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## Appendix A

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Biological Surveys of the University of Hawaii,  
Kauai Community College  
Rana Biological Consulting, Inc. and AECOS Consultants  
September 30, 2010

Biological Surveys of the University of Hawai'i,  
Kaua'i Community College Campus  
Tax Map Key: 3-04-07:01, 02, 06, and 06  
Puhi, Island of Kaua'i.

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Introduction and Background

As part of the University of Hawai'i, Kauai Community College, long range development plan the university is seeking to re-designate it's property to a more suitable land use classification to aid in it's long range development and expansion. The approximately 199-acre site is identified as Tax Map Keys: 3-4-07:03, 01, 02, 03, and 06 (Figure 1). This report describes the methods used and the results of the botanical, avian and mammalian surveys conducted on the subject property as part of the environmental disclosure process associated with the schools master development plan.

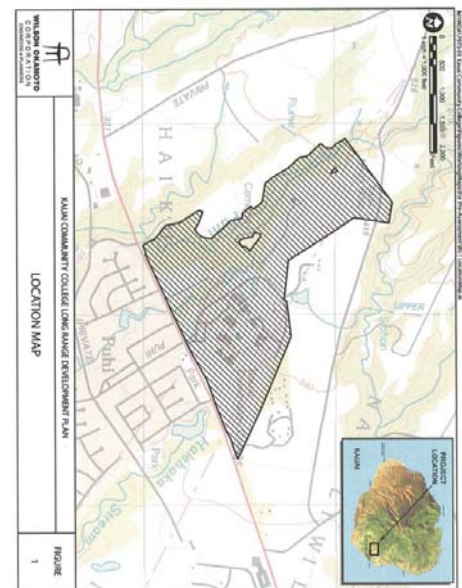
The primary purpose of the surveys was to determine if there are any botanical, avian or mammalian species currently listed, or proposed for listing under either federal or State of Hawai'i endangered species statutes within or adjacent to the study area. We were also asked to evaluate the potential impacts that the development of the project might pose to any sensitive or protected native botanical, avian or mammalian species, and to propose appropriate minimization and or mitigative measures that could be implemented to reduce or eliminate any such impacts. The federal and State of Hawai'i listed species status follows species identified in the following referenced documents, (Department of Land and Natural Resources (DLNR) 1998, U. S. Fish & Wildlife Service (USFWS) 2005a, 2005b, 2010). Fieldwork was conducted on April 10, 11 and 12, 2010.

The avian phylogenetic order and nomenclature used in this report follows the *AOU Check-List of North American Birds* (American Ornithologists' Union 1998), and the 42nd through the 51st supplements to the Check-List (American Ornithologists' Union 2000; Banks et al. 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010). Mammal scientific names follow (Tomich 1986). Plant names follow (Palmer, 2003) for ferns (Wagner et al., 1990, 1999) for native and naturalized flowering plants, and (Staples and Herbst, 2005) for crop and ornamental plants. Place names follow (Pukui et al. 1974).

Hawaiian and scientific names are italicized in the text. A glossary of technical terms and acronyms used in the document, which may be unfamiliar to the reader, are included at the end of the narrative text.

General Site Description

The University of Hawai'i, Kauai Community College (KCC) is located in Puhi, on the Island of Kaua'i. The approximately 198,826 – acre site is built on lands formerly used for sugar cane cultivation. The property is owned by the State of Hawai'i, University of Hawai'i. The main entrance to KCC is from Kaunualoi Highway, opposite Puhi Road. The access road loops around the main campus and reconnects with Kaunualoi Highway, 0.4-mile east of the main entrance. This eastern access/egress is shared with Gaylord's Restaurant at Kilohana. Nearly all of the campus buildings and facilities are centrally located within the access road loop. Punana Leo Pre-School and Kawaikiki New Century Public Charter School are located southwest of the KCC main campus and loop road. Adjacent to the KCC campus to the north is the Island School, which occupies TMK 3-8-02:16. The Island School is



accessed from the KCC campus via the loop road. Across Kaunuaui Highway, to the south is the town of Puihi, which is characterized by residential and commercial development. Active and fallow agricultural land and undeveloped land in gullies generally characterizes areas to the north, east and west of the KCC campus.

The property surveyed consists of three distinct types of environments which are based upon land use: 1) the landscaped KCC campus and adjoining agriculture station; 2) abandoned agricultural fields, and 3) a gulch and riparian forest. The vegetation found in each environment is distinct, although many species are shared across the other areas. An adjacent property, Island School was also surveyed in August 2010 (see David and Guinther, 2010).

#### Botanical Survey Methods

The botanical survey was undertaken on August 11-12, 2010. A pedestrian or wandering transect method was used, entailing the botanist covering the survey area on foot and noting plant species as they were encountered. As the survey progressed, notes were made on the relative abundances of each species (e.g., rare, common, abundant, etc.). Photographs were taken, or specimens collected for closer inspection, of plants not readily identified in the field. In a few cases (typically grasses), plants could not be identified due to a lack of flowering or fruiting at the time of the survey. Conditions with respect to the dry season appeared not to be adverse, as this windward area has experienced sufficient rainfall recently to support the natural vegetation on the site. Very light rains were experienced intermittently during the course of the survey.

#### Botanical Survey Results

A plant checklist (Table 1) was compiled from field observations, with entries arranged alphabetically under plant family names (standard practice). Included in the list are scientific name, common name, and status (whether native or non-native) for each species observed on the property. In addition to identifying the plants present within the study site, qualitative estimates of plant abundance were made. These are coded in the table as explained in the Legend to Table 1 and apply to observations made during the present survey. For some species, a two-level system of abundance is used: the letter-number codes indicating species that have a limited distribution (e.g., found in only one small area of the property), but present there in numbers exceeding just a few individuals. For example, an abundance rating of "R" indicates a plant encountered only once or twice during the entire survey. An "R2" indicates a plant encountered in just one or two places, but with several to many individuals present where encountered. An "R3" would be a plant seldom encountered (i.e., rare), but locally abundant in one or more of the locations where it was encountered.

The project area supports three basic types of vegetation reflecting land use: 1) landscaped areas on the KCC campus (Figure 2) and adjacent, former agriculture station southwest of the campus, 2) abandoned agricultural fields northwest of the campus, and 3) a broad,

steep-sided gulch covered in secondary forest along the west side of the abandoned fields and agriculture station. Abundance scale values in Table 1 are given only for the undeveloped areas, in particular the gulch and low-sloping ground between the gulch and abandoned agricultural fields. The agriculture fields (former sugar cane land) are covered almost exclusively by Guinea grass (*Urochloa maxima*), and an open forest of large albizia (*Falcataria moluccana*) trees (Figure 3). A number of other species are invading these fields, particularly around the margins.

