Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Volume II

APPENDICES

Appendices 1 though 9

September 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
www.sustain-hi.com

Final Environmental Impact Statement
for the proposed
Kapa'a Light Industrial Park, Kailua, Hawaii
List of Appendices 1 through 9

No.	Description / Title	New for FEIS or previously submitted with the DEIS
1	**Comments Received and Responses Given:** Appendix presents letters to stakeholders and comments received by stakeholder for the Draft Environmental Impact Statement (DEIS) and the Environmental Impact Statement Preparation Notice (EISPN)	Appendix was created new for this FEIS; It contains some material that was presented with the DEIS
2	**Market Study:** Appendix presents findings about the ability of the Koolaupoko region to absorb the planned amount of new industrial space added to the existing warehouse development	Appendix was already published as part of the DEIS; no changes were done to the content
3	**Survey of Existing Businesses at the Project Site:** Appendix presents findings of a survey of businesses which lease industrial space in the existing warehouse development at the proposed project site	Appendix was already published as part of the DEIS; no changes were done to the content
4	**Sustainable Design Approach:** Appendix presents a detail concept plan for the design and construction of the proposed project that will satisfy the requirements to achieve LEED Silver certification upon completion of the proposed project	Appendix was already published as part of the DEIS; no changes were done to the content
5	**Traffic Impact Analysis Report:** Appendix presents the TIAR that was conducted for this environmental review. The TIAR assesses the anticipated traffic impacts of the proposed project	Appendix was already published as part of the DEIS; no changes were done to the content
6	**Sight Distance AnalysisStudy:** Appendix presents the sight distance analysis that was conducted for this environmental review. The assessment evaluates if the proposed driveways for the proposed project would have adequate sights	Appendix was revised for this FEIS, four drawings of Driveway No. 1 were revised and pertinent text was revised, in response to comments received to the DEIS
7	**Water Resources Assessment for the Project Site:** Appendix presents the results of an investigation of water resources at the site	Appendix was already published as part of the DEIS; no changes were done to the content
8	**Visual Impact Assessment Study:** Appendix presents a visual impact assessment of the proposed project by evaluating existing viewplanes and the consequences of the proposed project by means of a photographic documentation and a virtual realty model of the completed future development	Appendix was revised for this FEIS, one new viewplane was added, in response to comments received to the DEIS
9	**Information about Previously Conducted Archeological survey:** Appendix presents information about previously conducted archeological survey, which is cited in the DEIS	Appendix was already published as part of the DEIS; no changes were done to the content

Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 1:

Comments Received and Responses Given

<u>Appendix 1 contains changes from Appendix 1 of DEIS</u>

September 2011

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Appendix 1 of the FEIS is an appended version of the Appendix 1 that was part of the DEIS.

Appendix 1: Comments Received and Responses Given

The appended FEIS Appendix 1 presents as follows:

- Mailing list for the DEIS
- Copies of letters with comments sent by DEIS stakeholders and responses by Consultant
- Mailing list for the EISPN
- Copies of letters with comments and recommendations sent by EISPN stakeholders

Mailing list for the DEIS: The following 39 stakeholders received the DEIS Volume I :Main Report and Volume II; Appendices on Data-CD, per regular mail:

No.	Mailing list of DEIS to Selected Governmental Agencies, Community / Advocacy Group and Public Libraries, as listed
1	Ahahui Malama I Ka Lokahi P.O. Box 751 Honolulu, Hawaii 96808 Attn.: Office of the President
2	Mr. John Harrison, President Hawaii Audubon Society 850 Richards Street, Suite 505 Honolulu, Hawaii 96813
3	Kawai Nui Heritage Foundation C/o Ms. Susan Miller 1030 Aoloa Place, Apt. 102 B Kailua, Hawaii 96734
4	Ms. Joan Fleming, President Lani-Kailua Outdoor Circle 653 Milokai Street Kailua, HI 96734
5	Ms. Donna Wong, Executive Director Hawaii's Thousand Friends 25 Maluniu Avenue, Suite 102 #282 Kailua, Hawaii 96734
6	Kailua Bay Advisory Council 629-A Kailua Road, Suite #3 Kailua, Hawaii 96734
7	Mr. Puna Nam, President Kailua Chamber of Commerce Post Office Box 1496 Kailua, Hawaii 96734

