0.51 cm) (Wagner et al. 1999). Most vegetative growth occurs during the wet winter season and, as the dry summer months approach, vegetative growth slows and flowering occurs. In mid-summer to early fall, fruiting plants become dormant but do not lose their leaves. Seeds, dispersed by wind and gravity, germinate during the summer (USFWS 1994). The inflorescences and leaves of round-leaved chaff flower have been used for traditional lei making; however, the plant appears to no longer be used for this purpose (USFWS 2009).

Round-leaved chaff flower has successfully been propagated by seed and cutting. Each dry fruit contains a single seed, and while a high percentage of non-viable seed are found in some batches, viable seed has been reported to have a 90% germination success rate (USFWS 2009). Longevity of seeds from this species is unknown, and it is not known if the species has a transient or persistent seed bank.

3.6.1.2. HABITAT DESCRIPTION

Round-leaved chaff flower is an extremely salt and drought tolerant plant that prefers limestone substrates covered with a thin surface layer of soil and pockets of humus. It typically occurs in open or closed kiawe forests, as well as in open shrub communities characterized by other nonnative species such as koa haole (*Leucaena leucocephala*), pickleweed, and fleabane (*Pluchea* spp.). This species has also been noted in association with two native species, maiapilo (*Capparis sandwichiana*) and naio (*Myoporum sandwicense*). Round-leaved chaff flower is endemic to low altitude sites up to 100 feet (30 m) in elevation (USFWS 2010).

3.6.1.3. LISTING STATUS

Round-leaved chaff flower was listed as a federally endangered plant species in 1986 (USFWS 1986). The species was originally listed as *A. rotundata* and subsequently renamed *A. splendens* var. *rotundata* (USFWS 1994). Critical habitat was not designated at the time of listing due to concern for potential vandalism or unauthorized collection (USFWS 2010). Downlisting and delisting objectives were developed in a draft recovery plan for this species in 1994 (USFWS 1994).

3.6.1.4. DISTRIBUTION AND POPULATION TRENDS

Historically, round-leaved chaff flower was found on arid and semi-arid coastal lowlands of O‘ahu, Moloka‘i, and Lana‘i. According to herbarium labels, it was regarded as "frequent" in 1937 and "common" as recently as 1968 (USFWS 1994). At the time of federal listing in 1986, only two populations were known at on O‘ahu within the ‘Ewa Plain Kaena Point State Park, consisting of two individuals and Barbers Point, comprised of approximately 400 individuals. The populations on Moloka‘i and Lana‘i were already extirpated at the time of listing (USFWS 1986).

From 1987 to 1991, three subpopulations were discovered at Kaena Point consisting of 71 individuals at all life stages. There were four subpopulations on the ‘Ewa Plains reported from 1985 to 1991 containing approximately 1,387 individuals. The biggest subpopulation was fenced and in 1990 three plant sanctuaries were created to protect plants in situ (on-site). One of the plant sanctuaries was a newly reintroduced population from nursery stock (USFWS 2009).

In 1996, two populations were known to occur; one at the Barbers Point area of the ‘Ewa Plains (4,270 individuals) and another at Kaena Point (48 individuals) (USFWS 1996). In 2004, a second subpopulation at Barbers Point (C. Brewer Plant Sanctuary) consisted of 150 mature and 150 immature plants, and two other fenced exclosures (Alternative Tech Park) were documented, consisting of 62 mature and 200

immature individuals (Kane 2004). However, additionally in 2004, a decline in the number of extant individuals was reported, with a loss of 224 individuals in a subpopulation at Barbers Point at the Lighthouse Plant Sanctuary (USFWS 2009).

In 2007, estimates of the number of wild and reintroduced individuals ranged from four subpopulations (Kaena, Makaha, Campbell Industrial Park, and the Kalaeloa Unit) to six subpopulations on other sites on O‘ahu consisting of approximately 1,000 individuals (USFWS 2009). A population of 600 to 700 mature individuals was discovered in 2004 on the ridge between Makaha and Waianae Kai (USFWS 2009). In 2006, the Barbers Point (Kaomi Loop/Campbell Industrial Park) subpopulation was reported to consist of four mature individuals, four immature individuals and one seedling (USFWS 2009).

Today, the round-leaved chaff flower is only known from two fragmented populations grouped along the northwestern and southwestern boundaries of the species historic range on O‘ahu (Figure 3.3). Currently, the largest native remnant stand occurs at the Kalaeloa Unit of the Pearl Harbor National NWR, which is part of the O‘ahu NWR Complex (Figure 1.1).

The overall population trend for this species has shown an increase since its 1986 listing (USFWS 2009). Recent restoration efforts have greatly augmented the number of extant individuals on O‘ahu. At the Kalaeloa Unit, over 100 individuals have been reintroduced and natural recruitment is occurring; however, actual counts are not currently available (USFWS 2009, Ellis 2011a).

3.6.1.5. THREATS

Round-leaved chaff flower has had 88% of its historic range reduced by habitat conversion largely for industrial and agricultural developments, and the remaining 12% of habitat has been degraded by invading exotic shrubs and trees. Habitat destruction continues to be the main threat to the survival of the taxon. At Kaena Point, the invasive nonnative koa haole is a threat to the species, and at Barbers Point sourbush and kiawe alter the habitat of the species and compete for light (USFWS 2009). Weed control is ongoing at the Kalaeloa population (Ellis 2010). Increased mortality of wild individuals has been observed due to scale farming by long-legged ants (*Anoplolepis gracilipes*) in the Kalaeloa Unit of the Pearl Harbor NWR (USFWS 2009). In addition, human activities, such as the deposition of trash and construction material into exclosures, are a threat to the survival of the taxon in its native habitat.

3.6.1.6. OCCURRENCE WITHIN THE PROJECT SITE

Round-leaved chaff flower was first documented on the project site during a botanical survey conducted in 1985 by Dr. Arthur Whistler. Dr. Whistler described round-leaved chaff flower to be the dominant understory species within the site. Approximately 116 individuals of round-leaved chaff flower were recorded at various stages of growth within the property, occupying an area of 60 m² (646 sqf) (Whistler 1985). This constitutes the largest population of round-leaved chaff flower documented at the project site.

Subsequent to the 1985 survey, Morden & Associates conducted botanical surveys within the parcel in 2005, 2007, and 2008 (Morden & Associates 2005, 2007, and 2008). The 2005 survey concluded that the species was absent from the site (Morden & Associates 2005); however, subsequent surveys noted the two individuals discussed above, as well as several smaller seedlings that have since been extirpated (Morden & Associates 2008). Appendix B presents the results of the Morden & Associates botanical surveys of the site.

Representatives from DLNR and AMEC conducted a site visit on July 19, 2010. Two individuals of round-leaved chaff flower were observed during this visit; no other individuals were observed. The large individual was observed within a crack of exposed limestone and a much smaller individual was present within similar conditions, 18 inches (46 cm) east of its larger counterpart. Appendix C contains

photographs of the site and round-leaved chaff flower individuals that were taken during the July 19, 2010, site visit.

Most recently, SWCA (2013) found three round-leaved chaff flower individuals within the project site. All individuals were flowering or in early stages of seeding and were found near the center of the property, within an area of approximately 16.1 feet² (1.5 m²). The largest individual was approximately 3 feet in height; the others were approximately 12 to 20 inches (30 – 50 cm) tall. The smallest individual was fairly small and spindly, indicating it may have been a relatively young plant.

It is unknown if the species has a transient or persistent seed bank. At the project site, the scarcity of soil and harsh nature of the environment make it unlikely that a persistent seed bank exists locally (Morden & Associates 2005).

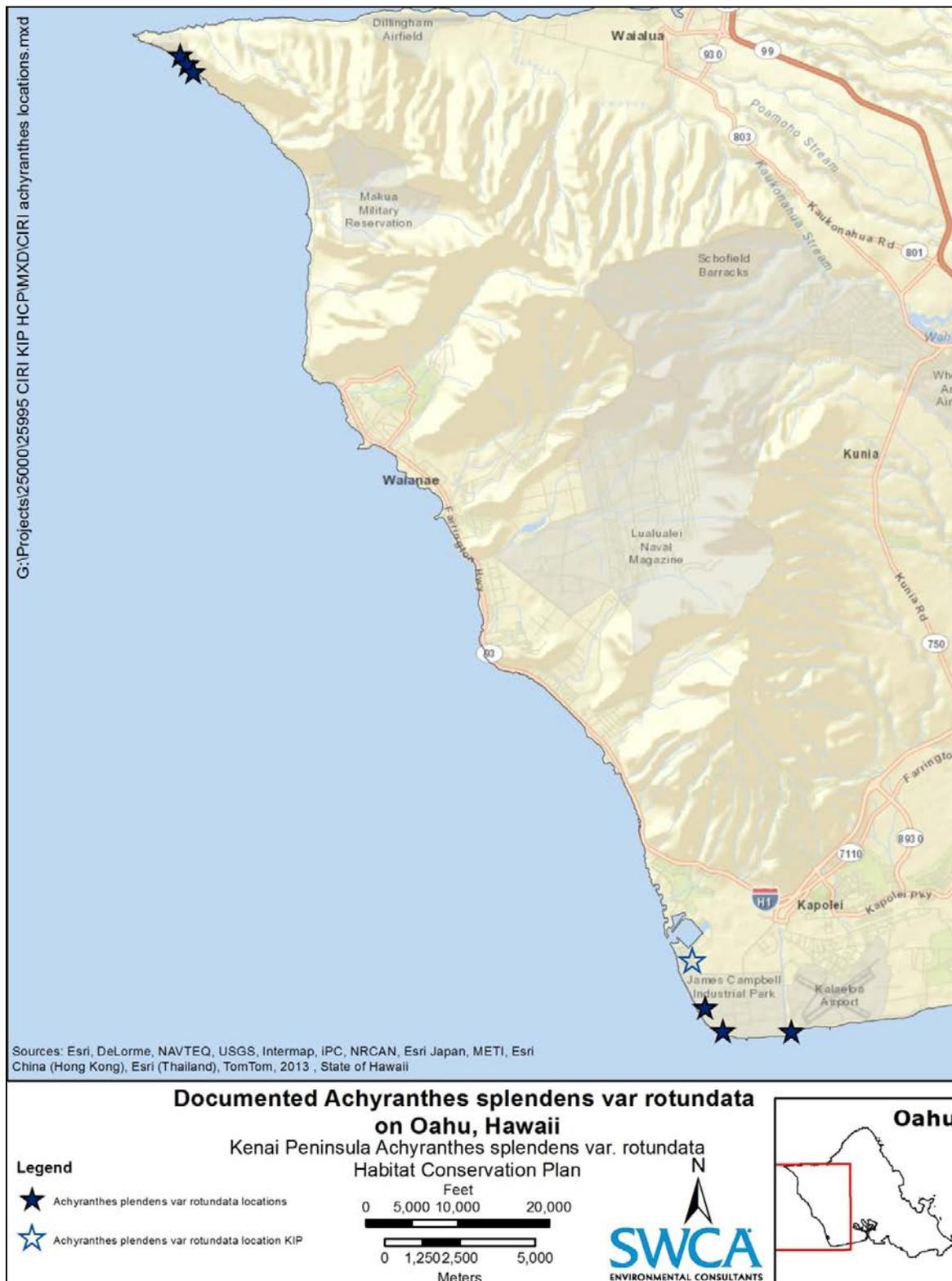


Figure 3.3. Documented round-leaved chaff flower occurrences on O’ahu.

3.7. Fauna

3.7.1. Surveys Conducted

Formal wildlife surveys have not been conducted at the KIP project site. The site is overgrown by nonnative vegetation and is located adjacent to Campbell Industrial Park, which is the largest industrial park in the State of Hawai‘i. Land use within this area is designated Industrial under the Ewa Development Plan and it is zoned as I-3 Waterfront Industrial. Therefore listed or sensitive avifauna is not expected to occur at the project site. SWCA (2013) performed a one-day survey in April 2013 to determine the presence of anchialine pool animals, including Hawaiian red shrimp (*Halocaridina rubra*) and anchialine pool shrimp (*Metabetaeus lohena*) at the project site.

3.7.2. Non-Listed Species

The anchialine pool shrimp (*Metabetaeus lohena*), is currently a candidate species under the ESA of 1973, as amended. Federal candidate species are not automatically offered protection under HRS Chapter 195D and this species is not listed as endangered pursuant to section 195D-4. However, in accordance with section 195D-25 (1), the ESRC reviews applications for HCPs and makes recommendations in consideration of the cumulative impacts of the proposed action on the recovery potential of endangered, threatened, proposed, or candidate species.

During the survey in April 2013, SWCA (2013) found one single sinkhole, located just south of the center of the property, containing water. This sinkhole measured 3.6 × 4.4 feet (1.1 – 1.3 m). The surface of the water was 3.6 feet (1.1 m) below the level of the carbonate floor of the central area. The water in this sinkhole was stagnant, with a strong hydrogen sulfide odor, indicating anoxic process within the pool.

Salinity levels in the pool were within the fairly broad range of salinity known among the pools that support anchialine organisms. However, the dissolved oxygen (DO) level was very low, at 8.3% to 16.8%. Few organisms, including fish and invertebrates, are able to survive in such anoxic conditions, and it is not surprising that none were captured during the trapping effort. The anoxic conditions may result from stagnation, eutrophication, or pollution and likely indicate poor connectivity with hypogeal (underground) waters.