Species observed on the landscaped campus and/or the agriculture area are marked in Table 1 with note <1>. If an abundance value is given for a species indicated as occurring in the landscaped area, it occurred in both developed and undeveloped environments and the relative abundance given is for the undeveloped land only. Species associated only with aquatic areas (Puihi Stream and irrigation ditches and ponds) are indicated in Table 1 by note <2>. For plant status, indigenous (**Ind**) and endemic (**End**) indicate native plants; naturalized (**Nat**), ornamental (**Orn**), and Polynesian introduced (**Pol**) indicate non-natives. The latter (so-called "canoe plants"), were introduced to the Hawaiian Islands by Polynesian settlers prior to 1778. A majority of the native species recorded is plants used in landscaping on campus (i.e., ornamentals); thus, "status" reflects their relationship generally in the Hawaiian Islands and not their use in the present situation. This distinction is important, because a few of the natives are rare, and at least one (*Munroidendron racemosum*) is a listed species (USFWS, 2010).



Figure 2 - Open field and KCC structures - looking west from southeastern corner



Figure 3 - Vegetation typical of the abandoned agricultural fields.

Table 1. Flora for Kauai Community College Expansion Project, Puihi, Kauai

Species	Common name	Status	Abundance	Notes
<b>FUNGI</b>				
AGARICACEAE				
<i>Leucocoprinus fragillissimus</i> (Ravenel) Pat.		---	R	
<b>FERNS and FERN ALLIES</b>				
CYATHEACEAE				
<i>Sphaeropteris cooperi</i> (Hook. ex F. Muell) R.M. Tryon	Australian tree fern	Nat	R	
DENNSTAEDTIACEAE				
<i>Microlepia strigosa</i> (Thunb.) C. Presl	palapalai	Ind	<1>	
<i>Pteridium aquilinum</i> var. <i>decompositum</i> (Gand.) R. M. Tryon	kilau	End	R1	<2>
NEPHROLEPIDACEAE				
<i>Nephrolepis cordifolia</i> (L.) C. Presl	---	Ind	<1>	
POLYPODIACEAE				
<i>Phlebodium aureum</i> (L.) J. Sm.	rabbit's-foot fern	Nat	U1	
PSILOTAECAE				
<i>Psilotum nudum</i> (L.) P. Beauv.	mosa	Ind	R	
PTERIDACEAE				
<i>Adiantum 'Edwini'</i>	maidenhair fern	Nat	R	
<i>Pteris cretica</i> L.	Cretan brake	Ind	<1>	
THELYPTERIDACEAE				
<i>Christella dentata</i> (Forsk.) Brownsey & Jerny	wood fern	Nat	U	
<i>Cyclosorus interruptus</i> (Willd.) H. Ito	neke	Ind	R	<2>
CONFERS and CYCADS				
ARAUCARIACEAE				
<i>Arancaria columnaris</i> (G. Forsk.) J.D. Hook.	Cook-pine	Orn	<1>	
CYCADACEAE				
<i>Cycas</i> sp.	sago palm	Orn	<1>	
PODOCARPACEAE				
<i>Podocarpus</i> sp.	podocarpus	Orn	<1>	
<b>FLOWERING PLANTS</b>				
<b>DICOTYLEDONE</b>				
ACANTHACEAE				
<i>Barleria repens</i> C. Nees	pink-ruellia	Orn	<1>	
<i>Graptophyllum pictum</i> (Lam.) Griff.	caricature plant	Orn	--	<1>
<i>Justicia betonica</i> L.	white shrimp plant	Nat	U3	
<i>Thunbergia fragrans</i> Kosh.	sweet clockvine	Nat	<1>	
<i>Thunbergia laurifolia</i> Lindl.	purple allamanda	Nat	R	<1>
AMARANTHACEAE				
<i>Amaranthus spinosus</i> L.	spiny amaranth	Nat	R	

ANACARDIACEAE				
<i>Schinus terebinthifolius</i> Raddi	Christmas berry	Nat	<1>	
APIACEAE				
<i>Ciclospermum leptophyllum</i> (Pers.) Sprague	fir-leaved celery	Nat	R	
APOCYNACEAE				
<i>Catharanthus roseus</i> (L.) G. Don	periwinkle	Nat	<1>	
<i>Cerbera manghas</i> L.	cerbera	Orn	<1>	
<i>Plumeria obtusa</i> L.	Singapore plumeria	Orn	<1>	
<i>Plumeria rubra</i> L.	graveyard flower	Orn	<1>	
<i>Thevetia peruviana</i> (Pers.) K. Schum.	be-still tree	Nat	<1>	
ARALIACEAE				
* <i>Maurodendron racemosum</i> (C. Forbes) Sherff	'ohe	End	<1>	
<i>Polyscias guilfoylei</i> (W. Bull.) L.H. Bailey	panax	Orn	<1>	
<i>Reynoldsia sandwicensis</i> A. Gray	'ohe makai	End	<1>	
<i>Schefflera actinophylla</i> (Endl.) Hams	octopus or umbrella tree	Nat	<1>	
ASCLEPIADACEAE				
<i>Calotropis gigantea</i>	crown flower	Orn	<1>	
<i>Marsdenia floribunda</i> (Brong.) Schlecht	stephanotis	Orn	<1>	
ASTERACEAE (COMPOSITAE)				
<i>Ageratum conyzoides</i> L.	maile hohono	Nat	U	<1>
<i>Bidens pilosa</i> L.	ki	Nat	R	<1>
<i>Calypocarpus vialis</i> Less.	---	Nat	U	<1>
<i>Conyza</i> sp.	horseweed	Nat	U	<1,4>
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	---	Nat	R	
<i>Elephantopus mollis</i> Kunth	elephant's foot	Nat	U2	
<i>Erechtites valerianifolia</i> (Walt) DC	fireweed	Nat	R	
<i>Parthenium hysterophorus</i> L.	false ragweed	Nat	U2	
<i>Emilia fosbergii</i> Nicolson	Flora's paintbrush	Nat	U	<1>
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	Nat	U	<1>
<i>Sigesbeckia orientalis</i> L.	sm. yellow crownbeard	Nat	U	<1>
<i>Sphagnetocola triloba</i> (L.) Pruski	wedelia	Nat	O3	
<i>Synedrella nodiflora</i> (L.) Gaertn.	nodeweed	Nat	U	
<i>Youngia japonica</i> (L.) DC	oriental hawkbeard	Nat	R	<1>
BIGNONIACEAE				
<i>Spathodea campamulata</i> P. Beauv.	African-tulip tree	Nat	U	<1>
BORAGINACEAE				
<i>Carmona retusa</i> (Vahl) Masamune	Fukien tea	Nat	<1>	
<i>Cordia subcordata</i> Lam.	kou	Pol	<1>	
CAMPANULACEAE				
<i>Hypobroma longiflora</i> (L.) G. Don	star-of-Bethlehem	Nat	R	
CARICACEAE				
<i>Carica papaya</i> L.	papaya	Nat	<1>	
CASUARINACEAE				