No.	Mailing list of DEIS to Selected Governmental Agencies, Community / Advocacy Group and Public Libraries, as listed
8	Mr. Bill Lane, Account Manager Hawaiian Electric Company, Inc. P.O. Box 2750 Honolulu, Hawaii 96840
9	Mr. Henry Curtis, Executive Director Life of the Land 76 North King Street, Suite 203 Honolulu, Hawaii 96817
10	Mr. Robert D. Harris, Director Sierra Club of Hawaii Chapter P.O. Box 2577 Honolulu, Hawaii 96803
11	Mr. Randy Ching, County President The League of Women Voters of Honolulu 49 South Hotel Street, Room 314 Honolulu, Hawaii 96813
12	Todd Cullison, Executive Director Hui o Ko`olaupoko 1051 Keolu Drive #208 Kailua, HI 96734
13	Mr. Chuck Prentiss, Chair Kailua Neighborhood Board No. 31 Neighborhood Commission Office 530 South King Street, Room 406 Honolulu, Hawaii 96813
14	Kailua Satellite City Hall 1090 Keolu Drive, # 110 Kailua, Hawaii 96734

No.	Mailing list of DEIS to Selected Governmental Agencies, Community / Advocacy Group and Public Libraries, as listed
15	Mr. Wayne Hashiro, Manager Honolulu Board of Water Supply 630 South Beretania Street Honolulu, HI 96813-2404
16	Mr. Wayne Yoshioka, Acting Director City and County of Honolulu, Department of Transportation Services 650 S. King Street, 3rd Floor Honolulu, Hawaii 96813
17	Mr. Tim Steinberger, Director City and County of Honolulu Department of Environmental Services 1000 Uluohia Street, Suite 212 Kapolei, HI 96707
18	Mr. George K. Miyamoto, Acting Director City and County of Honolulu Department of Facility Management 1000 Uluohia Street, Suite 215 Kapolei, HI 96707
19	Mr. Louis M. Kealoha, Chief of Police Honolulu Police Department 801 South Beretania Street Honolulu, Hawaii 96813
20	Mr. Kenneth G. Silva , Fire Chief Honolulu Fire Department 636 South Street Honolulu, HI 96813

No.	Mailing list of DEIS to Selected Governmental Agencies, Community / Advocacy Group and Public Libraries, as listed
21	Mr. Gary Cabato, Acting Director City and County of Honolulu Department of Parks and Recreation 1000 Uluohia Street, Suite 309 Kapolei, I 96707
22	Collins D. Lam, P.E., Acting Director City and County of Honolulu Department of Design and Construction 650 S. King Street Honolulu, HI 96813
23	Dr. Pua Aiu, Administrator State Historic Preservation Div., DLNR Kakuhihewa Building 601 Kamokila Blvd., Suite 555 Kapolei, Hawaii 9670
24	Dr. Neal Palafox, Director Department of Health, State of Hawaii Kinau Hale 1250 Punchbowl Street Honolulu, Hawaii 96813
25	Mr. Orlando Dan Davidson, Executive Officer Land Use Commission, State of Hawaii DBEDT P.O. Box 2359 Honolulu, Hawaii 96804-2359
26	Richard C. Lim, Interim Director Department of Business, Economic Development & Tourism (DBEDT) No. 1 Capitol District Building 250 South Hotel Street, 5th Floor Honolulu, Hawaii 96813

No.	Mailing list of DEIS to Selected Governmental Agencies, Community / Advocacy Group and Public Libraries, as listed
27	Dr. Elizabeth Raman, Energy Program Specialist, State Energy Office Hawaii State DBEDT, Strategic Industries Div. PO Box 2359 Honolulu, Hawaii 96804
28	Mr. Brian Gibson, Executive Director Oahu Metropolitan Planning Organization Ocean View Center 707 Richards Street, Suite 200 Honolulu, Hawaii 96813
29	Glenn Okimoto, Interim Director Department of Transportation State of Hawaii 869 Punchbowl Street Honolulu, Hawaii 96813
30	Mr. Clyde Namu'o, Chief Executive Officer Office of Hawaiian Affairs 711 Kapiolani Boulevard, Suite 500 Honolulu, Hawaii 96813
31	Ms. Mary Lou Kobayashi, Administrator Office of Planning, State of Hawaii, DBEDT P.O. Box 2359 Honolulu, Hawaii 96804-2359
32	Mr. William J. Aila Jr., Interim Chairperson Department of Land and Natural Resources State of Hawaii 1151 Punchbowl Street, Room 130 Honolulu, Hawaii 96813