3.7.3. Listed Species

No rare or endangered wildlife species have been documented at the site (Helbert, Hastert, Van Horn, and Kimura, Planners, 1986; SWCA 2013). The project site does not contain critical habitat for wildlife as proposed or designated by USFWS.

4. BIOLOGICAL GOALS AND OBJECTIVES

CLDC has met with local representatives of DLNR and the ESRC to discuss potential adverse impacts to the round-leaved chaff flower and to discuss biological goals and objectives. Where the potential for impacts is unavoidable, this HCP provides means to minimize and mitigate any adverse impacts to the listed species that may occur, in order to provide a net-conservation benefit.

Based on surveys conducted in the project site, as well as records of species known to exist at adjacent areas, the proposed project is expected to directly or indirectly impact the round-leaved chaff flower.

Specific biological goals of this HCP are to:

1. Provide a net-conservation benefit for the recovery of the round-leaved chaff flower, pursuant to HRS Chapter 195D.

Specific biological objectives accompanying this biological goal include:

- 1.a. Adhere to goals of existing recovery plans for the species, considering the most recent updated information and goals.
- 1.b. Implement specific measures to manage and protect off-site habitat.
- 1.c. Establish or augment a population of round-leaved chaff flower at the off-site mitigation area.

5. POTENTIAL IMPACTS

5.1. Estimating Project-Related Impacts

The project site is proposed to be developed as a self-storage facility or other industrial use, as permitted under zoning. A conceptual development plan of the site as a 62-unit self storage facility is presented in Appendix A. The proposed construction and operation of an industrial use at the project site would result in direct incidental take of three round-leaved chaff flower (federally and state listed endangered) individuals, and their associated seed bank. The seed bank consists of ungerminated, viable seeds present on or in the soil or associated litter (Leck et al. 1989; Baskin and Baskin 2011).

These impacts will be mitigated through implementation of the compensation measures presented below. Due to the limited scope of the proposed project, the small number of individuals of the round-leaved chaff flower, and its location in the center of the project site, measures to avoid or minimize impacts are not feasible.

5.2. Cumulative Impacts to Listed Species

Presently no ITPs have been issued for the round-leaved chaff flower. Current population estimates on O‘ahu range between 1,600 and 1,700 wild individuals, in addition to hundreds of outplanted individuals. The requested take associated with this project represents less than 0.2% of the O‘ahu population.

CLDC, however, proposes mitigation measures that would provide a contribution to the overall recovery success of this species; thus, cumulative impacts would not be significant.

6. MITIGATION MEASURES

6.1. Selection of Mitigation Measures

CLDC coordinated with Division of Forestry and Wildlife (DOFAW), USFWS, and members of the ESRC to identify and select appropriate mitigation measures to compensate for the incidental take of round-leaved chaff flowers. In addition, mitigation is designed to ensure DOFAW ITL-issuance criteria are met. The criteria used for determining the most appropriate mitigation measures include:

1. The level of mitigation should (at least) be commensurate with the currently anticipated take.
2. Mitigation should be species-specific and, to the extent practicable, location or island specific.
3. Mitigation measures should be practicable and capable of being done given currently available technology and information.
4. Mitigation measures should have measurable goals and objectives that allow success to be assessed.
5. Mitigation measures should be flexible to adjust to changes in the level of take according to new information during project operation.
6. Mitigation measures should be consistent with or otherwise advance the strategies of the respective species' draft or approved recovery plans.

The only federal- and/or State-listed species considered to have potential to be incidentally taken during the life of the project is the round-leaved chaff flower. The mitigation proposed to compensate for impacts to these species is based on anticipated levels of incidental take as determined through on-site surveys. The primary goal of the proposed mitigation measure is to directly offset take at the project site and to increase populations of the round-leaved chaff flower to aid its recovery.

6.2. Mitigation Measures

Mitigation strategies have been developed within this HCP to minimize and mitigate negative impacts to round-leaved chaff flower as a result of the KIP project and to provide a net-recovery benefit for the species.

In order to offset impacts to the round-leaved chaff flower as a result of the development of the KIP project, CLDC proposes to conduct in-kind off-site mitigation in the form of habitat restoration and creation. The proposed off-site mitigation site is located on preserved lands of the Pearl Harbor NWR's Kalaeloa Unit located approximately 2 miles (3.2 km) from the project site (Figure 1.1 and Figure 6.1). A description of this site is provided below in Section 6.2.1.

CLDC has coordinated efforts with NWR staff to receive approval for use of the Kalaeloa Unit as a mitigation site. Accordingly, a proposal was submitted to Mr. David Ellis, project leader of the O'ahu NWR, on January 31, 2011, that detailed proposed mitigation efforts, and the plan has subsequently been refined in collaboration with Mr. David Ellis (USFWS) and Mr. Matt Schirman (Hui Kū Maoli Ola). A letter providing general support from the NWR to use the Kalaeloa Unit as a mitigation site is provided in Appendix E; final concurrence will depend on approval of the final HCP. Outplanting site selection would be determined by the refuge manager based on-site conditions at the time of planting. First and foremost, suitable sites will be chosen that do not currently support existing round-leaved chaff flower populations so that outplanted individuals associated with this project are kept separate for monitoring purposes. All work on the NWR would be conducted under a refuge special-use permit and subject to the general and special conditions of that permit, as well as to the conditions of this HCP.

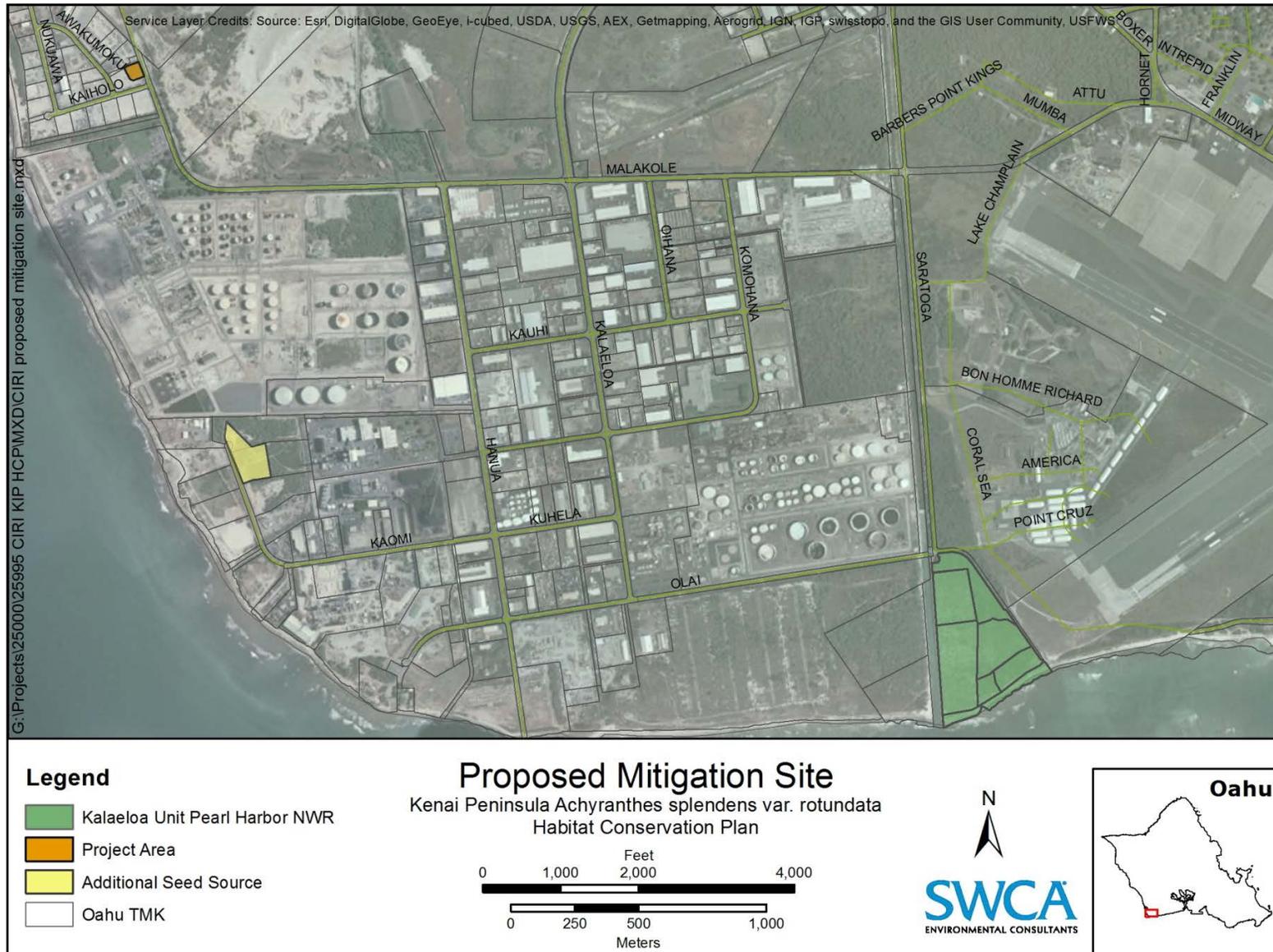


Figure 6.1. Proposed mitigation site at the Kalaeloa Unit.

6.2.1. Proposed Mitigation Site Description

Pearl Harbor NWR is part of the O‘ahu NWR Complex, which comprises three units located within a highly developed and degraded landscape along the southern shore of O‘ahu: the Waiawa Unit (24.5 acres), the Honouliuli Unit (36.5 acres [14.1 ha]), and the Kalaeloa Unit (37.4 acres [15.1 ha]) (Figure 1.1).

The newest unit, Kalaeloa Unit (Figures 1.1 and 6.1), is located on the flat coastal ‘Ewa Plain approximately 7 miles (11 km) southwest of Pearl Harbor. This unit was formerly part of the Barbers Point Naval Air Station (NAS) and is a unique example of the dry coastal shrubland habitat that once extended along most of the ‘Ewa Plain. The small remnant populations of endangered plants, including round-leaved chaff flower—as well as other rare native flora, such as an endemic subspecies of naio (*Myoporum sandwicense* ssp. *stellatum*) found only at this site—are clear indicators of the critical importance of this managed and protected refuge unit to these endangered species. The Kalaeloa Unit was established during Barber Point NAS base-closure proceedings in 2001 to protect and enhance the habitat for the endangered coastal dryland plants, round-leaved chaff flower, and ‘Ewa Plains ‘akoko (*Chamaesyce skottsbergii* var. *skottsbergii*).

The rare coastal coralline environment that occurs on the Kalaeloa Unit is a small remnant of this unique habitat that once occurred across much of the ‘Ewa Plain along the south shore of O‘ahu. This natural plant community has almost been lost due to urban, industrial, and agricultural development and severe invasion by many pest species of plants and animals. Dominant pest plants (e.g., kiawe, koa haole, and others) have been greatly reduced on much of the unit, but where they still occur, their presence can result in poor or inadequate germination and survival for many sensitive or endangered native plants (USFWS 2010). Restoring and protecting this habitat is vital to maintaining the biological integrity of the NWR. The Kalaeloa Unit also provides a critical site where the genetic integrity of endangered plants can be maintained and where seed reserves can be harvested for future propagation and restoration (USFWS 2010).

Currently, approximately 25 acres (10.1 ha) of the 37.4-acre (15.1 ha) Kalaeloa Unit are under active management within designated work units (Figure 6.2). Management will be undertaken on the remaining seven acres (Work Unit 6) to include removal of mature kiawe trees—as well as removal and control of other invasive species—and to initiate restoration through natural regeneration and outplanting of native plants (Figure 6.2). Also, identification and restoration of additional anchialine pools will take place across the entire unit (USFWS 2010). The Kalaeloa Unit is generally closed to the public in order to minimize human disturbance.

The most recent round-leaved chaff flower restoration project at the Kalaeloa Unit included outplanting approximately 300 plants (4-inch pots) within Work Unit 5 (Figure 6.2) in January and February 2011 using volunteer labor. A slow-release commercial fertilizer was used during installation and weekly watering was conducted by volunteers through March and reduced to every other week thereafter; watering commenced in mid-May. Plant growth was observed to be extremely rapid and flowers were observed on all surviving plants (most 12–16 inches (30 - 40 cm) tall) by late May. Exact counts are currently not available but estimated survival is approximately 290 plants. Hand weeding was done around most plants through this period (Ellis 2011b).

The Pearl Harbor NWR CCP (USFWS 2010) includes goals and objectives for the management and conservation of habitats and species located within the Kalaeloa Unit (Table 6.1). The proposed mitigation efforts presented in this HCP are consistent with Goal 2 and Goal 4 of the CCP for the Kalaeloa Unit (USFWS 2010; Table 6.1). Management activities at the Kalaeloa Unit will result in long-term conservation of the transplanted and outplanted round-leaved chaff flower plants. Although the goals of this HCP are consistent with those of the CCP, the NWR is not responsible for the net recovery of the species as it relates to this HCP. CLDC, or its successors and assigns, is ultimately responsible for the success of mitigation efforts and a net recovery of the species as related to this project.



Figure 6.2: Kalaeloa Unit, Pearl Harbor NWR, Designated Work Units.