<i>Casuarina equisetifolia</i> L.	ironwood	Nat	O	<1>
CLUSIACEAE				
<i>Calophyllum inophyllum</i> L.	kamani	Pol	<1>	
CONVOLVULACEAE				
<i>Ipomoea obscura</i> (L.) Ker-Gawl.	---	Nat	R	<1>
<i>Ipomoea triloba</i> L.	little bell	Nat	R	<1>
<i>Merremia tuberosa</i> (L.) Rendle	wood rose	Nat	R	
CUCURBITACEAE				
<i>Momordica charantia</i> L.	wild bitter melon	Nat	<1>	
ERICACEAE				
<i>Rhododendron</i> sp.	azelia	Orn	<1>	
EUPHORBIACEAE				
<i>Acalypha wilkesiana</i> Mill.	beefsrake plant	Orn	R	
<i>Acalypha</i> sp.	acalypha	Orn	<1>	
<i>Aleurites moluccana</i> (L.) Willd.	kukui	Pol	<1>	
<i>Aleurites moluccana</i> 'Remyi'	kukui	Pol	<1>	
<i>Chamaecybe albomarginata</i> (Torr.) & A. Gray Small	rattlesnake weed	Nat	U1	
<i>Chamaecybe hirta</i> (L.) Millsp.	garden spurge	Nat	U2	
<i>Chamaecybe hypericifolia</i> (L.) Millsp.	graceful spurge	Nat	R	
<i>Chamaecybe prostrata</i> (Aiton) Small	prostrate spurge	Nat	<1>	
<i>Jatropha integririma</i> N. Jacq.	rose-flowered jatropha	Orn	<1>	
<i>Macaranga tanarius</i> (L.) Mill. Arg	---	Nat	AA	<1>
<i>Ricinus communis</i> L.	castor bean	Nat	U2	
FABACEAE				
<i>Acacia confusa</i> Merr.	Formosan koa	Nat	R	<1>
<i>Acacia koa</i> A. Gray	koa	End	R	<1>
<i>Adenanthera pavonina</i> L.	circassian bean	Orn	R	<3>
<i>Bauhinia ct. purpurea</i> L.	bauhinia	Orn	<1>	
<i>Cassipouira cathartica</i> Thours	manaloa	Nat	C	<1>
<i>Cassia fistula</i> L.	golden shower tree	Orn	<1>	
<i>Cassia x nealae</i> H.S. Irwin & Barneby	rainbow shower tree	Orn	--	<1>
<i>Chamaecrista nictitans</i> (L.) Moench	partridge pea	Nat	U	<1>
<i>Delonix regia</i> (Bojar ex Hook.) Raf.	royal poinciana	Nat	<1>	
<i>Desmodium incanum</i> DC	Spanish clover	Nat	<1>	
<i>Erythrina sandwicensis</i> Degener	wilivili	End	<1>	
<i>Falcataria moluccana</i> (Miq.) Barneby & Gries	albizia	Nat	A	
<i>Leucaena leucocephala</i> (Lam.) deWit	koa haole	Nat	U2	<1>
<i>Mimosa pudica</i> L.	sensitive plant	Nat	O	
<i>Neonotonia wightii</i> (Wight & Arnott) Lackey	glycine	Nat	U3	
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod	Nat	<1>	
<i>Senna surattensis</i> (N.L. Burm.) H. Irwin & Barneby	kolomana	Nat	<1>	
<i>Sophora</i> sp.	---	Orn	--	<1>

indet tree	---	--	R	
GOODINACEAE				
<i>Scaevola taccada</i> (J. Gaert.) Roxb.	naupaka kahakai	Ind	<1>	
LAMIACEAE				
<i>Leonotis nepetifolia</i> (L.) R.Br.	lion's ear	Nat	R2	
LAURACEAE				
<i>Persea americana</i> Mill.	avacado	Nat	<1>	
LEEACEAE				
<i>Leea guineensis</i> G. Don	amamali	Orn	<1>	
LECYTHIDACEAE				
<i>Barringtonia asiatica</i> (L.) Kurz	barringtonia	Orn	<1>	
LOGANIACEAE				
<i>Fragraea berteriana</i> Benth.	pua kenikeni	Orn	<1>	
LYTHRACEAE				
<i>Cuphea hyssopifolia</i> Kunth	false heather	Nat	<1>	
<i>Lagerstroemia speciosa</i> (L.) Pers.	giant crepe myrtle	Orn	<1>	
MALVACEAE				
<i>Gossypium tomentosum</i> Nutt. ex Seem.	ma'o	End	<1>	
<i>Hibiscus arnottianus</i> A. Gray	kaki'o ke'okeo	End	<1>	
<i>Hibiscus kokio</i> Hitchc.	kaki'o 'ala'ala	End	<1>	
<i>Hibiscus mutabilis</i> L.	changeable rose-mallow	Nat	<1>	
<i>Hibiscus rosa-sinensis</i> L. cultivars	Chinese hibiscus	Orn	<1>	
<i>Malvaviscus penduliflorus</i> A.P. de Candolle	Turk's cap	Orn	R1	
<i>Sida rhombifolia</i> L.	Cuba jute	Nat	R	
<i>Sida spinosa</i> L.	prickly sida	Nat	R	
<i>Sida</i> sp.	---	Nat	U	
<i>Thespesia populnea</i> (L.) Sol. ex Corria	milo	Ind	<1>	
MELASTOMATACEAE				
<i>Melastoma cf. sanguineum</i> Sims	fox-tongued melastome	Nat	R	
MELIACEAE				
<i>Azadirachta indica</i> Adr. Jussieu	neem	Orn	<1>	
MORACEAE				
<i>Artocarpus altilis</i> (Z) Fosberg	'ulu, breadfruit	Pol	<1>	
<i>Artocarpus</i> sp. 1	---	Orn	<1,4>	
<i>Broussonetia papyrifera</i> (L.) Vent.	wauke	Pol	<1>	
<i>Broussonetia luzonica</i> (Blanco) Bureau	alokon	Orn	<1>	
<i>Ficus cf. dammaropsis</i>	highland breadfruit	Orn	<1,4>	
<i>Ficus microcarpa</i> L. fil.	Chinese banyan	Nat	R	
<i>Ficus</i> sp. 1	---	Orn	<1>	
MYOPORACEAE				
<i>Myoporum sandwicense</i> A. Gray	naio papa	Ind	<1>	
MYRTACEAE				
<i>Eucalyptus cf. paniculata</i> J.E. Smith	ironbark	Nat	R	<4>
<i>Eucalyptus robusta</i> J.E. Smith	swamp-mahogany	Nat	C2	
<i>Eucalyptus</i> sp.	gum	Orn	<1,4>	