No.	Mailing list of DEIS to Selected Governmental Agencies, Community / Advocacy Group and Public Libraries, as listed
33	Mr. Lawrence T. Yamamoto, State Conservationist USDA NRCS, Pacific Islands Area State Office P.O. Box 50004 Honolulu, Hawaii 96850
34	Lt. Col. Douglas Guttormsen, District Commander US Army Corps of Engineers Honolulu District, Bldg. 230, CEPOH-EC-R Fort Shafter, Hawaii 96858-5440
35	Dr. Loyal Mehrhoff, Field Supervisor Pacific Islands Fish and Wildlife Office 300 Ala Moana Boulevard Room 3-122, Box 50088 Honolulu, Hawaii 96850
36	Mr. Guilherme R. Costa, Conservation Specialist Oahu Soil & Water Conservation District 99-193 Aiea Heights Drive, Suite 109 Aiea, Hawaii 96701
37	Mr. Philip Moravcik, Environmental Coordinator University of Hawaii, Environmental Center Krauss Annex 19 2500 Dole Street Honolulu, HI 96822
38	Kailua Public Library 239 Kuulei Road Kailua, HI 96734 Attn.: Mr. Tom Coleman
39	Kaneohe Public Library 45-829 Kamehameha Highway Kaneohe, HI 96744 Attn.: Ms. Cindy Chow, Branch Manager

Sustainable Design & Consulting LLC
Engineering • Strategy • Change Management

January xx, 2011

Sample transmittal letter for DEIS to stakeholders on DEIS distribution list (two public libraries received separate cover letters)

Mr. or Ms ……
xxxxxxxxxxxxxx
xxxxxxxxxxxxxxx
xxxxxxxxxxxxxx

Subject: **Draft Environmental Impact Statement (DEIS)**
Kapa'a Light Industrial Park in Kailua, Oahu, Hawaii
Request for comments on the DEIS

Dear xxxx

On behalf of Kapa'a I, LLC, 905 Kalanianaole Hwy., Kailua, HI 96734, Sustainable Design & Consulting LLC (SDC) is submitting the DEIS for the proposed Kapa'a Light Industrial Park (KLIP) project in the Koolaupoko District of Oahu, for your review and comment. The City & County of Honolulu, Department of Planning & Permitting (DPP) has instructed us that the Office of Environmental Quality Control, State of Hawaii (OEQC) will publish the DEIS in *The Environmental Notice* on February 8th, 2011 (the text of publication notice is attached to this letter). The date of publication marks the start of the 45 day public review period during which stakeholders are invited to submit their comments. With the publication date of February 8th, we will be accepting comments through Friday, March 25th, 2011.

To reduce hard copies printed and in keeping with an environmentally friendly spirit, we are sending you the DEIS in electronic format. On the enclosed CD please find two PDF files, (1) DEIS Volume 1: Main Report, and (2) DEIS Volume 2: Appendices.

If you have questions, please call Dr. Manfred Zapka (SDC) at 808-265-6321 or email to sustainabledc@gmail.com. Please send 2 copies of any written comments via regular mail, one to SDC, and the other to DPP. Addresses are:

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, HI 96828

Mr. Mike Watkins
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, HI 96813

Sincerely,
Sustainable Design & Consulting, LLC

M. Zapka

Manfred Zapka, PhD, PE, LEED-AP, CEM
Principal and Senior Consultant

2 Enclosures: One Data-CD containing PDF files of DEIS main report and appendices
Text of Publication Notice

Sustainable Design & Consulting LLC
Engineering • Strategy • Change Management

February 9, 2011

Kailua Public Library
239 Kuulei Road
Kailua, HI 96734
Attn.: Mr. Tom Coleman or Branch Manager

Subject: **Draft Environmental Impact Statement (DEIS)**
Kapa'a Light Industrial Park in Kailua, Oahu, Hawaii
Request to make DEIS available to the public at your library

Dear Sir or Madam,

On behalf of Kapa'a I, LLC, 905 Kalanianaloe Hwy., Kailua, HI 96734, Sustainable Design & Consulting LLC is submitting the Draft Environmental Impact Statements (DEIS) for the proposed Kapa'a Light Industrial Park (KLIP) project in the Koolaupoko District of Oahu, Hawaii, to stakeholders and the public for review and comments. The Office of Environmental Quality Control, State of Hawaii (OEQC) has published the Draft EIS in the current *The Environmental Notice*, dated February 8, 2011, which marks the start of a 45 day public comment period.