Table 6.1. Goals 2 and 4 from the Pearl Harbor NWR CCP

Goal 2: Restore and protect coastal coralline plain habitat at the Kalaeloa Unit.	
Objective 2.1: Restore and manage dry coastal shrubland habitat.	Strategies Applied to Achieve Objective
<p>Manage 25 to 37 acres of dry coastal shrubland habitat characterized by the following:</p> <ul style="list-style-type: none"> • Coral limestone substrate with pockets containing sandy organic humus soil; • <20 stems per acre of woody invasive species, including marsh fleabane, kiawe, and koa haole; • No mature kiawe; • <25% cover of herbaceous invasive plants (e.g., buffleggrass, khaki weed, and golden crownbeard); • Patchy distribution of low-growing (2 to 8 inch) native woody species (e.g., kou, 'ilima, beachnaupaka, pilo, wiliwili, naio) as a mosaic; and • Endangered plants ('Ewa hinahina, 'akoko) distributed in appropriate microhabitat (e.g., suitable moisture-retentive soils with wind/sun protection). 	<ul style="list-style-type: none"> • Close unit to general public access to minimize human disturbance • Prevent trampling of endangered plants • Create a fence boundary • Develop a formal trail system for guided tours to reduce ground disturbance, protect plants, and improve visitor safety • Control pest plants and animals using integrated pest management (IPM) techniques, including herbicide application, mowing, rototilling, trapping, and rodenticide bait stations • Harvest seed with subsequent propagation and outplanting of endangered and native plant species
Goal 4: Provide interpretive and educational opportunities to enhance public understanding of and appreciation for the natural and cultural resources of Pearl Harbor NWR.	
Objective 4.1: Provide a quality environmental education program at the Honouliuli and Kalaeloa units.	Strategies Applied to Achieve Objective
<p>Environmental education programs will have specific learning objectives and diverse opportunities with the following attributes:</p> <ul style="list-style-type: none"> • Meet State standards for learning; • Based on refuge and endangered species recovery management programs; • Support the mission of the Service and the Refuge System; • 90% of programs are teacher-led; • Support the Service's "Connecting Children with Nature" program; • Seasonal program (September through December) at Honouliuli Unit provides educational visits for up to 60 third-grade students per day, for up to five days a week, and less than 3,500 students per year; and 	<ul style="list-style-type: none"> • Provide seasonal educational visits for up to 1,500 high-school and college students per year at Kalaeloa Unit. • Maintain partnership for providing environmental education opportunities primarily by Leeward Community College staff at Kalaeloa on native and endangered plant restoration • Maintain partnerships for providing environmental education opportunities at Honouliuli for <3,500 students • Provide seasonal program for high school and college students at Kalaeloa for <1,500 students • Hire environmental education specialist position for complex

Source: USFWS 2010

6.2.2. Mitigation Design

The proposed compensatory mitigation efforts implemented as a result of this HCP would create new populations of round-leaved chaff flower on the Kalaeloa Unit from the genetic stock (seeds and cuttings) of the three individuals that would be impacted as a result of the KIP project. In addition, at the request of the USFWS, additional seed from a local wild source will be included within the mitigation design in order to ensure genetic variation.

In preparation of the proposed mitigation activities, seed and cutting collection efforts were coordinated with DLNR DOFAW Horticulturalist Greg Mansker. In December 2010, Mr. Mansker collected approximately 100 seeds from the two round-leaved chaff flower individuals located within the KIP project site. Collected seeds and cuttings are currently being stored at the Seed Conservation Laboratory at the Lyon Arboretum Tissue Culture Facility located on O‘ahu. There will be no take of plants at the wild site until a sufficient amount of seed is obtained for storage and propagules are grown from the parent plants.

In addition, in order to ensure genetic diversity, additional round-leaved chaff flower seed was collected from individuals that occur within plant sanctuaries located on properties belonging to the City and County of Honolulu (Honolulu) (Figure 1.1). Seed collection was conducted by Mr. Rick Barboza, with approval from Honolulu, under a State Permit for Threatened and Endangered Plant Species (dated December 2011). A copy of this permit and a letter providing approval for collection on Honolulu lands are provided in Appendix F. Per ESRC recommendation on July 24, 2013, prior to start of site preparation for the project, seeds will be collected from the plants remaining at the project site at that time, and voucher materials will be collected by authorized persons for preservation at the Bishop Museum herbarium. Per ESRC request, Bishop Museum herbarium staff were contacted to confirm this on October 17, 2013.

CLDC will propagate round-leaved chaff flower seeds and cuttings at the Hui Kū Maoli Ola Native Plant Nursery located in Kane‘ohe, Hawai‘i. Hui Kū Maoli Ola will incorporate the Hawaiian Rare Plant Restoration Group’s (HRPRG) phytosanitation standards and guidelines at their nursery for the propagation efforts. Native plant specialists, Mr. Matt Schirman and Mr. Rick Barboza at Hui Kū Maoli Ola have conducted several round-leaved chaff flower outplanting activities for the NWR within the Kalaeloa Unit with much success. As professional horticulturists experienced in the propagation and planting of round-leaved chaff flower, Mr. Schirman and Mr. Barboza will oversee all site preparation and outplanting activities within the NWR.

Once the plants reach a stage ready for outplanting, CLDC will outplant a minimum of 120 individual plants within suitable habitat located on the Kalaeloa Unit, half of which will be from the seed source at the KIP site and half of which from the seed source at the City and County of Honolulu plant sanctuary (Figure 6.1). Designated planting sites will be identified by refuge staff in conjunction with Mr. Barboza’s and Mr. Schirman’s recommendations within work units 1, 2, and/or 5 of the NWR (Figure 6.2). In addition to other considerations and site factors, planting sites will be selected that do not currently have any existing round-leaved chaff flower plants and that are sufficient distance from existing plants to ensure that monitoring of outplanted plants can document success or failure of mitigation activities. All plants will be outplanted within the first wet season after permit approval.

In preparation of outplanting activities, CLDC will conduct habitat-enhancement activities, including nonnative species removal within the planting sites, as necessary. Site preparation consists of removal of all nonnative vegetation, followed by irrigation to stimulate germination of the nonnative seed bank. If a large number of native plants germinate, subsequent weeding will be done by hand or herbicide will be used to reduce the nonnative seed bank. Plants will be planted in four plots of 30 plants, with a minimum

spacing of 4 feet (1.2 m). Thus, the minimum planting area will comprise 115m² (1238 sqf). Outplanted individuals will be watered every other day for 1 month after outplanting, then once a week for 1 month. An irrigation system will remain in place for 5 years to allow for supplemental watering in case of severe drought events that might threaten the survival of the outplanted individuals.

Since the exact planting locations have not been chosen within the Kalaeloa Unit at this time, the dominance of native species within the chosen sites is currently unknown. If sites are chosen that are dominated by nonnative species, then habitat enhancement will include planting of native species upon removal of nonnatives. However, if a site is chosen that is dominated by native species, then planting of common native plants will not be necessary (although subdominant nonnatives will be removed). Furthermore, since the baseline conditions of the chosen sites are currently unknown, details regarding site preparation, irrigation, water sources, and so on are subject to adjustment. CLDC proposes to prepare and submit a planting plan once site selection has been determined. Per ESRC request on July 24, 2013, the planting plan will provide photographs, maps, and coordinates of planting locations and will provide details regarding baseline conditions, site preparation, planting methods, nonnative weed removal, and proposed pest-control methods (as necessary). The planting plan will be prepared in consultation with the project horticulturist and NWR staff that have successfully conducted and are currently conducting round-leaved chaff flower outplanting activities within the Kalaeloa Unit. The planting plan will be submitted to DOFAW within 30 days of issuance of the ITL for approval prior to mitigation activities.

CLDC will promote community involvement and education by including educational institutions in the implementation of habitat restoration and enhancement activities within the round-leaved chaff flower planting sites. Educational native plant restoration programs such as the Plant Bioscience Technology Program at Leeward Community College and the Wai‘anae High School Hawaiian Studies Program, led by Dr. Bruce Keobebe, will be invited to participate with planting and habitat-enhancement activities in order to provide hands-on opportunities for students to learn history and science, blended with environmental stewardship. All activities will be overseen by the project horticulturist (Mr. Matt Schirman) and conducted in coordination with the NWR staff, as per conditions of the special use permit and this HCP. The utilization of such institutions would additionally support Goal 4, Objective 4.1, for the Kalaeloa Unit (Table 6.1) as described in the Pearl Harbor NWR CCP.

Successful implementation of these mitigation efforts would significantly increase the numbers of new plants on O‘ahu as well as improve their quality compared to the in situ disturbed location of the KIP site. These mitigation efforts would also protect the genetic diversity of the existing population and existing individuals plants by relocating them to appropriate habitat within preserved and managed lands, as well as provide education stewardship opportunities within the NWR. By offsetting the incidental take of three round-leaved chaff flowers at a 30:1 ratio, this project will provide a positive contribution to the recovery of this species. Further net environmental benefit is achieved through habitat restoration and conservation of unique dry coastal shrubland on O‘ahu, which will provide long-term benefits to the conservation of native coastal communities, and a seed source for further round-leaved chaff flower conservation efforts. In contrast, the round-leaved chaff flower is the only native species recorded at the KIP project site.

6.3. Maintenance

Maintenance activities will be performed to ensure overall outplanting success. These efforts may include weed control, pest control (e.g., ants), erosion control, irrigation, soil-fertility management, and dead-plant replacement, as needed. Depending on the nature of maintenance activities that will be necessary, maintenance personnel may include a qualified landscape contractor and/or volunteer groups. The project horticulturist, which will be retained for the duration of the HCP, will oversee and supervise the maintenance program and work directly with maintenance personnel to ensure project success.

Once outplanting is complete, follow-up maintenance will occur as necessary for five years—or until mitigation goals have been met for all KIP project round-leaved chaff flower populations located within the NWR—provided, however, that goals are met within 10 years. After this period the NWR will take over management of these populations. Maintenance under this HCP will be performed by qualified personnel with experience in maintaining native habitat revegetation in Hawai‘i and will be coordinated with the NWR. Maintenance would be conducted on a monthly basis during Year 1, bimonthly during Year 2, and on a quarterly basis during years 3 through 5. Maintenance activities may need to occur more or less frequently if recommended by the project horticulturist. Generally, a 2-foot radius will be cleared and maintained (i.e., void of vegetation) around each individual plant in order to reduce competition, promote growth, and encourage regeneration (Ellis 2011a).

Ongoing NWR management activities at the Kalaeloa Unit include removal of invasive nonnative plant species and planting of native and endangered plant species, with an emphasis placed on the recovery of round-leaved chaff flower (USFWS 2010). All invasive-plant control methods within the planting areas will be coordinated with the NWR and conducted in compliance with the NWR’s IPM plan. Nonnative removal techniques will be implemented, as per the NWR accepted methods and in accordance with the Pearl Harbor NWR CCP and best management practices (BMPs), in order to avoid adverse impacts to biological resources that are known to occur within the Kalaeloa Unit. Fire-management activities on the NWR are conducted, as per an established fire-management plan. CLDC does not have the authority, responsibility, or capability to conduct these activities on a NWR; however, the proposed two-foot [0.6 m] buffer area around each plant, which will be kept void of vegetation, will provide minor incidental protection.

6.4. Schedule for Implementation

The mitigation program is proposed for five years, or until mitigation goals have been met, within the 10-year life of the permit. Appendix G presents the proposed HCP implementation schedule. Section 7.2 provides a detailed schedule for outplanting and monitoring activities. All restoration, maintenance, monitoring, and seed storage efforts will be funded by CLDC within this time period (Section 7.4).

6.5. Consistency with Approved Recovery Plans

A USFWS draft recovery plan was developed for round-leaved chaff flower and associated species in 1994 (USFWS 1994); however, this plan has not yet been finalized. The ultimate objective for these taxa is to delist them, completely removing them from federal protective status. As noted in the draft recovery plan, in order to consider downlisting, there must be at least three self-reproducing populations, with a minimum of 1,000 reproductive plants per population, in each of the two geographically distinct regions in which it occurs (USFWS 1994; Figure 3.3).

A recent evaluation of the status of round-leaved chaff flower was conducted by the USFWS *5-Year Review Summary Evaluation* in 2008 (USFWS 2009). The evaluation ultimately determined that it is not possible to determine if the delisting goals for this species have been met, as the number of mature individuals is not currently known and the recovery plan has not been finalized, due to taxonomic issues with the other species in the plan. Furthermore, the evaluation states that not all of the threats are being managed. Therefore, the evaluation determined that round-leaved chaff flower meets the definition of endangered as it remains in danger of extinction throughout its range. The five-year evaluation presented the following recommendations for recovery of this species:

- Continue collection of fruit and plant material for future reintroductions, especially from the recently discovered population at Waianae Kai/Makaha.

- Eradicate invasive introduced plant species within the species' habitat.
- Establish more populations within suitable habitat in protected sites.
- Survey geographical and historical range for a thorough current assessment of the species.
- Determine and implement control methods for scales and ants in the populations.
- Assess genetic variability within extant populations;
- Assess the suitability of habitat for reintroducing this species on Lana'i and Moloka'i;
- Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this taxon;
- Study round-leaved chaff flower populations with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, seed banks, specific environmental requirements, limiting factors, and threats; and
- Revise the draft recovery plan with current information (USFWS 2009).

This HCP is designed to enhance populations of round-leaved chaff flower in a protected and managed area. The goal of this HCP is to 1) maintain genetic representation of the original population by growing cuttings and seeds in nurseries for outplanting efforts and additionally placing seeds at Lyon Arboretum; and 2) to establish new, self sustaining wild populations within protected suitable habitat located on Pearl Harbor NWR's Kalaeloa Unit in order to provide a net-recovery benefit for the species.