<i>Melaleuca quinquenervia</i> (Cav.) S.T. Blake	paperbark	Nat	<1>	
<i>Metrosideros polymorpha</i> Gaud.	'ohi'a	End	<1>	
<i>Psidium cattleianum</i> Sabine	strawberry guava	Nat	A3	
<i>Psidium cattleianum</i> var. <i>littorale</i> (Raddi) Fosberg	waiawai	Nat	O	
<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	downy myrtle	Nat	U	
<i>Syzygium cumini</i> (L.) Skeels.	Java plum	Nat	C	<1>
<i>Syzygium jambos</i> (L.) Aiton	rose-apple	Nat	R2	
<i>Syzygium malaccense</i> (L.) Merr. & L.M. Perry	mountain apple	Pol	--	<1>
NANDINACEAE				
<i>Nandina domestica</i>	---	Orn	<1>	
NICTAGINACEAE				
<i>Bougainvillea spectabilis</i> Willd.	bougainvillea	Orn	--	<1>
OLEACEAE				
<i>Ligustrum</i> sp.	privet	Orn	--	<1>
Deg. & L. Johnson	<i>Nestegis sandwicensis</i> (A. Gray) Deg. & L. Johnson	End	<1>	
<i>oleoua</i>	---	End	<1>	
PASSIFLORACEAE				
<i>Passiflora laurifolia</i> L.	yellow granadilla	Nat	A	
PITTIOSPORACEAE				
<i>Pittosporum</i> sp.	---	Nat	<1>	
PLANTAGINACEAE				
<i>Plantago lanceolata</i> L.	nrw-lvd plantain	Nat	U	<1>
<i>Plantago major</i> L.	brd-lvd plantain	Nat	U1	
POLYGALACEAE				
<i>Polygala paniculata</i> L.	bubblegum plant	Nat	U	
PROTEACEAE				
<i>Grevillea robusta</i> A. Cunn ex R.Br.	silk oak	Nat	<1>	
ROSACEAE				
<i>Raphiolepis umbellata</i> (Thunb.) Makino	Yeddo hawthorn	Orn	<1>	
<i>Rubus rosifolius</i> Sm.	thimbleberry	Nat	R	
RUBIACEAE				
<i>Coffea arabica</i> L.	coffee	Nat	O	
<i>Gardenia taitensis</i> de Candolle	Tahitian gardenia	Orn	<1>	
<i>Gardenia</i> sp.	gardenia	Orn	<1>	
<i>Ixora cf. chinensis</i>	ixora	Orn	<1>	
<i>Morinda citrifolia</i> L.	noni	Pol	<1>	
<i>Paederia foetida</i> L.	maile pilau	Nat	R2	<1>
<i>Psychotria oederata</i> (G. Forst.) A.C. Sm. & S. Darwin	aloha'e	Ind	<1>	
<i>Spermatocoe assurgens</i> Ruiz. & Pav.	buttonweed	Nat	O	<1>
RUTACEAE				
<i>Citrus</i> spp.	orange, other citrus plants	Orn	<1>	
SAPINDACEAE				
<i>Dimocarpus longan</i> Lour.	longan	Orn	<1>	
<i>Dodonaea viscosa</i> Jacq.	'a'ali'i	Ind	<1>	

<i>Filicium decipiens</i> (Wight & Amott)	fern tree	Nat	<1>
SAPOTACEAE			
<i>Chrysophyllum oliviforme</i> L.	satin leaf	Nat	U2 <1>
STERCULIACEAE			
<i>Brachycton acerifolius</i> (G. Don)	Illawarra flame tree	Orn	<1>
THYMELAEACEAE			
<i>Wikstroemia uvae-ursi</i> A. Gray	'akia	End	<1>
TURNERACEAE			
<i>Turnera ulmifolia</i> L.	yellow alder	Nat	R
VERBINACEAE			
<i>Clerodendrum quadriloculare</i> (Blanco)	Meni	Orn	<1>
<i>Darunia erecta</i> L.	golden dewdrop	Orn	<1>
<i>Lantana camara</i> L.	lantana	Nat	U <1>
<i>Vitex rotundifolia</i> L. fil.	<i>pohinahina</i>	Ind	<1>
MONOCOTYLEDONES			
AGAVACEAE			
<i>Dracaena fragrans</i> (L.) Ger-Gawl.	fragrant dracaena	Orn	<1>
<i>Dracaena marginata</i> Lam.	money tree	Orn	<1>
<i>Dracaena marginata</i> 'Tricolor'		Orn	<1>
<i>Dracaena sanderriana</i> M. T. Masters	sanderiana	Orn	<1>
ARACEAE			
<i>Alocasia cucullata</i> (Lour.) G. Don	Chinese taro	Nat	R <2>
<i>Colocasia esculenta</i> L.	kalo	Pol	<1,2>
<i>Dieffenbachia maculata</i> (Lodd.) G. Don	spotted dumb cane	Orn	R
<i>Epipremnum pinnatum</i> 'Aureum' J. Linden & André	pothos	Nat	A
<i>Philodendron bipinnatifidum</i> Endl.	sellum	Orn	<1>
<i>Synгоним sp.</i>	nephtytis	Orn	U
ARECACEAE			
<i>Cocos nucifera</i> L.	coconut palm	Nat	<1>
<i>Dypsis lutescens</i> (H. Wendl.) Beentje & Dransfield	golden-fruited palm	Orn	<1>
<i>Latania loddigestii</i> Mart.	blue latan palm	Orn	
<i>Levistonia chinensis</i> (M. Jacq.) Mart.	Chinese fan palm	Nat	R3
<i>Pritchardia</i> sp.	---	---	<1,4>
<i>Psychosperma macarthurii</i> (Veitch) J. D. Hook.	Macarthur palm	Orn	<1>
<i>Raphis excelsa</i> (Thunb.) Rehder	lady palm	Orn	<1>
<i>Roystonia</i> cf. <i>regia</i> (Kuntze) O.F. Cook	royal palm	Orn	<1>
indet. palm	---	---	<1>
BROMELIACEAE			
<i>Neoregelia caroliniae</i> L.B. Smith	blushing bromeliad	Orn	<1>
CYPERACEAE			
<i>Cyperus polystachyos</i> Rottb.	---	Ind	<1>
<i>Cyperus involucreatus</i> Rottb.	umbrella sedge	Nat	R <1,2>