This EIS is prepared pursuant to the requirements of Chapter 343, Hawaii Revised Statutes, Environmental Impact Statements. Besides being distributed in electronic version by OEQC, we have been instructed by the Accepting Authority, the City & County of Honolulu, Department of Planning and Permitting, that the DEIS should be made accessible to the public at public libraries in Kailua and Kaneohe.

Several weeks ago, we communicated with your library and arranged that your library will receive one data-CD containing the electronic version of the DEIS after the DEIS is published by OEQC. We are also sending herewith a copy of the first two pages of the current *The Environmental Notice*, which states the DEIS publication.

We would kindly request that you make the enclosed information accessible to the public in the framework of your library service until, at least, the end of the public review period, which is March 24, 2011. The applicant, Kapa'a I, LLC, and we, the consultants, very much appreciate your support in this matter. If you have questions please call Dr. Manfred Zapka, Sustainable Design & Consulting, LLC, at 808-265-6321 or per email at sustainabledc@gmail.com.

Sincerely,
Sustainable Design & Consulting, LLC

M. Zapka

Manfred Zapka, PhD, PE, LEED-AP, CEM
Principal and Senior Consultant

Encl.: One data-CD and one copy of the DEIS notice (only pages 1 and 2 of the Feb 8, 2011 OEQC notice)

P.O. Box 283267, Honolulu, Hawaii 96828, USA Tel: 808-265-6321 sustainabledc@gmail.com
www.sustainabledesignconsult.com

Sustainable Design & Consulting LLC
Engineering • Strategy • Change Management

February 9, 2011

Kaneohe Public Library
45-829 Kamehameha Highway
Kaneohe, HI 96744
Attn.: Ms. Cindy Chow, Branch Manager

Subject: **Draft Environmental Impact Statement (DEIS)**
Kapa'a Light Industrial Park in Kailua, Oahu, Hawaii
Request to make DEIS available to the public at your library

Dear Ms. Chow ,

On behalf of Kapa'a I, LLC, 905 Kalanianaloe Hwy., Kailua, HI 96734, Sustainable Design & Consulting LLC is submitting the Draft Environmental Impact Statements (DEIS) for the proposed Kapa'a Light Industrial Park (KLIP) project in the Koolaupoko District of Oahu, Hawaii, to stakeholders and the public for review and comments. The Office of Environmental Quality Control, State of Hawaii (OEQC) has published the Draft EIS in the current *The Environmental Notice*, dated February 8, 2011, which marks the start of a 45 day public comment period.

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Sincerely,
Sustainable Design & Consulting, LLC

M. Zapka

Manfred Zapka, PhD, PE, LEED-AP, CEM
Principal and Senior Consultant

Encl.: One data-CD and one copy of the DEIS notice (only pages 1 and 2 of the Feb 8, 2011 OEQC notice)

P.O. Box 283267, Honolulu, Hawaii 96828, USA Tel: 808-265-6321 sustainabledc@gmail.com
www.sustainabledesignconsult.com

Text of the

Publication Form
The Environmental Notice
Office of Environmental Quality Control

Name of Project: …….. Kapa'a Light Industrial Park

Applicable Law: …… HRS 343-5(c)

Type of Document: …….. Draft EIS

Island: …….. Oahu

District: …….. Koolaupoko

TMK: …… (1) 4-2-15: 1 (por.), 6 and 8

Permits Required: ……. Zone Change, SMA, NPDES, Grading Permit, Building Permit

Name of Applicant or
Proposing Agency: ……. Kapa'a I, LLC
Address …….. 905 Kalanianaole Highway
City, State, Zip ……. Kailua, Hawaii 96734
Contact and Phone …… John King, (808) 853-4768