The conservation measures presented herein are consistent with the recommendations provided in the 5-Year evaluation. These conservation measures will contribute to the overall success of this species, in support of the species recovery as identified in the draft recovery plan (USFWS 1994).

6.6. Measures of Success

The goal of the measures of success is to ensure that the outplanted populations of round-leaved chaff flower become established and are stable and viable self-producing populations. Success criteria include the metrics of native plant cover, nonnative species cover, recruitment, plant survivorship and density. The criteria presented below were developed based on consultation with the NWR and in accordance with the goals and objectives presented in the Pearl Harbor NWR CCP for the Kalaeloa Unit (USFWS 2010). If it is determined that these criteria are not realistic based on an evaluation of baseline conditions, CLDC will request a minor amendment (Section 7.7) with sound justification to DLNR for approval. In addition, note that contingency measures, as discussed below, will be implemented if survivorship falls below standards set forth by Year 1. Proposed measures for mitigation success will be determined by the following:

1. Outplanted individual survivorship:
 - a. 100% of the 120 outplanted individuals will survive by Year 1
 - b. 95% of the 120 outplanted individuals will survive by Year 2
 - c. 85% of the 120 outplanted individuals will survive by Year 3
 - d. 75% of the 120 outplanted individuals will survive by years 4 and 5
2. There must be (a) recruitment of seedlings that survive through the dry season, in absence of any supplemental watering, and (b) seed production by at least 25% of the outplanted lineages by Year 5;

3. The number of seedlings recruited into the mature age class must be greater than the mortality rate of existing adult plants over a five-year period, with a minimum recruitment of 25% of the number of outplanted individuals over a five-year period;
4. No fewer than 120 mature plants, which will include plants recruited from the planted lineages, will be established by Year 5;
5. Cover of herbaceous nonnative plants (e.g., buffelgrass, khaki weed, and golden crownbeard) will be less than 25% within planting sites by Year 5.
6. No mature kiawe will be within the planting sites over the five year period.
7. Native species cover within the planting sites will be greater than 25% by Year 5.

6.7. Contingency measures

Should survivorship fall below standards set forth by the end of Year 1, outplanting of additional individuals (from seed collected from the three individuals on KIP project site and additional seed source site [Figure 6.1]) would be implemented during the following rainy season in order to achieve success standards by the end of Year 2. To facilitate monitoring, and to allow for consistent management practices over time (e.g., duration of irrigation), the additional individuals planted after Year 1 will be planted in a separate area. If it is determined that site selection is the result of plant mortality, an additional recipient site will be selected within the Kalaeloa Unit for replanting and monitoring efforts. If overall success is not met by Year 5, CLDC will identify an additional recipient site for mitigation efforts within the NWR or at an alternative site, or propose additional compensation measures that are sufficient to achieve a net benefit for the species.

Currently, CLDC is requesting permission from the Hawaii Community Development Authority and the newly formed private non-profit Kalaeloa Heritage and Legacy Foundation to use Kalaeloa Heritage Park (which provides suitable habitat for the species), as a back-up compensatory mitigation site, in the event that mitigation success is not met on the NWR. Kalaeloa Heritage Park was previously part of Barbers Point Naval Station (Figure 1.1); the 77-acre (31 ha) parcel is now being restored as a heritage park, to serve as a community benefit and a venue to educate both residents of Kapolei and visitors about Hawaiian cultural heritage. All contingency measures would be submitted to DLNR for approval prior to implementation.

7. IMPLEMENTATION

7.1. HCP Administration

This HCP will be administered by CLDC, its successors, or its assigns with guidance from DLNR. Other experts may be consulted as needed, including biologists from other agencies (e.g., USGS), conservation organizations, consultants, and academia. HCP-related issues may also be brought before the ESRC for formal consideration when deemed appropriate by CLDC or DLNR.

7.2. Monitoring and Reporting

The overall goal of this HCP is to successfully implement mitigation and minimization efforts that would offset impacts to the round-leaved chaff flower as a result of the KIP development project. These efforts would increase the number of new plants on O‘ahu by establishing a self-sustaining population, as well as improving their habitat quality compared to the in situ disturbed location of the KIP site. Mitigation efforts provided herein would also protect the genetic diversity of this population and protect existing individuals by relocating them to appropriate habitat within preserved and managed lands.

In order to measure the success of these efforts, CLDC proposes to implement a monitoring and maintenance program for five years upon plant installation. Monitoring will measure the success of survival, growth, reproduction, and phenology of all individual outplants. These efforts would additionally document and recommend remedial and adaptive management measures that would be required for project success. Maintenance and monitoring efforts will be completely funded by CLDC, its successors, or assigns, until mitigation obligations have been satisfied.

7.2.1. Monitoring

7.2.1.1. YEAR 0 – BASELINE MONITORING

Prior to site preparation and outplanting of round-leaved chaff flower individuals, the spatial extent of each planting site will be located and demarcated with a global positioning system (GPS) device. Baseline conditions will be established within this area; at a minimum, the relative abundance of native and nonnative species and soil conditions will be collected. Photo-points will additionally be established and recorded with a GPS. Baseline conditions of the site will be photographed from a variety of perspectives at each photo-point. Following these data collection efforts, the site will be prepared for installation by removing nonnative species and preparing the soil and topography for plant installation. These efforts will be monitored by the project horticulturalist to ensure that native species and natural resources within the NWR are not impacted during site preparation. The five-year monitoring period will commence upon the 120-day establishment period (Section 7.2.1.2). As noted above, a Planting Plan will be prepared for submittal to DLNR for approval within 30 days of the ITL issuance.

7.2.1.2. 120-DAY ESTABLISHMENT PERIOD

The establishment monitoring period will commence after the individuals of round-leaved chaff flower have been installed within the NWR. The establishment monitoring period will last for 120 days. The purpose of the 120-day establishment period is to provide an observation and guarantee period to ensure that the different components that comprise installation are operating and performing as intended. For example, flaws with the irrigation system (if implemented) or health problems with plants that were not detectable during installation are likely to be identified during the 120-day establishment period. During

this period, the project horticulturist will conduct weekly inspections for the first 30 days and biweekly (every two weeks) thereafter. The project horticulturist will develop a list of items that need to be addressed to meet success criteria and will oversee or implement these items in coordination with the NWR as necessary. A memorandum detailing the results of the 120-day monitoring activities will be submitted to DOFAW upon completion of this monitoring period. Successful completion of this period will verify that installation was properly performed prior to starting the monitoring and maintenance period.

7.2.1.3. YEARS 1 THROUGH 5 MONITORING

The monitoring and maintenance period will commence after the completion of the 120-day establishment period. Upon commencement of this period, the planting sites will be monitored through a combination of qualitative and quantitative means. Qualitative or horticultural monitoring provides proactive direction and oversight of the maintenance program, while qualitative or botanical monitoring measures quantitative habitat development. Each of these methods is discussed in more detail below. Note that each individual plant will be tagged and the locations will be demarcated by a submeter GPS device prior to monitoring activities.

7.2.1.4. HORTICULTURAL MONITORING

The project botanist or horticulturalist will conduct horticultural monitoring within the planting sites bimonthly (twice monthly) during the first 6 months of Year 1, monthly thereafter through Year 2, and quarterly between Year 3 through Year 5. Each monitoring visit will include a qualitative assessment of the mitigation areas and identification of maintenance needs. Horticultural monitoring visits will include a minimum of the following tasks:

- Direct counts of healthy round-leaved chaff flower individuals (note each plant will be tagged and demarcated by a GPS device upon installation)
- Mortality counts of round-leaved chaff flower individuals
- Plant vigor categories—healthy, moderate, and dead (based on developed criteria)
- Phenological stage counts—number of vegetative, reproductive, or dead
- A general description of the status of the plantings
- Plant damage from rodents, insects, etc.
- Threats
- A list of maintenance requirements
- Visual assessment and photographic documentation of native and nonnative percent cover
- Visual assessment and chemical analysis of soil conditions

A written memorandum will be prepared after each horticultural monitoring visit, listing problems (if observed) and recommending remedial measures. These memoranda will be sent to the maintenance personnel (contracted by CLDC) or suitable alternate for implementation. The project horticulturalist will be responsible for dead plant counts and for recommending remedial measures needed to improve the mitigation areas and species growth if they are not meeting the desired growth success criteria. The horticulturalist will prepare a letter report subsequent to all horticultural monitoring assessments to track the progress of the mitigation areas. All reports will address the presence of nonnative species and will identify corrective measures for weed control. A copy of each monitoring letter report will be provided to the maintenance personnel. CLDC will also submit these reports to DLNR. Required maintenance will be

performed promptly, generally within two weeks of the receipt of the monitoring report and will be overseen by the project horticulturist.

While remedial measures are partially defined herein, they are also left to the discretion of the horticulturist, since it is expected that one approach will not always be the best or most cost effective for the problem at hand. Remedial measures may include some or all of the following: invasive plant control, replanting, and addition of irrigation.

7.2.1.5. BOTANICAL MONITORING

Botanical monitoring includes the quantitative measurements of the growth and establishment of plants and assessment of the invasion of exotic species. Botanical monitoring will be conducted by a qualified biologist or horticulturist quarterly during the first monitoring year and twice per year thereafter, with monitoring visits in January and June. Sampling times will be consistent from year to year (see Section 7.2.1.7 for schedule). The monitoring data will be included in the annual reporting that will be submitted to DLNR (Section 7.2.2).

Plant establishment will be quantitatively assessed through direct counts of round-leaved chaff flower individuals (outplanted and naturally recruited). Each individual will be documented with a submeter GPS device and tagged with a unique number. All seedlings will also be noted, counted and numbered in order to track their success. Photographs will additionally be taken of each individual (Section 7.2.1.6).

The overall condition of the planting sites will be evaluated through the use a randomized block design. Each of the outplanting areas will be divided into 1×1 m (3.3×3.3 ft) quadrats. A minimum of five quadrats will be randomly selected and used as permanent monitoring quadrats. Cover for each species will be evaluated in each quadrat.

Quadrats will be recorded with a GPS device. Data collected from quadrats will be used to evaluate project performance relative to the success standards (Section 4.4). Data will be collected on vegetative composition. Volunteer establishment of native species will also be noted and measured as appropriate.

Permanent photograph viewpoints will also be established and photographs taken from the same location each year (Section 7.2.1.6). In addition, photographs will be taken of each monitoring quadrat. These photographs will be included in each annual report (Section 7.2.2).

Botanical monitoring visits will include a minimum of the following:

- Direct count of round-leaved chaff flower individuals
- An assessment of natural regeneration
- A list of plant species found within the planting areas
- A list of wildlife species noted within the planting areas
- Data analysis from monitoring quadrats
- Site photography from photograph photo-points
- List of maintenance requirements

In addition, any significant issue or contingency that arises within the mitigation site (e.g., plant survival issues, fire, or flooding) will be reported by CLDC in writing to DLNR within two weeks of the date of the incident. Accompanying the report will be CLDC's proposed plan for remediation with an implementation and monitoring schedule.

7.2.1.6. PHOTOGRAPHIC DOCUMENTATION

The mitigation efforts will be documented using photographic monitoring. The purpose of photographic monitoring is to provide CLDC and DLNR with a clear understanding of the restoration efforts and success. Permanent photo-points will be established prior to plant installation to document baseline conditions of the mitigation area (Section 7.2.1.1). Photos will be taken from the same location each year and will be taken from a variety of perspectives at each point to create a clear picture of the effort. Video will additionally be captured of the planting areas. Color print photographs will be taken of the following activities:

- Pre-existing conditions prior to any restoration actions occurring at sites representing the habitat within the planting areas;
- Installation activities;
- Photographs of each of the 120 planted individuals (identified by given number)
- Representative photographs of healthy, dead, reproducing, and naturally recruited individuals;
- Maintenance and monitoring of the mitigation area; and
- Any other activities deemed to be significant in the restoration and enhancement efforts.

7.2.1.7. MAINTENANCE AND MONITORING SCHEDULE

The monitoring and maintenance period will continue for a period of five years, after plant installation is complete. The mitigation area will be monitored for success through a combination of horticultural and botanical means, as discussed above. Maintenance visits will be made as needed, based on the results of horticultural monitoring visits. A five-year monitoring and maintenance schedule is provided in Table 7.1.

Once success standards have been met upon the five-year monitoring period (with DLNR concurrence), a no-net-loss of round-leaved chaff flower will be achieved. Only areas failing to meet success standards will require additional remedial measures. If success criteria are not met by Year 5, then additional mitigation measures will be agreed upon by CLDC and DLNR for compensation (Section 6.7).

Table 7.1. Five-Year Maintenance and Monitoring Schedule.