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<i>Fimbristylis dichotoma</i> (L.) Vahl	---	---	Ind	<1>
HELICONIACEAE				
<i>Heliconia bihai</i> (L.) L.	Jacquinii heliconia	Orn	R	
<i>Heliconia rostrata</i> Ruiz & Pavón	parrot's-beak heliconia	Orn		<1>
IRIDACEAE				
<i>Diets grandiflora</i> N. E. Brown	African iris	Orn		<1>
LILIACEAE				
<i>Hippeastrum</i> sp.	amaryllis	Orn		<1,4>
<i>Ophiopogon japonicus</i> (L. fil.) Ker Gawl.	dwarf mondo cult.	Orn		<1>
<i>Ophiopogon cf. jaburan</i> (Sieb.) Loddiges	variagated mondo	Orn		<1>
<i>Ophiopogon planiscapus</i> Nakai	mondo grass	Orn		<1>
MUSACEAE				
<i>Musa hybrid</i>	banana	Orn		<1>
PANDANACEAE				
<i>Pandanus tectorius</i> S. Parkinson ex Z	<i>hala</i>	Ind	O	
POACEAE (GRAMINEAE)				
<i>Andropogon virginicus</i> L.	broomsedge	Nat		<1>
<i>Bambusa vulgaris</i> J.C. Wendl. 'Vittata'	golden bamboo	Orn		<1>
<i>Bothriochloa pertusa</i> (L.) A. Camus	pitted beargrass	Nat		<1>
<i>Chloris barbata</i> (L.) Sw.	swollen fingergrass	Nat	R1	<1>
<i>Coxis lacynosa-johi</i> L.	Job's tears	Nat	R1	<2>
<i>Digitaria ciliaris</i> (Retz.) Koeler	Henry's crabgrass	Nat	U	
<i>Eleanis indica</i> (L.) Gaertn.	wiregrass	Nat		<1>
<i>Eragrostis pectinacea</i> (Michx.) Nees	Carolina lovegrass	Nat	U1	<1>
<i>Eragrostis tenella</i> (L.) P. Beauv. ex Roem. & Schult.		Nat		<1>
<i>Eragrostis</i> sp.	---	Nat	U2	
<i>Melinis repens</i> (Willd.) Zizka	Natal redtop	Nat	R	<1>
<i>Oplismenus hirtellus</i> (L.) P. Beauv.	basketgrass	Nat	U	
<i>Paspalum conjugatum</i> Bergius	Hilo grass	Nat	C	
<i>Paspalum fimbriatum</i> Kunth	fimbriate paspalum	Nat	U	<1>
<i>Paspalum</i> sp. [crs t-grass]	indet.	Nat		
<i>Pennisetum purpureum</i> Schumacher	elephant grass	Nat	U1	<3>
<i>Saccharum officinarum</i> L.	sugar cane	Pol		<1>
<i>Schizostachyum glaucofolium</i> (Rupr.) Munro	'ohe	Pol	U	
<i>Setaria palmifolia</i> (J. König) Stapf	palmgrass	Nat	R	
<i>Sporobolus cf. africanus</i> (Poir.) Robyans & Toumaz	smutgrass	Nat	C	<1>
<i>Stenotaphrum secundatum</i> (Walter) Kuntz.	St. Augustine grass	Nat		<1>
<i>Urochloa maxima</i> (Jacq.) Webster	Guinea grass	Nat	AA	<1>
STREITIZACEAE				
<i>Ravenala madagascariensis</i> Som.	traveler's tree	Orn		<1>
ZYGIBERACEAE				
<i>Zingiber zerumbet</i> (L.) Sm.	'anapahi	Pol		<1>

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Legend to Table 1

Status = distributional status

Endm = endemic; native to Hawai'i and found naturally nowhere else.

Indm = indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.

Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

Orn = exotic, ornamental or cultivated crop; plant not naturalized (not well-established outside of cultivation, at least at this location).

Pol = Polynesian introduction; brought to the Hawaiian Islands before 1778.

Abundance = occurrence ratings for plants on property in August 2010

R - Rare - only one or two plants seen, several to a dozen plants observed.

U - Occasional - found regularly, but not abundant anywhere.

O - Occasional - found regularly, but not abundant anywhere.

C - Common - considered an important part of the vegetation and observed numerous times.

A - Abundant - found in large numbers, may be locally dominant.

AA - Abundant - very abundant and dominant, defining vegetation type.

Numbers (as in R3) reflect occurrence ratings (1 - several plants; 2 - many plants; 3 - abundant in a limited area) in cases where distribution across the survey area may be limited, but individuals seen are more than indicated by the occurrence rating alone.

Notes:

<1> Developed campus and agriculture area (abundance, if given, relates to the presence on undeveloped land)

<2> Associated with water features (stream, irrigation canals, ponds)

<3> Seed only seen.

<4> Plant lacking fruit or flowers; identification uncertain.

In all, one mushroom, 10 ferns, three gymnosperms, and 203 taxa of flowering plants were recorded in the KCC survey area (Table 1). Another, approximately seven plants could not be identified and are not included in the table because of incomplete information; either a critical identifying characteristic was missing, an indecipherable field note was recorded, a bad photograph was taken, and/or a collected specimen was lost or was in such poor condition as to not be identifiable in the lab. Further, vegetable garden areas and other enclosed growing areas were not entered and plants in these areas (presumably all cultured vegetables and weeds) are not listed. Many small, ruderal and lawn weeds were not recorded and may have been missed in trying to observe all of the more conspicuous plants around the campus. Many more ruderal weeds appeared in a survey of Island School made the day before (David and Guinther, 2010), and their absence on the campus and surrounding KCC property may be real or an oversight based upon focusing on the many ornamental and unusual specimen plants present. Considering only those flowering plants, gymnosperms, and ferns found outside the landscaped areas (88 species), only five are native plants (six percent); three are ferns; the only endemic flowering plant was *Acacia koa* growing along the margin of the gulch. One early Polynesian introduction was recorded (*ohe*, bamboo, or *Schizostachyum glaucofolium*) here as well.

The planted or landscaping vegetation on the campus (and in the agriculture station area) includes a number of native and Polynesian introduced species. In all, 12 Polynesian, "canoe" plants, 14 species of vascular plants indigenous to the Hawaiian Islands, and 11 species of vascular plants endemic to these islands are recorded in Table 1.

As noted above, the vegetation in the abandoned agriculture fields north of the developed campus was dominated by Guinea grass growing so thick as to preclude surveying these areas except along old farm roads. Large albizia trees are also present. Other species are seen invading the margins of the fields, and are listed as found on "undeveloped" land.