Approving Agency or
Accepting Authority: …… City and County of Honolulu, Department of Planning and Permitting
Address …….. 650 South King Street, 7th Floor
City, State, Zip ……. Honolulu, Hawaii 96813
Contact and Phone …… Mike Watkins, (808) 768-8044

Consultant ……... Sustainable Design & Consulting LLC
Address ……. P.O. Box 283267
City, State, Zip ……. Honolulu, Hawaii 96828
Contact and Phone ……. Dr. Manfred Zapka, (808) 265-6321

Project Summary:

This Draft EIS was preceded by an EIS Preparation Notice (listed in the July 23, 2010 issue of the Environmental Notice) and by a Draft Environmental Assessment (listed in the January 8, 2009 issue).

The applicant, Kapa'a I, LLC, is proposing to expand its existing 22-acre light industrial park in Kapaa Valley on the windward side of Oahu. This area is currently zoned I-2 Intensive Industrial District. The applicant is seeking I-1 zoning for two adjacent areas now within the P-2 General Preservation District – an 11-acre area to the west, by the H-3 Freeway, and a 44-acre parcel to the east, just across Kapaa Quarry Road from Kawainui Marsh.

The proposed Kapa'a Light Industrial Park would be developed incrementally over a span of 18 years. Short-term construction impacts during this period would include increased vehicular traffic and heavy machinery operation, soil erosion, noise and air pollution, and water runoff. There would also be long-term impacts, mainly on vehicular traffic, utility systems, utilization of resources, noise levels, local social services and businesses, and visual character and ambiance. The Draft EIS goes beyond the Final EA in providing additional details on the project's anticipated impacts on Kawainui Marsh, traffic, visibility, etc. See also the Appendix.

Copies of letters with comments sent by DEIS stakeholders and responses by Consultant

The following is a list of letters with comments received from stakeholders::

No.	Date of letter	Letter from Agency or Organization
	4/21/2011	**Accepting Agency: City & County of Honolulu – Department of Planning and Permitting**
1	2/3/2001	Board of Water Supply
2	2/3/2001	City & County of Honolulu – Department of Parks and Recreation
3	2/10/2011	Honolulu Police Department
4	2/16/2011	Honolulu Fire Department
5	2/22/2011	State Department of Health – wastewater branch
6	2/24/2011	City & County of Honolulu – Department of Facility Maintenance
7	3/7/2011	USA Corp of Engineers
8	3/12/2011	Kailua Neighborhood Board No. 31
		State Department of Land and Natural Resources (DLNR); divisions
9	3/21/2011	DLNR Land Division
	1/27/2011	DLNR Division of State Parks (received as attachment to Letter No. 9
	1/27/2011	DLNR Engineering Division (received as attachment to Letter No. 9)
10	4/19/2011	DLNR – Aquatic Resources
11	3/22/2011	City & County of Honolulu – Department of Design and Construction
12	3/24/2011	The Lani-Kailua Outdoor Circle
13	3/25/2011	Water Resources Research Center – Environmental Center
14	3/28/2011	Hawaii's Thousand Friends
15	3/28/2011	State Department of Hawaiian Affairs
16	3/25/2011	State Office of Environmental Quality Control

No.	Date of letter	Letter from Agency or Organization
17	3/25/2011	Unites States Department of the Interior
18	3/25/2011	Department of Transportation Services
19	3/30/2011	State Department of Transportation (DoT)
20	4/06/2011	State Department of Transportation (DOT) follow up to letter 3/30/2011
21	8/31/2011	State Department of Transportation (DOT); response to request by applicant

Copies of letters with comments sent by DEIS stakeholders and responses by Consultant

The copies of the letter with comments from the accepting agency, City and County of Honolulu, Department of Planning and Permitting (DPP), as well as of 19 letters by stakeholders with comments to the DEIS are presented in the following.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
TELEPHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

Letter from Accepting Agency DPP

PETER B. CARLISLE
MAYOR

DAVID K. TANOUE
DIRECTOR

JIRO A. SUMADA
DEPUTY DIRECTOR

2011/ELOG-121 (mw)

April 21, 2011

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Draft Environmental Impact Statement for Kapa'a Light Industrial Park, Kailua, Koolaupoko, Oahu, TMK 4-2-15: 1 (por.), 6 and 8

As the accepting authority for your Draft Environmental Impact Statement (EIS) on the proposed Kapaa Light Industrial Park project in Kapaa Valley, we have the following comments.