Monitoring Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Year 0 (2014)	I	EPM	EPM	EPM	EPM LR	H (x2)	H (x2)	H (x2)	H (x2)	H (x2)	H (x2)	H
Year 1 (2015)	H B	H	H	H B	H	H B	H	H AR-1	H	H B	H	H
Year 2 (2016)	H B	H	H	H	H	H B	H	H AR-2	H	H	H	
Year 3 (2017)	B	H		H		B		AR-3	H		H	
Year 4 (2018)	B	H		H		B		AR-4	H		H	
Year 5 (2019)	H B			H		H B		FR-5				

Notes: I = Completion of Installation; EPM= Establishment Period; LR = Letter Report; H = Horticultural Monitoring; B = Botanical Monitoring; AR = Annual Report; FR = Final Mitigation Completion Report

7.2.2. Reporting

Annual monitoring reports (Table 7.2) will be submitted each year for five years (by August 30 of each year), beginning approximately one year after installation (Table 7.1). Reports will detail project progress and remedial measures recommended and implemented during the reporting period. Reports will include a summary and analysis of the abiotic and biotic monitoring data collected and an evaluation of project progress relative to success standards. Copies of the yearly monitoring reports will be submitted to the appropriate agencies (i.e., NWR staff and DLNR).

The annual reports will contain a minimum of following information:

- List of names, titles, and companies of persons who participated in monitoring and maintenance activities for that year
- Analysis with discussion of the quantitative and qualitative monitoring data, prepared in graph and table format
- Prints or color photocopies of monitoring photographs
- Maps identifying monitoring areas, transects, planting zones, etc. as appropriate

Table 7.2. Summary of reporting deliverables for the round-leaved chaff flower HCP.

Activity	Deliverable
Plant Installation	<ul style="list-style-type: none"> • Planting Plan to DOFAW 30 days after issuance of ITL for approval. • Letter Report- upon commencement of installation.
Maintenance Activities	<ul style="list-style-type: none"> • Summarized in annual report to DOFAW.
Year 0 Monitoring:	<ul style="list-style-type: none"> • 120-day Establishment Period Letter Report- to DLNR within 30 days of termination of establishment period. • Semiannual Horticultural Monitoring Letter Report to DOFAW.
Years 1 through 5 Monitoring	<ul style="list-style-type: none"> • Annual Report detailing horticultural and botanical monitoring conducted during years 1 through 5.
Year 5 Monitoring	<ul style="list-style-type: none"> • Final Summary Report summarizing horticultural and botanical monitoring conducted between Year 1 through Year 5, once mitigation goals are reached.

7.3. Adaptive Management

According to USFWS policy (65 Fed. Reg. 35242 [June 1, 2000]), adaptive management is defined as a formal, structured approach to dealing with uncertainty in natural resources management, using the experience of management and the results of research as an ongoing feedback loop for continuous improvement. Adaptive approaches to management recognize that the answers to all management questions are not known and that the information necessary to formulate answers is often unavailable. Adaptive management also includes, by definition, a commitment to change management practices when determined appropriate.

Natural environments are recognized as open, changing, complex ecosystems. In the case of this project, some uncertainty exists, including the success of the proposed mitigation measures. Based on monitoring activities and periodic reviews of HCP implementation, CLDC will ensure adjustments to management activities affecting the success of this HCP as necessary. All adjustments will be approved by DOFAW, and minor and major amendments (Section 7.7) to this HCP will be made as necessary.

7.4. Funding

Consistent with HRS Chapter 195D, this funding plan has been designed to ensure that all the identified mitigation and conservation actions and their associated costs will be funded.

CLDC, or, if applicable, its successors and assigns, will fund all monitoring and mitigation activities. Appendix H provides an estimated budget for anticipated costs associated with implementation of mitigation and monitoring activities. CLDC will provide the required conservation measures (e.g., mitigation and monitoring) in full, even if actual costs are greater than anticipated.

Assurances that adequate funding will be available to support the proposed monitoring and mitigation measures will be provided by CLDC in the form of a performance bond or letter of credit in the amount of \$197,500, naming DLNR as the beneficiary, which will be available to fund mitigation in the unlikely event of a revenue shortfall or, in the worst case scenario, bankruptcy. The bond or letter of credit will be renewed prior to expiration, in the amount required to meet mitigation goals, unless it is determined to no longer be necessary by DLNR. In the event of a revenue shortfall or bankruptcy, the bond or letter of credit could be drawn upon by DLNR to fund any outstanding mitigation obligations of the project. In addition, a single bond or letter of credit valued at \$197,500 will be established for contingency funds, which will stay in place until mitigation obligations have been met. The HCP funding matrix is included in Appendix H.

7.5. Changes in Conditions or Circumstances

With a properly implemented HCP (HRS section 195D-23), CLDC will not be required to commit additional land, water, money, or financial compensation, nor will CLDC be subject to additional restrictions on land, water, or other natural resources to respond to changes in conditions or circumstances beyond what has been already agreed upon in the HCP, without the consent of the CLDC.

7.6. Permit Duration

Once approved by DLNR, the term of this HCP, and the associated incidental take authorizations, will be no longer than the earlier of 10 years from the effective date of the ITL or upon satisfaction of the measures of success as described in this HCP.

7.7. Revisions and Amendments

Two types of changes may be made to the HCP and/or the incidental take authorizations: minor amendments and major amendments. All revisions and amendments will be processed in accordance with all applicable legal requirements.

7.7.1. Minor Amendments

Minor amendments are changes to the HCP provided for under the operating conservation program, including adaptive management changes as noted above. They also include revisions, which do not significantly modify the scope, or nature of activities or actions covered by the ITPs, in terms of their affect on the covered species. Minor amendments may include, but are not limited to, the following:

- Minor changes to seed collection protocols (i.e., if additional seed is needed for collection)
- Minor changes to plant installation protocols
- Minor changes to planting location within the NWR lands
- Minor changes to monitoring or reporting protocols
- Minor changes to maintenance protocols in order to further minimize or avoid take of the species
- Any other modifications that are consistent with the goals and objectives described in this HCP that will not result in operations under the HCP that are significantly different from those analyzed in connection with the HCP as approved

CLDC may submit a proposed minor revision to DLNR for review. DLNR will respond in writing to the proposal within 60 calendar days of receipt of the request, or the request will be deemed to have been approved. The responses will either (1) concur in the proposed revision, (2) identify additional information necessary to enable the agency to evaluate the revision, or (3) disapprove the revision. If DLNR disapproves the revision, it will convey its disapproval in writing to CLDC, stating the reasons for disapproval. If DLNR disapproves the requested revision, then the revision may be revised or processed as a major amendment, as described below.

7.7.2. Major Amendments

A major amendment includes but is not limited to the following:

- Changes to the covered activities that were not addressed in the HCP as originally adopted, and which otherwise do not meet the criteria for a minor amendment, as discussed above
- Revisions to success criteria, if not achievable
- Extending the term of the incidental take authorizations due to failed success

A major amendment requires the submittal of a written application to DLNR and implementation of all permit processing procedures applicable to an original incidental take authorization. The specific documentation is required to comply with HRS Chapter 195D.

DLNR may suspend or revoke their respective incidental take authorizations if CLDC fails to implement the HCP or the terms of the incidental take authorizations. Suspension or revocation of the permits will be done in accordance with applicable federal or state law.

7.8. Permit Transfer

CLDC anticipates selling the property either before or after development. HRS section 195D-21(e) states:

The rights and obligations under any habitat conservation plan shall run with the land and shall be recorded by the department in the bureau of conveyances or the land court, as may be appropriate.

In the event of sale or transfer of ownership of the KIP property during the term of the permit, any and all responsibilities associated with the HCP and associated ITL will transfer to CLDC's successors and assigns. CLDC will notify DLNR prior to any sale or transfer of the KIP project site.

8. CONCLUSION

CLDC looks forward to working with DLNR throughout the approval and implementation period of this HCP for the KIP project. CLDC is committed to making all reasonable and appropriate efforts to compensate for these impacts as evaluated and determined through the HCP process and its adaptive management strategy. As currently designed, successful implementation of the proposed compensatory mitigation measures are believed to achieve a net benefit to this species. Ultimately, impacts to the three individuals of round-leaved chaff flower as a result of the proposed KIP project will be compensated by successful establishment of a viable population of this species within protected and managed lands.

9. LITERATURE CITED

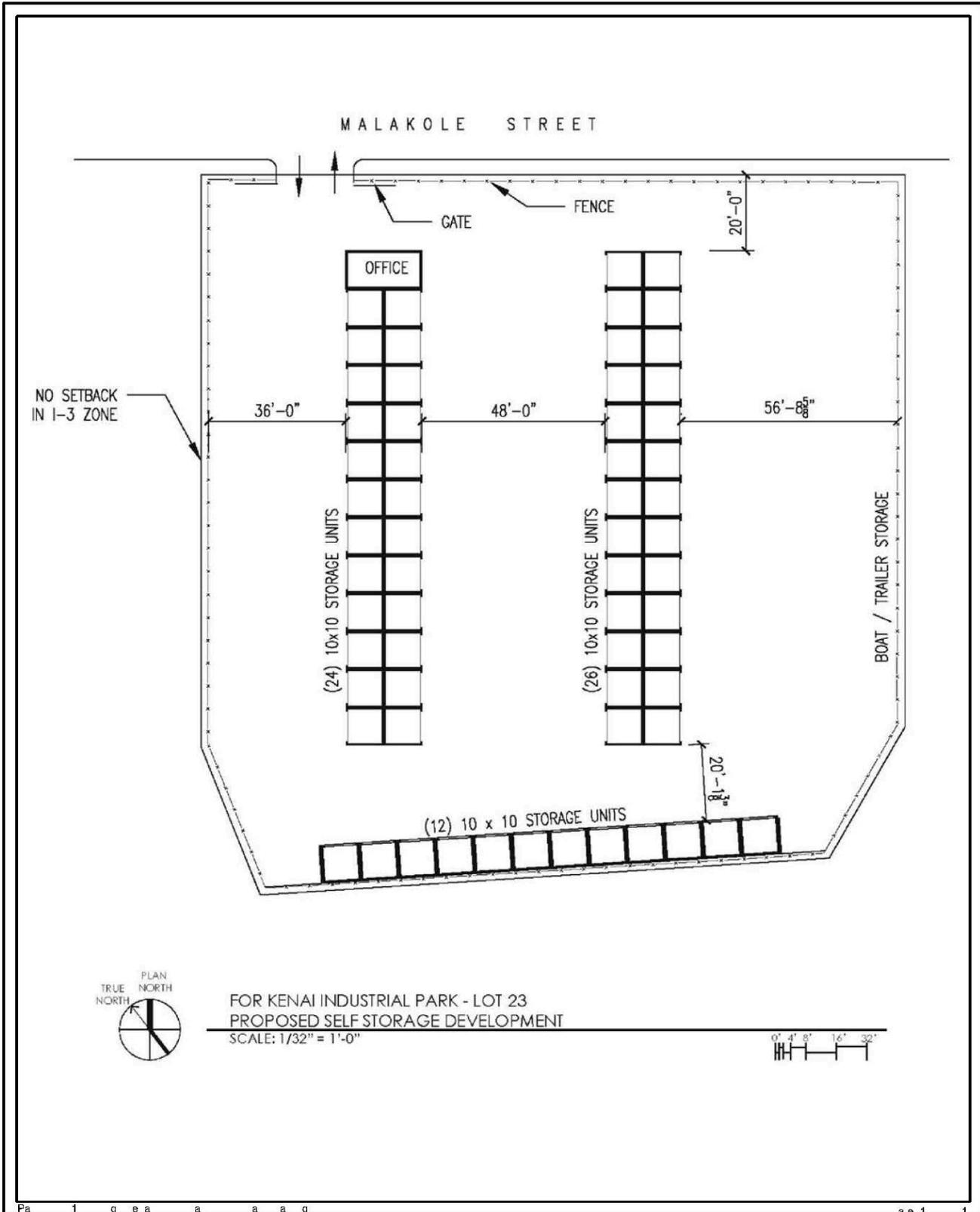
- Baskin, C. C. and J. M. Baskin. 2001. *Seeds: Ecology, Biogeography, and Evolution of Dormancy and Germination*. Academic Press, Inc: San Diego, CA.
- City and County of Honolulu Department of General Planning. 1990. O'ahu Water Management Plan. Accessed at: <http://hawaii.gov/dlnr/cwrp/planning/wudpoa1990.pdf>
- City and County of Honolulu, Department of Planning and Permitting. 2000. 'Ewa Development Plan. Accessed at: <http://honolulu.dpp.org/planning/ewa/ewa2.pdf>.
- City and County of Honolulu, Department of Planning and Permitting. 2002. O'ahu General Plan. Accessed at: <http://dev.honolulu.dpp.org/Planning/GeneralPlan.aspx>.
- City of Kapolei. 2010. Kapolei Area Long Range Master Plan Map. Kapolei Property Development. LLC. Accessed at: http://www.kapolei.com/images/kapolei_area_master_plan_2010.jpg.
- Ellis, David. 2010. Personal communication between O'ahu NWR Refuge Manager, Davis Ellis and AMEC Botanist Halleh Paymard.
- Ellis, David. 2011a. Personal communication between O'ahu NWR Refuge Manager, Davis Ellis and AMEC Botanist Halleh Paymard via telephone. 28 January, 2011.
- Ellis, David. 2011b. Personal communication between O'ahu NWR Refuge Manager, Davis Ellis and AMEC Botanist Halleh Paymard via email. 23 June, 2011.
- Hawaiian Native Plant Propagation Database. 2011. College of Tropical Agriculture and Human Resources: University of Hawai'i at Manoa. Accessed at: <http://pdc.ctahr.hawaii.edu:591/hawnprop/botlist.htm>.
- Helbert, Hastert, Van Horn, and Kimura, Planners. 1986. Camp Malakole Industrial Subdivision; Environmental Assessment.
- Kane, S. 2004. Preliminary report to H-Power *Achyranthes splendens rotundata* habitat conservation plan. Kapolei, Hawaii. Unpublished.
- Leck, M.A., V.T. Parker, and R.L. Simpson (eds.). 1989. Ecology of soil seed banks. Academic Press, Inc., San Diego, CA. pp. 283-305.
- Morden & Associates. 2005. Botanical Survey of Malakole Street Property. Unpublished report.
- Morden & Associates. 2007. Botanical Survey of Malakole Street Property. Unpublished report.
- Morden & Associates. 2008. Botanical Survey of Malakole Street Property. Unpublished report.
- Natural Resources Conservation Service (NRCS). 2011. Web soil survey. Accessed at: <http://websoilsurvey.nrcs.usda.gov/>.
- Oki, D.S., S.B. Gingerich, and R.L. Whitehead. 1999. Hawaii. In ground water atlas of the United States, Segment 13, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands: U.S. Geological Survey Hydrologic Investigations Atlas 730-N, p. N12–N22, N36.