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Similar abandoned field areas on the adjacent Island School property were described thusly:

"The vegetation found in the undeveloped parts of the property consists of mixed areas of moderately open to closed forest, shrubland, and grassland. Forest tends to predominate, with mostly mature macaranga (*Macaranga tanarius*) and albizia (*Falcataria moluccana*) trees. Other species conspicuous but generally not numerous, are Christmas berry (*Schinus terebinthifolius*), octopus (*Schefflera actinophylla*), and Java plum (*Syzygium cumini*). Ground cover and understory shrubs and vines varied considerably from place to place." (David and Guinther 2010).

The greatest diversity of plants on undeveloped land was found in the gulch formed by Puhi Stream. Presumably, this area has not been disturbed for a while, and a mature secondary forest occupies the gulch bottom and the low sloping ground of the northern margin. This forest is mostly *Macaranga tanarius*, albizia and Java plum, becoming more diverse at the upper end with at least two species of eucalyptus present. Other conspicuous plants, none particularly common, include rose apple (*Syzygium jambos*), avocado (*Persea americana*), coffee (*Coffea arabica*), *hala* (*Pandanus tectorius*), and bamboo (*Bambusa vulgaris* and *Schizostachyum glaucofolium*); strawberry guava (*Psidium cattleianum*) forms thickets in some areas, although within much of the gulch, the forest floor is open due to heavy shading. Pothos (*Epipremnum pinnatum* 'Aureum') and yellow granadilla (*Passiflora laurifolia*) vines are abundant at the margin of the forest. An unidentified vine or liana was noted in the riparian area just west of the agriculture station. Stems were just extending as if from recently germinated seeds; no adult plants were found. Stream flow is variable and coming mostly from an old agricultural irrigation ditch. The gulch floor is relatively flat and broad, forming muddy areas much rooted in by feral pig, but supporting some plants adapted to wetland conditions (e.g. *Pteridium aquilinum* and *Cyclosorus interruptus*). Other wet ground associated plants were observed along an irrigation ditch that crosses the agriculture planting area.

#### Avian Survey Methods

Twelve avian count stations spaced approximately equidistant from each other were situated within the campus, both within currently developed areas as well as in parts of the site, which are still undeveloped. Eight-minute point counts were made at each station. Stations were each counted once. Field observations were made with the aid of Leica 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated in the early morning hours, the peak of daily bird activity. Time not spent counting stations was used to search the rest of the site for species and habitats not detected during count sessions.

#### Avian Survey Results

A total of 526 individual birds of 18 species, representing 15 separate families, were recorded during station counts (Table 2). An additional three species, Hawaiian Goose, or

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*Nēnē* (*Branta sandvicensis*), Common Moorhen (*Gallinula chloropus sandvicensis*), Black-crowned Night-Heron (*Nycticorax nycticorax hoactli*), were recorded as incidental observations while transiting the site between count stations. Both the goose and the moorhen are listed as endangered species under both Federal and State of Hawai'i endangered species statutes. The Black-crowned Night-Heron is an indigenous resident breeding species. One species recorded during station counts, Pacific Golden-Plover (*Pluvialis fulva*), is an indigenous migratory shorebird species. The remaining 17 species recorded are all considered to be alien to the Hawaiian Islands.

Avian diversity and densities were in keeping with the habitat present on the site, and it's location in the lowlands of the Island of Kaua'i. Four species, Common Myna (*Acridotheres tristis*), Zebra Dove (*Geopelia striata*), Japanese White-eye (*Zosterops japonicus*) and Red Junglefowl (*Gallus gallus*) accounted 57.4 percent of all birds recorded during station counts. The most commonly recorded species was Common Myna, which accounted for slightly more than 20 percent of the total number of individual birds recorded. An average of 44 birds were detected per station count.

Table 2 - Avian Species Detected – KCC Campus

Common Name	Scientific Name	ST	RA
ANSERIFORMES			
ANATIDAE - Ducks, Geese & Swans			
Anserinae - Geese & Swans			
Hawaiian Goose (Nēnē)	<i>Branta sandvicensis</i>	EE	I-5
GALLIFORMES			
PHASIANIDAE - Pheasants & Partridges			
Phasianinae - Pheasants & Allies			
Red Junglefowl	<i>Gallus gallus</i>	A	4.75
CICONIIFORMES			
ARDEIDAE - Herons, Bitterns & Allies			
Cattle Egret	<i>Bubulcus ibis</i>	A	1.67
Black-crowned Night-Heron	<i>Nycticorax nycticorax hoactli</i>	IR	I-1
GRUIFORMES			
RALLIDAE - Rails & Allies			
Common Moorhen	<i>Gallinula chloropus sandvicensis</i>	EE	I-1
CHARADRIIFORMES			
CHARADRIIDAE - Lapwings & Plovers			
Charadriinae - Plovers			

Table 2 Continued.

Common Name	Scientific Name	ST	RA
Pacific Golden-Plover	<i>Pluvialis fulva</i>	IM	1.25
COLUMBIFORMES			
COLUMBIDAE - Pigeons & Doves			
Spotted Dove	<i>Streptopelia chinensis</i>	A	1.25
Zebra Dove	<i>Geopelia striata</i>	A	6.00
PSITTACIFORMES			
PSITTACIDAE - Lories Parakeets, Macaws & Parrots			
Psittacinae - Typical Parrots			
Rose-ringed Parakeet	<i>Psittacula krameri</i>	A	2.00
PASSERIFORMES			
CETTIDAE - Cettia Warblers & Allies			
Japanese Bush-Warbler	<i>Cettia diphone</i>	A	0.08
ZOSTEROPIDAE - White-eyes			
Japanese White-eye	<i>Zosterops japonicus</i>	A	6.00
TIMALIIDAE - Babbblers			
Hwamei	<i>Garrulax canorus</i>	A	1.50
TURDIDAE - Thrushes			
White-rumped Shama	<i>Copsychus malabaricus</i>	A	0.42
STURNIDAE - Starlings			
Common Myna	<i>Acridotheres tristis</i>	A	8.92
EMBERIZIDAE - Emberizids			
Red-crested Cardinal	<i>Paroaria coronata</i>	A	0.58
CARDINALIDAE - Cardinals Saltators & Allies			
Northern Cardinal	<i>Cardinalis cardinalis</i>	A	0.67
FRINGILLIDAE - Fringilline And Cardueline Finches & Allies			
House Finch	<i>Carpodacus mexicanus</i>	A	4.42
PASSERIDAE - Old World Sparrows			
House Sparrow	<i>Passer domesticus</i>	A	0.08
ESTRILIDAE - Estrilid Finches			
Estrilinae - Estrilid Finches			
Nutmeg Mannikn	<i>Lonchura punctulata</i>	A	0.50
Chestnut Munia	<i>Lonchura atricapilla</i>	A	3.42
Java Sparrow	<i>Padda oryzivora</i>	A	0.83

Key to Table 2.