The Final EIS should clarify whether or not your project will need to build a centralized private wastewater system instead of just more septic tanks, as suggested in the Department of Health comment letter dated February 2, 2011. If such a system is indeed required, then your Final EIS will need to discuss whether or not all industrial lots are to be served by such a system.

Second, please expand Section 4.13, Cumulative Impacts. According to the definition in the State's "Environmental Impact Statement Rules", cumulative impacts result not only from all the known or anticipated projects but also from all past actions. Thus, summary paragraphs are needed to explain such matters as: (1) the future combined stream flow in Kapaa Stream due to both existing conditions and your project's drainage improvements (comparable to Section 3.2.3), and (2) future traffic and road-safety conditions along the entire length of Kapaa Quarry Road.

Third, Chapter 6 needs to be totally rewritten. Only at the EA stage is there a requirement to discuss the significance criteria. We recommend that this chapter instead be a summary of key findings on required subjects such as: (1) the relationship between short-term uses and long-term productivity, (2) irreversible and irretrievable commitments of resources, (3) unavoidable adverse impacts, (4) cumulative and secondary impacts, (5) key mitigation measures, and (6) unresolved issues.

Another problem is that Chapter 6 misuses the term "significant impacts" in its attempt to claim that the project will be largely free of adverse environmental impacts. This term actually refers to the impacts before mitigation. Please acknowledge these impacts while proposing mitigation measures to minimize them. (See the EIS Rules, Subchapters 100-200-17 (L&M) and 11-200-23 (B).)

Fourth, we have the following technical concerns:

- The first paragraph of Chapter 1 should mention that the preparation of this EIS has been triggered by two needed permits: (1) the anticipated zone change, and (2) a Special Management Area Permit for the lower project area. This should also be stated in the Executive Summary.
- When discussing the social and utility-use impacts of future industrial tenants, it should be stated that only some industrial floor space will be occupied by businesses moving from elsewhere. We continue to question your assumption on page 298 that up to 70 percent of new floor space will be occupied by companies moving from elsewhere; our reading of the market study is that this proportion is likely to be no more than 24-40 percent. This also affects statements on pages 216 and 304 which claim that the project's impacts on islandwide energy consumption will be positive, despite the fact that the project at full buildout will use 2½ times more energy than today.
- In Section 4.14.9, if there are no existing utility poles along the section of Kapaa Quarry Road running from the project site to Kamehameha Highway (as Section 3.7.3 implies), then the EIS should discuss the impacts on the marsh of possibly constructing a new electrical power line along that route.
- In Section 4.12.2 and other discussions of demographic and employment impacts, you need to follow each introductory sentence regarding how the region's future population is projected to decline with another sentence stating that there are two separate causes of this decline: (1) fewer children being born and also more deaths due to higher numbers of elderly (a smaller or negative natural increase), and (2) more adult children and other residents moving out (also known as net outmigration, which is already discussed).
- In Section 3.11.1, you should replace all regional population data for the island's seven judicial districts with data for our eight official DP areas. You should also use our official data on the population of Kailua, Kaneohe, and the marine corps base. Also, you should refer to the year 2000 in the titles of Figures 3-42 and 3-43. All of this data is attached.
- In Section 6.1, part 12, we question your statement that "the Kapa'a Valley has an industrial appearance". Given the great amount of open space visible when looking up into the valley and given how well camouflaged the three most visible uses are – your existing industrial park, the City's refuse transfer station, and the green-waste facility on your project site's lower area – we see the valley as having more of an open-space and rural appearance from most vantage points.

Should you have any questions, please contact Mike Watkins of our staff at 768-8044.