- SWCA Environmental Consultants. 2013. SWCA survey results KIP April 11, 2013. Unpublished report.
- United States Department of Agriculture (USDA). 1972. Soil survey of Islands of Kaua'i, O'ahu, Maui, Moloka'i, and Lana'i, State of Hawai'i. Soil Conservation Service.
- United States Environmental Protection Agency. USEPA. 2012. My WATERS Mapper. Available at <http://map24.epa.gov/mwm/mwm.html?fromURL=02010003>.
- United States Fish and Wildlife Service (USFWS). 1986. Endangered and threatened wildlife and plants; determination of endangered status for *Achyranthes rotundata*. Final rule. Federal Register 51 (58):10518- 10521.
- United States Fish and Wildlife Service (USFWS). 1994. Draft recovery plan for *Chamaesyce skottsbergii* var. *kalaeloana* and *Achyranthes splendens* var. *rotundata*. USFWS. Portland, OR. 79 pages.
- United States Fish and Wildlife Service (USFWS). 1996. Species *Achyranthes rotundata* (Draft). Unpublished document.
- United States Fish and Wildlife Service (USFWS). 2009. Five-year review *Achyranthes splendens* var. *rotundata* (Round-leaved chaff-flower). Five-year review summary and evaluation. 22 July
- United States Fish and Wildlife Service (USFWS). 2010. Pearl Harbor NWR CCP.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer, S.H. 1999. Manual of the flowering plants of Hawai'i, rev. ed. Honolulu, HI: University of Hawai'i Press and Bishop Museum Press. 1853p.
- Western Regional Climate Center (WRCC). 2011. James Campbell Industrial Park Weather Station. Data. Accessed at: <http://www.wrcc.dri.edu/>.
- Whistler, Arthur, W. 1985. The *Achyranthes Rotundata* Population at Camp Malakole, Oahu, Hawaii. Unpublished report, prepared for Camp Malakole Industrial Subdivision; Environmental Assessment.
- Ziegler, Alan, C. 2002. Hawaiian Natural History, Ecology, and Evolution. University of Hawai'i Press. Accessed at: <http://www.botany.Hawai'i.edu/faculty/carr/natives.htm>.

This page intentionally blank

APPENDIX A

SELF STORAGE CONCEPTUAL DESIGN PLAN



**Kenai Industrial Park Conceptual Project Design
 Round-Leaved Chaff Flower HCP**

APPENDIX B
BOTANICAL SURVEY REPORTING

Morden & Associates

Botanical and Environmental Consultants

94-333 Alula Pl.
Mililani, HI 96789
(808) 292-1369

24 June 2005

Ms. Katie Gage
CIRI
22525 "C" Street, Suite 500
P.O. Box 93330
Anchorage Alaska 99509-3330

Dear Ms. Gage,

The property along Malakole Street near the intersection with Kaihola Street was re-examined to determine the status of the *Achyranthes splendens* var. *rotundata* (formerly *Achyranthes. rotundata*) population at this location. The location had been previously examined 20 years previous to this (by W. A. Whistler in 1985) when 116 plants were found at this site. At that time, *A. splendens* var. *rotundata* was found to be the dominant understory vegetation and appeared to be reproductively active with plants in all growth stages.

I visited this site again on 23 June 2005 and made a thorough search for *A. splendens* var. *rotundata* to estimate of population size and demographics of any individuals found. The habitat at this site is still very much as it was described in the previous report. The dominant overstory canopy consists of *kiawe* (*Prosopis pallida*) on coral rock with numerous sink holes. Surrounding the trees is a raised soil that is dominated along one side by sourbush (*Pluchea symphytifolia*) and on the other sides by buffelgrass (*Cenchrus ciliaris*).

The report by Whistler indicated that individuals of *A. splendens* var. *rotundata* were growing under the kiawe canopy directly out of the coral rock substrate. Although many of the other species mentioned by Whistler in his report were still present, there was no evidence of *A. splendens* var. *rotundata* to be found. The buffelgrass and sourbush portions surrounding the kiawe thicket were also searched, and again no evidence of *A. splendens* var. *rotundata* was found.

Whister mentions that the population was actively reproductive and appeared in good health, but that the plants were "spindly" as a consequence of growing under the canopy of *kiawe* and also probably because of the poor soil conditions. The normal habitat conditions for this species is in open scrub vegetation with intermittent small trees and growing in rocky soil. It is

my opinion that this population, although reproductively active at one time, was in decline and is now extirpated from this location. My previous experiences in seeing this species is that it is usually in well draining soils along the Waianae coast, but away from the ocean or with brackish water. The associated vegetation under the *kiawe* canopy includes pickleweed (*Batis maritima*), a common indicator of brackish waters and wet, saline soils.

Given the nature of the substrate, I would not anticipate there being a seed bank upon which the population could potentially regenerate. There is no soil present in the *kiawe* understory in which the seeds could be stored. Any seeds on the surface of this substrate would be completely exposed to the elements (humidity, rain, and heat), and seeds would not persist long under these conditions.

If you have any questions regarding the visit, other species found in association with the site, or other aspects of this project, feel free to contact me.

Sincerely,

Clifford W. Morden
Botanist

Morden & Associates

Botanical and Environmental Consultants

94-333 Alula Pl.
Mililani, HI 96789
(808) 292-1369

27 February 2007

Mr. John P. Whalen, President
PlanPacific, Inc.
345 Queen Street, Suite 802
Honolulu, HI 96813

Dear Mr. Whalen,

The property along Malakole Street near the intersection with Kaiholo Street was re-examined to determine the status of the *Achyranthes splendens* var. *rotundata* (formerly *Achyranthes rotundata*) population at this location. The location had been previously examined 22 years previous to this (by W. A. Whistler in 1985) when 116 plants were found at this site. At that time, *A. splendens* var. *rotundata* was found to be the dominant understory vegetation and appeared to be reproductively active with plants in all growth stages. A more recent survey was carried out two years ago (by myself, 2005). No plants were evident during this second survey. The present survey was carried out as a follow-up to the previous report that *Achyranthes splendens* var. *rotundata* had been extirpated from this site.

The site was visited again on 14 February 2007 and a thorough search for *A. splendens* var. *rotundata* was made (Fig. 1). Although a fence had been constructed around the site to protect the plants therein, a large section of the fence along the makai side (opposite Malakole Street) has been removed. The habitat at this site is as it was described in the previous reports. In contrast to the previous visit in June 2005, the vegetation was much more lush having benefited from the recent rains of the previous several months. The dominant overstory canopy consists of kiawe (*Prosopis pallida*; Fig. 2) on coral rock with numerous sink holes (Fig. 3). Surrounding the trees is a raised soil that is dominated along one side by sourbush (*Pluchea symphytifolia*; Fig. 4) and on the other sides by buffelgrass (*Cenchrus ciliaris*; Fig. 5). Other grasses such as guineagrass (*Panicum maximum*; Fig. 6) and other alien herbs were found growing in the understory of the kiawe trees.

In contrast to the findings from two years previous, one plant of *A. splendens* var. *rotundata* was found growing directly out of the coralline rock in the middle of the understory of the kiawe thicket (Figs. 7 & 8). The plant was approximately 3 feet tall and appeared to be in a

healthy condition. The entire understory canopy was then carefully searched by walking transects at five foot intervals. No other plants (seedlings, juvenile or mature) were found.

The conclusion of my previous report was that *A. splendens* var. *rotundata* had been extirpated from this location and that no seeds would survive in a seedbank because of the coralline nature of the substrate. This conclusion was obviously in error. There are two possibilities for this plants presence. First, a seedbank may have been present and the plant has germinated and grown since then. There have been two growing seasons since the last visit, and seeds may have been present and protected in cracks or crevices of the coralline rock. Second, The previous visit was during the summer months during which time this region of Oahu can become very dry. If the plant was present then, it likely had lost its leaves and appeared as a dry stem indistinguishable from sourbush or kiawe plants of similar size. As these are relatively fast growing plants, it would likely have been much smaller if present at all.

As mentioned in the 2005 report, the normal habitat conditions for this species is in open scrub vegetation with intermittent small trees and growing in rocky soil. The conclusion that this particular population is in decline is still valid although the species has not been extirpated as of yet. Plants of *A. splendens* var. *rotundata* are not long-lived, typically living up to five years, perhaps longer under optimal growing conditions. Thus, the site should continue to be monitored on an annual basis to track the survival of this one plant and to see if additional recruitment occurs.

If you have any questions regarding the visit, other species found in association with the site, or other aspects of this project, feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Clifford W. Morden', with a long horizontal line extending to the right.

Clifford W. Morden
Botanist

Morden & Associates

Botanical and Environmental Consultants

94-333 Alula Pl.
Mililani, HI 96789
(808) 292-1369

17 March 2008

Mr. John P. Whalen, President
PlanPacific, Inc.
345 Queen Street, Suite 802
Honolulu, HI 96813

Dear Mr. Whalen,

The property along Malakole Street near the intersection with Kaihola Street was re-examined to determine the status of the *Achyranthes splendens* var. *rotundata* (formerly *Achyranthes. rotundata*) population at this location. The location had been previously examined 22 years previous to this (by W. A. Whistler in 1985) when 116 plants were found at this site. At that time, *A. splendens* var. *rotundata* was found to be the dominant understory vegetation and appeared to be reproductively active with plants in all growth stages. A more recent survey was carried out two years ago (by myself, 2005). No plants were evident during this second survey. A third survey was made to this location on 14 February 2007 and a single, mature individual of one to two years old had re-colonized the site. No smaller plants (seedlings or juveniles) were found at that time.

The site was visited again on 8 March 2008 to check the status of the *A. splendens* var. *rotundata* plant found previously and search for additional plants. The habitat at this site is as it was described in the previous reports. The dominant overstory canopy consists of kiawe (*Prosopis pallida*) on coral rock with numerous sink holes. Surrounding the trees is a raised soil that is dominated along the northeast side by sourbush (*Pluchea symphytifolia*) and along the northwest and southwest sides by buffelgrass (*Cenchrus ciliaris*). Other grasses such as guineagrass (*Panicum maximum*) and other alien herbs were found growing in the understory of the kiawe trees. Pickleweed, *Batis maritima*, is a succulent-leaf shrub common to saline soils and brackish waters that was also common along the southeast side of the property in the understory.

The single individual previously found was still extant in the field site and had grown considerably. The main stem is approximately 1 inch in diameter and is much branched. The height of the plant is still approximately 3 feet tall, and the size of the crown has increased from last year. Diameter of the plant crown was approximately 2 feet last year, and it has increased to

approximately 4 feet by 2 feet. Leaves appear healthy and have adequate turgor (water pressure within leaf), and each branch is terminated with a long inflorescence.

The entire understory canopy was then carefully searched by walking transects at five foot intervals. Three seedlings were found, approximately 3-5 inches in height with a small (half inch) inflorescence. These are apparently from seeds of the single mature individual and were found clustered together approximately 4 feet to the north of this plant growing in accumulated leaf litter. The seedlings were wilting and are not expected to survive much longer unless their roots are able to establish in a crevice and reach ground water. Three other seedlings found 15 yards to the east of the plant that look suspiciously similar to *A. spendens* var. *rotundata*. However, these are believed to belong to a related species, *Achryanthes aspera*, an alien species also found in the vicinity. These seedlings have leaves with less pubescence, leaf attachment appears slightly different, and the apical bud of the plant looks different than do the seedlings of *A. spendens* var. *rotundata*.

Given the increase in size of the mature individual in one year period from February 2007 to February 2008, it is likely this individual is only two to three years old. An estimate of longevity would be that an established plant will survive for five years and perhaps up to 10 years under optimal conditions. The conditions at the Malakole Street site might be considered near optimal given that the plant is in a protected locality with ground water available under the coralline rock.

If you have any questions regarding the visit, other species found in association with the site, or other aspects of this project, feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Clifford W. Morden', followed by a horizontal line extending to the right.

Clifford W. Morden
Botanist



Fig 1. View of understory with kiawe and various shrubs, grasses and herbaceous plants.



Fig. 2. Close-up of coralline rock with cracks and sinkhole.



Fig. 3. Mature *A. spendens* var. *rotundata* plant with author behind it for scale.