ST Status  
EE Endangered/Endemic species -

A Alien species - introduced to Hawai'i by humans, and have become established in the wild  
IM Indigenous Migratory species -  
RA Relative Abundance: Number of birds detected divided by the number of count stations (12)  
I- Incidental Observation - a species recorded while transiting the site, and not recorded during station counts followed by the number recorded

**Mammalian Survey Methods**

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or 'ope'ope'a as it is known locally, all terrestrial mammals currently found on the Island of Kaua'i are alien species, and most are ubiquitous. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project area.

**Mammalian Survey Results**

Six mammalian species were detected during the course of this survey (Table 3). We saw several dogs (*Canis f. familiaris*) on leashes being walked by their owners, additionally; dog tracks and sign were encountered in numerous locations within the site. We saw three cats (*Felis c. catus*) within the site, and encountered cat tracks along most of the unpaved roadways and trails within the study area. Numerous domestic cattle (*Bos Taurus*) were seen grazing pastures to the northwest of the developed site. One pig (*Sus s. scrofa*) was encountered caught in a pig snare at the edge of the gulch to the west of the diversified agricultural facility, additionally pig tracks, sign, and scat were encountered within the site, especially within the thickly vegetated gulch located to the west of the main campus. Scat and sign of goats (*Capra h. hircus*) and horse (*Equus c. caballus*) were encountered in one location along the unpaved road leading to the County of Kaua'i water tank on the west edge of the site.

No mammalian species protected or proposed for protection under either the Federal or State of Hawai'i endangered species programs were detected during the course of this survey (DLNR 1998, USFWS 2005a, 2005b, 2010).

Table 3 - Mammalian Species Detected – KCC Campus

CCo o Cm No an	eSamtSn No an	of n	Tfn
CARNI/ORA- Flesh-Eaters			
Canidae - Wolves, Beckals & Allies			
Domestic dog	<i>panis jfaZ illaris</i>	A	j, T, S
Felidae- Cats			
House cat	<i>gelis catus</i>	A	j, T, S
PERISSODACTYLA - Odd-Toed Zngulates			

Equidae - Horses, Asses & f ebras

eavle Gcontinued	eSamtSn No an	of n	Tfn
Domestic horse	<i>hyuus cjavallus</i>	A	T, S
ATRIDACTYLA - Even-Toed Zngulates			
Suicidae - Old World Swine			
Pig	<i>Pus sj scrofa</i>	A	j, T, S
' ovidae- Hollow-horned Ruminants			
Domestic cattle	<i>Bos taurus</i>	A	j
Domestic goat	<i>paAra N Nrcus</i>	A	T

**Rabid Cf Nbiatn**

STn Status  
An Alien species - introduced to Hawai'i by humans, and have become established in the wild  
DT Detection Tj pe  
j j usual - the animal was seen  
T Tracks - tracks were encountered  
S Sign - animal sign such as pig wallowing, cattle rubbing encountered

**Discussion**

n BCI Nms Nl Ras Cur Sasn

The survey area within the MCC campus and the part] developed and undeveloped surrounding lands lacks botanical resources that would merit special concern, with some eceptions. In the undeveloped areas, the species present are common to lowland windward MaaK and are nearl] all non-native species (an eception is the one or two xoo trees), and not requiring or disserving olpresentation on this property]. Within the lbrmer agriculture station, a number olunusual trees (including native species) have been planted over a long period oltime and now constitute a botanical resource worth preserving. These trees should be worked into the landscaping olfuture development plans lbr this particular area (southwest corner olthe campus). Landscaping olfuture development plans would hold more promise lbr creating valuable botanical resources than the present weed] growth in the undeveloped and lbrmer sugar cane land.

n AvnMk Sas Cur Sasn

The Undings olthe avian survey] are consistent with the location olthe property], and the habitat present on the site. Additional]y, the Undings are consistent with at least one other recent avian survey] conducted on the Island School campus, which is located immediate] adjacent to the MCC site (David and Gunther 2010).

Four of the 21 avian species detected during the course of this survey, Hawaiian Goose, or Nēnē, Common Moorhen, Pacific Golden-Plover and Black-crowned Night-Heron are native species. Nēnē, and Common Moorhen are listed as endangered species under both the state and federal endangered species statutes. We recorded a total of five separate Nēnē, and one Common Moorhen on the site. The Nēnē population on Kaua'i is increasing at a fairly rapid pace, and is likely that if this increase continues that human - Nēnē interactions will continue to rise on the island over time. Common Moorhen are relatively abundant and wide spread on the island of Kaua'i. They can be found in association with just about any kind of standing or running water no matter how ephemeral in nature. We also recorded 15 Pacific Golden-Plover during station counts, this species is an indigenous migratory shorebird species that nests in the high Arctic during the late spring and summer months, returning to Hawai'i and the Tropical Pacific to spend the fall and winter months each year. They usually leave Hawai'i for their trip back to the Arctic in late April or the very early part of May each year. The remaining 17 avian species detected during this survey are all considered to be alien to the Hawaiian Islands (Table 2).

Although not detected during this survey, it is probable that the Hawaiian endemic sub-species of the Short-eared Owl, or Pūeo (*Asio flammeus sandwichensis*) use resources in the general project area, as they are regularly seen foraging over open fields in the low-to-mid elevation areas on the island (David 2010).

Two other species not detected during this survey, Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened endemic sub-species of the Newell's Shearwater (*Puffinus auricularis newelli*) have been recorded over-flying the project site between April and the end of November each year (David 1995, Morgan *et al.*, 2003, 2004, David and Planning Solutions 2008). Additionally, the Save Our Shearwaters Program has recovered both species from the general project area on an annual basis over the past three decades (Morgan *et al.*, 2003, 2004, David and Planning Solutions 2008, Save our Shearwater Program 2009).

The petrel is listed as endangered, and the shearwater as threatened under both Federal and State of Hawai'i endangered species statutes. The primary cause of mortality in both Hawaiian Petrels and Newell's Shearwaters is thought to be predation by alien mammalian species at the nesting colonies (USFWS 1983, Simons and Hodges 1998, Ainley *et al.*, 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with man-made structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Hadley 1961, Telfer 1979, Sinscock 1981, Reed *et al.*, 1985, Telfer *et al.*, 1987, Cooper and Day 1994, Podolsky *et al.*, 1998, Ainley *et al.*, 2001).

There are no nesting colonies nor appropriate nesting habitat for either of these listed seabird species within or close to the school site. The closest currently active Newell's Shearwater colony is located above Kalāheo, which is located approximately 9.5-kilometers

southwest of the site (David *et al.*, 2002). The closest known Hawaiian Petrel nesting colonies are located at the back of Limahuli, Wainiha, Lumaha'i, and probably Hanalei Valleys (David *et al.*, 2002, DOFAW 2009).