Very truly yours,

for David K. Tanoue, Director
Department of Planning and Permitting

DKT:js
Attachment
Kapaa\DEIS comment

Population Estimates by Development Plan Area, 1980-2035

DP/SCP	Existing				Projected					
Area	1980	1990	2000	2005	2010	2015	2020	2025	2030	2035
PUC	417,240	432,023	419,333	417,336	418,664	427,429	432,487	437,818	442,994	447,715
Ewa	35,523	42,931	68,718	82,595	94,504	107,234	123,101	137,721	151,332	164,556
CO	101,685	130,526	148,186	157,008	158,965	161,999	166,078	171,595	177,029	181,423
EH	43,213	45,654	46,735	49,229	49,129	51,119	51,238	50,400	49,600	48,843
K'poko	109,373	117,694	117,999	117,004	114,209	115,631	116,118	114,975	113,243	111,594
K'loa	10,983	14,263	14,546	14,482	14,156	14,592	14,899	15,150	15,336	15,452
NS	13,061	15,729	18,380	18,118	17,724	18,325	18,770	19,126	19,375	19,517
Waianae	31,487	37,411	42,259	43,923	44,490	45,518	46,776	47,847	48,667	49,217
TOTAL	762,565	836,231	876,156	899,695	911,841	941,847	969,467	994,632	1,017,576	1,038,317

Source: 1980 to 2000, U.S. Census Bureau counts and DPP counts and estimates; 2005, DPP estimate (September 2009); 2010 to 2035, DBEDT & DPP projections (September 2009)

Year 2000 Estimates for Subareas of Koolaupoko

Subarea	Population
Kailua	41,607
Kaneohe	40,013
Mokapu*	11,827
Kahaluu	14,391
Waimanalo	10,161
TOTAL	117,999

*the marine corps base
Source: DPP estimate (September 2009)

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Response to letter from Accepting Agency DPP

September 14, 2011

Mr. David K. Tanoue, Director
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813
Attn.: Mr. Mike Watkins, Planner

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated April 21, 2011
Your Reference 2011 / ELOG-121 (mw)

Dear Mr. Tanoue,
We would like to thank you and your staff, especially Mr. Mike Watkins, for the valuable support and helpful comments during the entire environmental review period.

Beginning on the next page, we provide our responses to the comments and suggestions in your letter of April 21, 2011.

If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or email at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

Your comment page 1, 2nd paragraph	Clarification of the comments submitted by the Department of Health (DoH) Wastewater Branch in the February 2, 2011 (the correct date is February 22) letter of whether a centralized private wastewater system needs to be installed instead of adding more septic tanks.
Our response	Discussion and communication with DoH Wastewater Branch following the referred DoH letter have provided the clarification that your letter requested. A major issue of the DoH comments is the number of individual wastewater systems (IWS) that can be built on the proposed site. DoH interpreted that the maximum number for the entire site is 15 IWSs, or 15,000 gallons per day of total wastewater volume; but actually the maximum number for each land parcel is 15 IWS. Since the proposed development will be built on three land parcels, TMK 4-15-2:001 (portion of), 006 and 008, the total maximum number would be 45, considering that each parcel would have the maximum number of IWSs on it, which will not be the case. Therefore, the proposed site development approach can use IWSs as the means of onsite wastewater treatment and does not have to implement a centralized private wastewater system. The onsite wastewater systems will use two different types of septic systems in the upper and lower portion of the site. In the upper portion of the site, which includes the two land parcels TMK 4-2-15:001 (portion of) and 008, conventional septic systems will be used with each system consisting of a septic tank and a leach fields. The lower portion of the field will use a more advanced septic system which has significantly higher pollutant removal rates than conventional septic systems. This more advanced septic system will include a septic tank effluent pumping (STEP) system that conveys the effluent of each septic tank to a system for further treatment and disposal in leach field or sub-surface irrigation. The advanced septic system in the lower portion of the proposed site is selected since the point of injection of the treated wastewater is closer horizontally to the receiving waters and vertically to saturated or impermeable soil layers.

	The FEIS states the fact that IWSs are permissible wastewater treatment process for the proposed site and that no centralized private wastewater treatment plant will be required by DoH.
Your comment page 1, 3rd paragraph	Expand Section 4.13, Cumulative impacts in accordance with your recommendations
Our response	We have deleted the statement in section 4.13 which stated that cumulative impacts do not need to be addressed in the EIS. We have added a short discussion in Section 4.13 about the type of cumulative impacts addressed in the FEIS. We have added a more comprehensive discussion of cumulative impacts in Chapter Six.
Your comment page 1, 4th paragraph	Totally rewrite Chapter 6, omit the discussion of significance criteria and provide a summary of key findings on subjects that you delineate in your letter
Our response	We have rewritten Chapter 6 in accordance with your letter and recommendation.
Your comment page 1, 5th paragraph	Your suggestion to acknowledge “significant impacts” in Chapter 6 as impacts that are present before mitigation.
Our response	We have rewritten Chapter 6 in accordance with your letter and recommendation.
Your comment Techn. Concern page 2, 1st paragraph	Your suggestion that we indicate two permits as triggers for EIS
Our response	We will add language in Chapter 1 and Executive Summary
Your comment Techn. Concern page 2, 2nd paragraph	Your suggestion (A) that we change our statement on page 298 about the percentage of businesses that move from elsewhere to the region; your suggestion (B) that we change our assumption that the project would