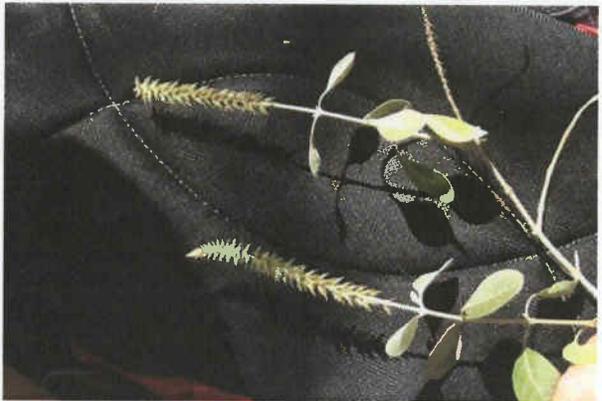


Fig 4. Inflorescences of mature *A. spendens* var. *rotundata*. Each spiny portion of inflorescence is a separate flower.



Fig. 5. Three juvenile plants of *A. spendens* var. *rotundata*



Fig. 6. Close-up of the two plants on the right in figure 5 showing wilting leaves and small inflorescence at apex.

APPENDIX C
SITE PHOTOGRAPHS

Appendix C



Photograph No. 1

Round-leaved chaff flower bush located within the Kenai Industrial Park Project Site



Photograph No. 2

Round-leaved chaff flower bush located within the Kenai Industrial Park Project Site (close up of Photograph 1)

Appendix C



Photograph No. 3

Close view of round-leaved chaff flower bush and inflorescences located within the Kenai Industrial Park Project Site (close up of Photograph 1).



Photograph No. 4

Close view of the limestone rock underlying the round-leaved chaff flower bush (photograph 1).

Appendix C



Photograph No. 5

Close view of the second smaller individual of round-leaved chaff flower located approximate 18 inches from the larger plant shown in Photographs 1-4.

APPENDIX D
SWCA SURVEY REPORT



ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

Honolulu Office
Bishop Square ASB Tower
1001 Bishop Street, Suite 2800
Honolulu, Hawaii 96813
Tel 808.548.7922 Fax 808.548.7923
www.swca.com

June 4, 2013

Dave Pfeifer
Vice President, Real Estate
Cook Inlet Region, Inc. (CIRI)
2525 C St., Ste. 500
Anchorage, AK 99503

RE: SWCA Survey results KIP - April 11, 2013

Dear Dave,

This letter report summarizes the findings of a natural resource survey conducted by SWCA biologists at the Kenai Industrial Park project site. The survey specifically focused on Hawaiian red shrimp (*Halocaridina rubra*) and the candidate species anchialine pool shrimp (*Metabetaeus lohena*) and their anchialine pool habitat.

Methods:

SWCA biologists Robert Kinzie and Jaap Eijzena visited the site on April 11, 2013. The site was accessed via the locked gate on the south eastern corner of the property. The limited size of the property allowed for a comprehensive, pedestrian survey, during which all sinkholes were investigated, and notes were taken on other flora and fauna. Two traps baited with cat food and fish food, were left in pools for two hours, to detect and identify anchialine organisms. In addition, SWCA collected basic water quality data in sinkholes with water using a YSI Model 556 Multiprobe calibrated to factory specifications.

Area Description:

The topography of the roughly square 3,035 sqm (0.75 acre) parcel consists of a flat carbonate area that occupied approximately two thirds of the total fenced area. This flat central portion was composed of lithified coral reef material, which is approximately 3 m (9 ft) below the level of the road and surrounding area. The south and east margins of the parcel sloped steeply from the road toward to the flat central area. A berm had been constructed around the entire perimeter; however, it was no longer distinct, especially on the north side of the parcel. The slopes were vegetated mainly with kiawe (*Prosopis pallida*) and Indian fleabane (*Pluchea indica*). The west slope was also fairly steep, but more open and covered in buffel grass (*Cenchrus ciliaris*). The slope on the north side was less steep and also was dominated by kiawe canopy. The fence along the eastern border has been partially taken down.

The central area was characterized by numerous small sinkholes. These ranged from a few centimeters (cm) in diameter to more than a meter. Almost all were filled with coarse woody debris and dry carbonate rubble. In most cases it was not clear whether the woody material that filled these sinkholes had been put in by people or was deposited during flooding events. In some cases it seems clear that people have filled these sinkholes since some of the wood (dead kiawe) are placed vertically and have several types of flagging tape attached. The entire central area is covered with a kiawe canopy.

The northern part of the parcel appears to contain concrete and steel foundations that may have been left by the Navy, indicating that the area was partially developed prior to private acquisition in the late 1980's.

Results and Discussion:

All but one of these sinkholes were dry on April 11, 2013. There had been little rain in the previous month, and no rain from April 1-10.

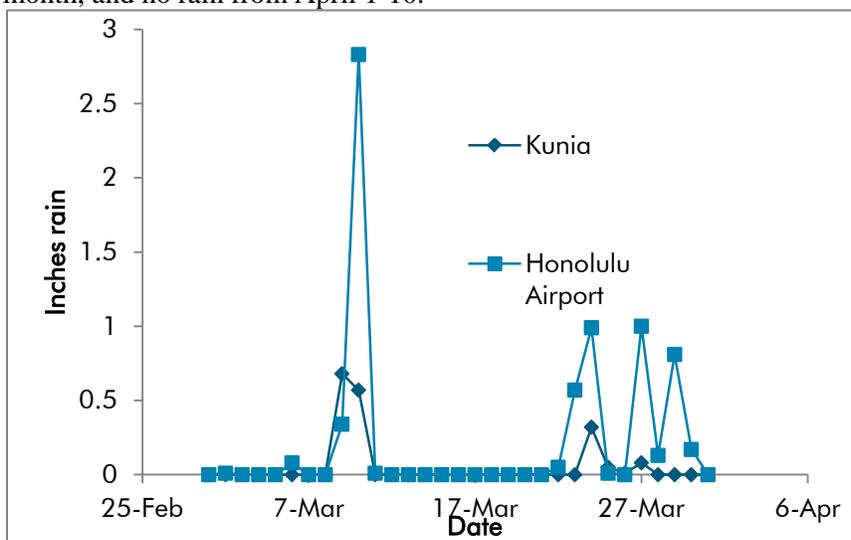


Figure 1: Rainfall data for Kunia and Honolulu Airport for Feb 25-Mar 31, 2013

Only one sinkhole, located just south of the center of the property, contained water. This sinkhole measured 110 cm by 135 cm (3.6 x 4.4 ft). The surface of the water was 110 cm (3.6 ft) below the level of the carbonate floor of the central area. The water in this sinkhole was stagnant with a strong hydrogen sulfide odor, indicating anoxic process within the pool. Mosquito larvae were very abundant in this small pool, and the alien ant (*Anoplolepis gracilipes*), was very dense on coarse woody debris in the pool. No anchialine organisms were captured during the trapping effort.

Parts of the hard substratum were coated with a cyanobacterial mat, indicating the standing water has been present for some time. The water in the pool was about 125 cm (4.1 ft) deep. The bottom, which was not visible due to the poor water quality, consisted of soft sedimentary material, which has likely been deposited by runoff from surrounding areas, and a layer of organic matter, mostly Kiawe leaves and branches.

Water quality in the pool was measured at 10 cm (3.9 in) below the surface, and at the bottom. Average water temperature was 25.7 C (78.3 F), and the water was brackish with a salinity of 10.86 ppt. This is

within the fairly broad range of salinity within anchialine habitat supporting anchialine organisms. However, the dissolved oxygen (DO) level was very low at 8.3 – 16.8%. Few organisms including fish and invertebrates are able to survive in such anoxic conditions, and it is not surprising that none were captured during the trapping effort. The anoxic conditions may be a result of stagnation, eutrophication, or pollution, and likely indicate poor connectivity with hypogeal (underground) waters.

In addition to the open anchialine pools, a major component of the habitat of anchialine animals includes subterranean interstices. Whether anchialine animals persist in the ground water of this heavily industrialized area is not known.

The round-leaved chaff flower (*Achyranthes splendens* ssp. *rotundata*) was the only native plant species observed at the property. Three individual plants, all flowering or in early stages of seeding, were found near the center of the property, within an area of approximately 1.5 square meters (16.1 ft²). The largest individual was approximately 1 meter (3ft) in height; the others were about 30-50 cm (12-20 in) in height. In addition, 20 introduced plant species were identified during the survey.

Recommendations:

Only one of the sinkholes contained water, which was too hypoxic to support native anchialine animals, including the Hawaiian red shrimp and candidate species anchialine pool shrimp. The proposed development of the property is not expected to impact anchialine pool habitat for these two species. Presence of hypogeal habitat at the site, or in the general area is not known.

The anchialine pool shrimp (*Metabetaeus lohena*), is currently a candidate species under the Endangered Species Act of 1973, as amended. Federal candidate species are not offered protection under 195D, Hawaii Revised Statutes (HRS) and this species is not listed as endangered pursuant to §195D-4. However, in accordance with §195D-25 (1), the Endangered Species Recovery Committee reviews applications for habitat conservation plans, and makes recommendations in consideration of the cumulative impacts of the proposed action on the recovery potential of endangered, threatened, proposed, or candidate species. Considering the absence of anchialine pool habitat at the property, the proposed activity will not affect the recovery potential of these two federal candidate species.

The status and condition of the round-leaved chaff flowers at the property appeared to be comparable to conditions reported in the HCP and appended botanical reports. However, three individual plants were found during this site visit, one of which was fairly small and spindly, indicating that this may be a relatively young plant and suggesting that a certain amount of recruitment may take place within the site. It would be prudent to include a third individual to the take request.

Should you have any questions regarding this letter report, please feel free to contact us any time.

Sincerely,



Jaap Eijzenga
Natural Resources Lead

Attachments: Appendix A. Plant list of April 11, 2013 site visit

Appendix B: Photographs of April 11, 2013 site visit

APPENDIX A

CHECKLIST OF PLANTS OBSERVED AT KENAI INDUSTRIAL PARK PROJECT SITE on April 11, 2013.

The following checklist is an inventory of all the plant species observed by SWCA biologists on April 11, 2013 during a survey of Kenai Industrial Park project site on the Island of O’ahu, Hawai’i. The plant names are arranged alphabetically by family and then by species into two groups: Monocots and Dicots. The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999), Wagner and Herbst (2003), and Staples and Herbst (2005). Recent name changes are those recorded in Wagner et al. (2012).

Status:

- E = endemic = native only to the Hawaiian Islands.
- I = indigenous = native to the Hawaiian Islands and elsewhere.
- P = Polynesian = introduced by Polynesians.
- X = introduced/ alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (Cook’s arrival in the islands in 1778).

Relative Site Abundance:

- A = Abundant = forming a major part of the vegetation within the survey area.
- C = Common = widely scattered throughout the area or locally abundant within a portion of it.
- U = Uncommon = scattered sparsely throughout the area or occurring in a few small patches.
- R = Rare = only a few isolated individuals within the survey area.

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
<u>MONOCOT</u>			
Poaceae			
<i>Cenchrus ciliaris</i> L.	buffelgrass	X	U
<i>Urochloa maxima</i> (Jacq.) R.D. Webster	Guinea grass	X	R
Aizoaceae			
<i>Sesuvium verrucosum</i> Raf.	verrucose seapurslane, western sea purslane	X	U

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
Amaranthaceae			
<i>Achyranthes splendens</i> Mart. ex Moq. var. <i>rotundata</i> Hillebr.	Round-leaved chaff flower	E	R
<i>Achyranthes aspera</i> (L.) Standl.	prickly chaff flower	X	R
<i>Amaranthus spinosus</i> L.	spiny amaranth	X	R
<i>Atriplex suberecta</i> Verdc.		X	R
<i>Atriplex semibaccada</i> R. Br.	Australian saltbush	X	U
Asteraceae			
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	X	C
<i>Pluchea indica</i> (L.) Less.	Indian fleabane, Indian pluchea	X	C
<i>Sonchus oleraceus</i> L.	sow thistle, pualele	X	R
<i>Tridax procumbens</i> L.	coat buttons	X	R
Bataceae			
<i>Batis maritima</i> L.	pickleweed	X	A
Convolvulaceae			
<i>Ipomoea obscura</i> (L.) Ker Gawl.	morning glory	X	R
Euphorbiaceae			
<i>Euphorbia hirta</i> L.	hairy or garden spurge	X	R
<i>Euphorbia hypericifolia</i> (L.)	graceful spurge	X	R
<i>Euphorbia tirucalli</i> L.	pencil tree	X	R

Scientific Name	Common & Hawaiian Name(s)	Status	Abundance
Fabaceae			
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	kiawe, algaroba, mesquite	X	C
Portulacaceae			
<i>Portulaca oleracea</i> L.	pigweed, 'ākulikuli kula	X	U
Solanaceae			
<i>Solanum lycopersicum</i> var. <i>cerasiforme</i> (Dunal) D.M. Spooner, G.J. Anderson & R.K. Jansen	tomato	X	R

APPENDIX B

PHOTOGRAPHS FROM KENAI INDUSTRIAL PARK PROJECT SITE, April 11, 2013



Figure 2: Sinkhole containing water



Figure 3: Sinkhole filled with debris



Figure 4: Partially dismantled fence on western border of property. Slope is vegetated by buffelgrass (*Cenchrus ciliaris*) and kiawe (*Prosopis pallida*)



Figure 5: Small round-leaved chaff flower (*Achyranthes splendens* var. *rotundata*) near sinkhole



Figure 6: Small, spindly round-leaved chaff flower (*Achyranthes splendens* var. *rotundata*)



Figure 7: Largest round-leaved chaff flower (*Achyranthes splendens* var. *rotundata*)



Figure 8: Interior of property. Kiawe (*Prosopis palida*) canopy with round-leaved chaff flower (*Achyranthes splendens* var. *rotundata*) in center



Figure 9: Densely vegetated south slope: Kiawe (*Prosopis pallida*) canopy with buffelgrass (*Cenchrus ciliaris*) and Indian fleabane (*Pluchea indica*)

APPENDIX E

USFWS NATIONAL WILDLIFE REFUGE
LETTER OF SUPPORT



United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE

Oahu National Wildlife Refuge Complex

66-590 Kamehameha Highway, Room 2C

Haleiwa, HI, 96712

Phone: (808) 637-6330 FAX: (808) 637-3578

June 18, 2013



To: Hawaii Department of Land and Natural Resources
Endangered Species Recovery Committee

This is a letter of intent to support the proposed Round-leaved Chaff Flower, Habitat Conservation Plan submitted by CIRI Land Development Company by providing sites for the outplanting, maintenance and monitoring of approximately one hundred and twenty (120) individual plants of *Achyranthes splendens* var. *rotundata*. These outplantings will occur on the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge, located on suitable dry coastal plain habitat of the former Barbers Point Naval Air Station near Kapolei.