**Mammalian Resources**

The findings of the mammalian survey are consistent with the location of the property and the habitat currently present on the site. All of the six mammalian species detected during the course of this survey are alien to the Hawaiian Islands (Table 3). Although no Hawaiian hoary bats were detected during the course of this survey, bats have been recorded foraging for insects over the site in the past (David 1995), and within the general project area, on a regular basis (David 2010). Hawaiian hoary bats are widely distributed in the lowland areas on the island of Kaua'i, and have been documented in and around almost all areas that still have some dense vegetation (Tomich 1986, USFWS 1998, David 2010).

Although no rodents were detected during the course of this survey, it is likely that the four established alien *muridae* fund on Kaua'i, roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), European house mouse (*Mus musculus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources found within the general project area. All of these introduced rodents are deleterious to native ecosystems and the native faunal species dependant on them.

**Potential Impacts to Protected Species**

**Botanical Resources**

No plant species currently listed as endangered, threatened, or proposed for listing under either the federal or the State of Hawai'i's endangered species programs were recorded as growing naturally on the KCC property. One listed species was observed as an ornamental in a Hawaiian native plant garden. Therefore, it is not expected that proposed expansion of the campus will result in deleterious impacts to any plant species currently listed as endangered, threatened, or proposed for listing under either federal or State of Hawai'i endangered species statutes (DLNR 1998, USFWS 2005, 2010).

**Nēnē**

The principal potential impacts that the additional development of the site poses to Nēnē is during the construction phase of the project, and following build-out by the increased number of humans and associated school activities. Although Nēnē on Kaua'i tend to show a remarkable disregard of human activity, fatalities have occurred on construction sites, along roads, and numerous nests have failed due to human disturbance and as a direct result of predators taking eggs and goslings (David 2009a, Ebbin Moser + Skaggs, and Rana Biological Consulting, Inc. 2010).

**Hawaiian Petrel and Newell's Shearwater**

The principal potential impact that the development of the site poses to Hawaiian Petrels and Newell's Shearwaters is the increased threat that birds will be downed after becoming disoriented by outdoor lighting associated with possible night-time construction activity, and following build-out with exterior lighting associated with whatever structures and appurtenances that are built on the property.

**Hawaiian Hoary Bat**

The principal potential impact that the further development of the site poses to Hawaiian hoary bats is during the clearing and grubbing phases of the project. Areas that currently have dense vegetation are likely used to some degree by roosting bats, normally it is not thought that the availability of roosting habitat is a limiting factor in this species survival (Bonaccorso 2009). The principal threat that clearing potential roosting habitat poses to this species is between May and July when female bats may be carrying pups and potential may not be able to flee vegetation clearing activity quickly enough to avoid harm (Bonaccorso 2005, 2007, 2009).

Following build-out of the project lighting associated with the school, and landscaping vegetation will likely attract volant insects to the site, which in turn will provide bats with additional foraging opportunities.

**Critical Habitat**

There is no federally delineated Critical Habitat present on the school site or adjacent to the property. Thus the further development of the school will not result in impacts to federally designated Critical Habitat. There is no equivalent statute under State law.

**Recommendations**

- Since it is likely that endangered Nēnē will use resources on the site, and both Newell's Shearwaters and Hawaiian Petrels may fallout onto the site during the construction phase of the project, we recommend that an endangered species awareness program be developed which includes general information on the endangered species act and protected species, specific restrictions that will be in force on the job site to protect endangered species, and a set of protocols on who, and how job site personnel will respond to any downed or injured endangered species that may occur on the site. All construction personnel should required to be familiar with the program, it's guidelines, restrictions and protocols that will need to be followed. Similar programs have been developed and are being used at several construction project sites, and resorts on the Island of Kaua'i.
- If construction activity is planned to occur during the Nēnē nesting season, which typically runs from October through March on Kaua'i, the project site should be

surveyed by a qualified biologist before the onset of the construction, to determine if any active Nēnē nesting activity is occurring on the site.

- If active Nēnē nesting does occur while construction is ongoing it may be advisable to have a Nēnē monitor on site during such activity to ensure that no harm befalls the birds.
- If nighttime work will be required in conjunction with the development of the project, it is recommended that lights be shielded to reduce the potential for interactions of nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures (Reed *et al.* 1985, Telfer *et al.* 1987).
- It is also recommended that all exterior lighting associated with the operation of the proposed facility be shielded so as to reduce the potential for interactions of nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures (Reed *et al.* 1985, Telfer *et al.* 1987).
- It is recommended that if heavy vegetation on the periphery of the existing developed school facilities needs to be cleared, that clearing not occur between May 15 and July 15, when bats may be carrying young and potentially could be placed at risk by such clearing.
- Plantings of *Munroidendron racemosum* need to be protected (moved out of harm's way) if plans for future development include area(s) where these plants occur.

## Glossary

Alien - Introduced to Hawai'i by humans  
'Auwai - irrigation flume, usually left over from sugar cultivation days  
Commensal - Animals that share human food and lodgings, such as rats, mice cats and dogs.  
Endangered - Listed and protected under the Endangered Species Act of 1973, as amended (ESA) as an endangered species  
Endemic - Native to the Hawaiian Islands and unique to Hawai'i  
Gymnosperms - Plants that have seeds unprotected by an ovary or fruit. Gymnosperms include the conifers, cycads, and ginkgo  
Indigenous - Native to the Hawaiian Islands, but also found elsewhere naturally  
Mauka - Upslope, towards the mountains  
Makai - Downslope, towards the ocean  
Naturalized - A plant or animal that has become established in an area that it is not indigenous to  
Nēnē - Hawaiian Goose (*Branta sandvicensis*) and endangered endemic species  
Nocturnal - Night-time, after dark  
Ornamental - Usually referring to a plant or tree grown for its attractive appearance, usually a non-native species  
'Ōpe'ape'a - Endemic endangered Hawaiian hoary bat (*Lasiorus cinereus semotus*)  
Pelagic - An animal that spends its life at sea - in this case seabirds that only return to land to nest and rear their young  
Phylogenetic - The evolutionary order that organisms are taxonomically arranged by  
Ruderal - Disturbed, rocky, rubbishy areas, such as old agricultural fields and rock piles  
Taxa - a taxonomic group of any rank, such as a species, family, or class  
Threatened - Listed and protected under the ESA as a threatened species

DLNR - Hawai'i State Department of Land & Natural Resources  
DOFAW - Division of Forestry and Wildlife  
ESA - Federal Endangered Species Act of 1973, as amended  
KCC - Kaua'i Community College  
USFWS - United State Fish & Wildlife Service

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