We believe the current population of *Achyranthes* on the refuge and the status of the population of this plant as a whole will benefit from the genetic diversity provided by these additional outplanted specimens on this protected site.

The project and all associated work on the Refuge will be covered by a National Wildlife Refuge, Special Use Permit. The final issuance of this permit cannot be approved until we are able to review the final approved HCP to be sure that all requirements and conditions of the HCP are compatible with U.S. Fish and Wildlife Service, and National Wildlife Refuge policies and requirements. The applicant (CIRI Land Development Co.) and associated contractors will be expected to fully comply with the conditions of this Special Use Permit throughout the term of the project.

In coordination with preparation of the draft HCP we recommend and support the outplanting, maintenance and monitoring of these plants under this plan until the mitigation goals as set forth in the draft HCP are met, for a duration of up to ten years. If the goals of the HCP are not achieved after ten years then the continued use of the refuge as a mitigation site will need to be reevaluated. Although we have little specific data, based on general observations of both wild and previously outplanted *Achyranthes* on the Refuge, as well as very recent outplantings, the proposed plantings under this HCP should become well-established, mature and seed-producing during this timeframe.

The Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge was primarily established for the conservation of *Achyranthes splendens* var. *rotundata*. The Pearl Harbor National Wildlife Refuge Comprehensive Plan includes goals and objectives for conservation and management of this species. Thus, the Refuge will provide perpetual protection of *Achyranthes splendens* var. *rotundata* at the Kalaeloa Unit. Once the goals of the proposed HCP have been successfully achieved all of these plants will be integrated into the ongoing management and protection of the population of *Achyranthes* on the refuge.

Please contact me if you need additional information, discussion or clarification.

Sincerely,

A handwritten signature in black ink, appearing to read 'D.M. Ellis', written in a cursive style.

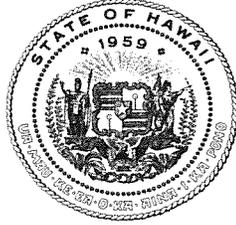
David M. Ellis

Project Leader

Oahu National Wildlife Refuge Complex

APPENDIX F

**STATE OF HAWAII PLANT PERMIT
AND
CITY/COUNTY OF HONOLULU APPROVAL FOR SEED COLLECTION**



PERMIT FOR THREATENED AND ENDANGERED PLANT SPECIES

Department of Land and Natural Resources

Division of Forestry and Wildlife

1151 Punchbowl Street, Room 325

Honolulu, Hawaii 96813

(808) 587-0165, Fax (808) 587-0160

Permit No. P-169
Date of Issue: December 15, 2011
Expiration Date: December 14, 2012

The Board of Land and Natural Resources hereby grants permission under the authority of Hawaii Administrative Rules §13-104, §13-107, and §13-124, Hawaii Revised Statutes §195D and all other applicable laws, to the person(s) listed below.

Persons in violation of the terms and conditions of this permit and /or related or appropriate laws may be subject to criminal and or administrative penalty under Hawaii Revised Statutes 195D-8, §195D-9, §195D-27, §183-4, §183-5, § 183-18, §183-21, §183C-7, §171-6.4 §171-31.6, Hawaii Administrative Rules §13-104-3, §13-107-8, or as otherwise provided by law.

Halleh Paymard – AMEC Earth & Environmental, Inc.
3049 Ualena Street, Suite 1100
Honolulu, Hawaii 96819
Phone: 619-838-4034
Email: halleh.paymard@amec.com

Richard Barboza – Hui Ku Maoli Ola
46-403 Haiku Rd.
Kaneohe, Hawaii 96744
Phone: 295-7777
Email: nativehawaiianplants@gmail.com
rick.ck.barboza@gmail.com

To collect, possess, transfer, propagate, and outplant for the purpose conservation, the following plant life:

Achyranthes splendens var. *rotundata*

Seeds and cutting from the two individuals that will be impacted as a result of the KIP project (Lot 25 on Malakole Street in Kapolei) will be collected by Rick Barboza, of Hui Ku Maoli Ola. Seeds will also be collected from individuals located in plant sanctuaries on properties belonging to the City and County of Honolulu (under the supervision of Shad Kane). These seeds and cuttings will be propagated at Hui Ku Maoli Ola's nursery in Kaneohe. Hui Ku Maoli Ola will incorporate HRPRG's phytosanitation standards and guidelines at their nursery for the propagation. Seedlings will be used to create new populations at the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge (NWR) with their approval. The exact outplanting locations will be coordinated with NWR staff based on suitable habitat. Monitoring and maintenance will be conducted by Rick Barboza for 5 years in accordance to the HRPRG guidelines. Seeds will also be stored at the Lyon' Arboretum Seed Storage Facility.

Subject to the following conditions:

I. GENERAL CONDITIONS

- A. This permit authorizes the permit holder(s) to conduct described activities at location(s) noted, on State Forest Reserves, or lands that are under the control of the control of the Division of Forestry and Wildlife (DOFAW), Department of Land and Natural Resources (DLNR).
- B. Activities conducted in DOFAW's Natural Area Reserves System (NARS) require a Special Use Permit. Activities conducted on other lands under the jurisdiction of DOFAW/DLNR, will require access permits.
- C. The permit holder(s) must obtain approval from other landowners on lands where activities are planned, including other divisions of the DLNR, private landowners, tenants, and County, State, and Federal agencies prior to conducting activities on lands under their jurisdiction.
- D. This permit is not transferable or assignable. A signed copy must be carried by permit holder(s) while engaging in activities authorized by this permit. Each permit holder is individually responsible and accountable for his or her actions under this permit.
- E. This permit does not authorize activities with any other plant species except those stated. Permission to collect additional plant material must be obtained from district DOFAW offices.
- F. Appropriate DOFAW district office must be notified in advance of proposed fieldwork, for a access permit, to coordinate collections, plant propagation needs, district requests, and approval of additional field personnel other than the listed associates for state reintroduction projects and/or their island cooperators.
- G. Primary repositories are cooperating rare plant nurseries for live storage. Lyon micropropagation laboratory (for tissue culture) and seed storage facilities (for seed storage) are secondary depositories for these propagules.

- H. This permit does not in any way make the Board of Land and Natural Resources of the State of Hawaii liable for any claims of personal injury or property damage to the permit holder(s) or his or her party which may occur while engaged in activities permitted under this permit; further, the permit holder(s) agrees to hold the State harmless against any claims of personal injury, death or property damage resulting from the activities of the permit holder(s).
- I. **This permit shall become valid upon completion of the following:**
- 1. All persons who are actively involved in activities authorized by this permit have read this permit in its entirety and acknowledge understanding & agreement to abide by its conditions by signing this permit.**
 - 2. The signed permit is returned to DOFAW. Upon approval by the DOFAW Administration, a copy of the signed permit will be returned to the principal investigator.**
- J. The permit holder(s) will provide copies of all publications/reports of any study resulting from the activities of this permit to DOFAW. The permit holder(s) will also provide or make available for inspection any raw data that is obtained under this permit when requested by the Division.
- K. Any person violating any of the conditions stipulated under this permit will be subject to the penalty provision provided by law. Further, any infractions of this permit may be cause for revocation of this permit and/or denial of future permit requests.
- L. This permit is issued for one year. This permit can be renewed at the end of this period. Please submit plans for the coming year and the need for permit renewal or extension before expiration of present permit.

II. SPECIAL CONDITIONS

- A. The purpose of this permit is collection, possession, propagation, transferring and outplanting of *Achyranthes splendens* var. *rotundata* for a conservation project.
- B. Propagules resulting from this permit can be accessed for conservation programs focusing on plant restoration and outplanting programs.
- C. When collecting, highest priority should be given to plants that have secure outplantings sites, are needed by district DOFAW nurseries or their cooperators, or are needed to complete genetic representation in *ex situ* collections.
- D. Collection of viable seed is the preferred propagation material, whenever possible, rather than cuttings of T&E species. The permit holder(s) will keep records of date of seed or propagule collection and estimates of the number of seeds or propagule collected. This information will be provided to DOFAW in the annual report with an inventory of green house plants resulting from present and past collection permits.
- E. Permit holder(s) is strictly prohibited from collecting whole plants unless under specific DOFAW request.
- F. **The permit holder(s) will adhere to methods that are in accordance with established procedures as published by the Hawaii Rare Plant Restoration Group (HRPRG) for collection of Threatened and Endangered species. Completion of HRPRG Rare Plant Monitoring Forms is required for all collections.**

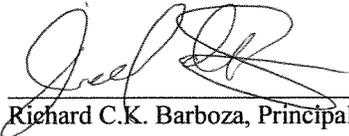
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street Room 325
Honolulu, Hawaii 96813

License No. P-169
Date of Issue: December 15, 2011
Expiration Date: December 14, 2012

G. Yearly reports with collection information are required and will be in electronic form. If a new population is discovered, GPS information will be supplied when possible.

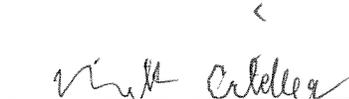
The undersigned have read, understood, and hereby agree to abide by the conditions as stated above.

Principal Investigators:

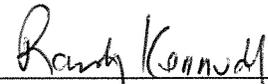

Richard C.K. Barboza, Principal Investigator

12-5-11
(Date)

Associates:


Nicholas Critcher

12-5-11

APPROVED:  Date 1/4/12
 PAUL CONRY, Administrator,
Hawaii Division of Forestry and Wildlife

Nov. 14, 2011

Halleh Paynard, Project Manager
AMEC Earth & Environmental, Inc.
3049 Ualena Street, Suite 1100
Honolulu, HI. 96707

Dear Halleh:

This letter is in response to our telephone conversation and your request to gather seeds of the *Achyranthes Splendon Rotunda* located in plant sanctuaries on property belonging to the City and County of Honolulu. The *Achyranthes Splendon Rotunda* is identified as an endangered Hawaiian plant species and afforded the protection under the Endangered Species Act and for this reason they are secured within fenced enclosures. The enforcement and management of endangered plant species are within the purview of the Department of Land and Natural Resources, Division of Forestry and Wildlife. Vickie Caraway is the State of Hawaii State Botanist and the final authority regarding the taking of seeds of endangered species plants. I serve as a volunteer curator toward the care and protection of the *Achyranthes Splendon Rotunda* on the property owned by the City. As the curator AMEC Earth & Environmental has my permission to gather seeds.

The enclosures are locked and the keys are held by both me and Henry Gabriel of the City's Department of Environmental Services at HPOWER. Please let me know of the date of the planned taking of seeds that I may assist in the unlocking of the gate and the identification of the plants to take seeds from.

Feel free to contact me either by phone at 672-4765H, 429-7175C or by email at shadskane@gmail.com for assistance.

Mahalo,
Shad S, Kane
Shad S. Kane

Cc: Vickie Caraway, State of Hawaii Botanist
Division of Forestry and Wildlife, DLNR

APPENDIX G
HCP IMPLEMENTATION SCHEDULE

APPENDIX H

KENAI INDUSTRIAL PARK HCP FUNDING MATRIX

Funding Matrix
Round-leaved Chaff Flower Habitat Conservation Plan
Kenai Industrial Park Project
Kapolei, County of Honolulu, Hawai'i

Activity	One Time Cost	Annual Cost	Years 0-5	Contingency Funding (5-Years)
Propagation and Installation	\$20,000	-	\$20,000	-
Seed Storage	-	\$100	\$500	\$500
Site Maintenance	-	\$500	\$2,500	\$2,500
Year 0 Monitoring and Reporting	-	\$16,000	\$16,000	\$16,000
Year 1 Monitoring, and Reporting	-	\$13,000	\$13,000	\$13,000
Year 2 Monitoring and Reporting	-	\$10,000	\$10,000	\$10,000
Year 3 Monitoring and Reporting	-	\$10,000	\$10,000	\$10,000
Year 4 Monitoring and Reporting	-	\$10,000	\$10,000	\$10,000
Year 5 Monitoring and Final Reporting	-	\$10,000	\$10,000	\$10,000
Total	\$20,000	\$69,600	\$92,000	\$72,000