have positive impacts on the island-wide energy consumption

Our response

In response to your suggestion (A): We agree with you conclusions and have changed the FEIS accordingly.

In response to your suggestion (B): We agree with you conclusions that the island wide use of energy will not be reduced but will increase since new business activities occupy new industrial space. The fact that the warehouse structure in the proposed light industrial park will use energy saving technologies will lessen the increase of use of electricity, rather than reduce it.

Your comment
Techn. Concern page 2, 3rd paragraph

Your suggestion that the EIS discusses the impacts on the marsh of possibly constructing a new electric power line along the Kapa'a Quarry Road.

Our response

At this point in the design process it is not clear how and when the electric utility will address the need to implement new capacity to the Kapa'a Valley.

The applicant has been installing a substantial capacity of photo-voltaic (PV) on the existing warehouses and also plans to add PV on future structures in the proposed development. Plans of how much PV capacity will be added are still being finalized by the applicant in cooperation with the electric utility.

Based on current developments it is expected that there is no short-term need to add capacity, e.g. a new electric line to the existing electric grid connection.

The electric utility has the final decision to change the supply configuration, e.g. add a new electric line. The impacts of such activity to the environment and community need to be addressed by the electric utility after the decision has been made if and how the connection to the supply to the Kapa'a valley from the island wide electric grid will be configured in the future.

We have added language to Section 3.7.3 to emphasize that the assertion by Hawaiian Electric Company (HECO) about the need to add electric capacity from Kalanianaole Highway by means of a new line is

based on an older assessment by HECO. The older assessment by HECO did not consider more recent developments, such as the addition of significant additions of PV power in the existing warehouse development and the commitment by the applicant to add even more PV capacity on the planned warehouses in the upper and lower portion of the proposed industrial park. Furthermore, the older assessment of the need to add new capacity did not include the commitment of the applicant to implement higher energy savings through adoption of low-impact development technologies and the declared goal to attain LEED Silver certification for the proposed industrial park.

We have also added language to Section 4.8.4 to indicate that a more detailed assessment of impacts from installation of utility poles would have to be carried out by the utility. As discussed with your office, the applicant will assess the actual PV capacity to be added to the development in conjunction with the zone change request.

Your comment Techn. Concern page 2, 4th paragraph	Your statement about the need to elaborate on future demographic and employment impacts in the Koolaupoko region.
Our response	We have used in the FEIS your data to describe the expected demographic changes through 2030 that is provided in your letter.
Your comment Techn. Concern page 2, 5th paragraph	Your statement about the need to replace the population data from the seven judicial districts with data for the eight official DP areas.
Our response	We have used the demographic data that you provided in your subject letter. We have created three new figures to replace the older Figures 3-42, 3-43 and 3-44 to reflect the changed data. We have created a new table to indicate the population growth rates within the DP areas in accordance to your data. We have edited the text to reflect the changed data.

Your comment Techn. Concern page 2, 6th paragraph	Your suggestion that the Kapa'a valley has more open-space and rural appearance rather than an industrial appearance that was suggested in our text.
Our response	We agree that there is a lot of open-space in the Kapa'a Valley and that the valley depicts a rural appearance from many vantage points. We have changed the text at the referred locations in the text of the FEIS accordingly. We fully agree with the need to "camouflage" the new structures, or hide them behind a screen of vegetation to the extent possible. We have indicated several visual impacts mitigation measures that would be used. Some of the measures that will qualify as visual impact mitigation will also serve functions delineated under the sustainable design approach of the proposed development. For example, the vegetated buffer zones around the lower portion of the proposed site will be part of the restored habitat area that will be developed around the development footprint. This area will be open and vegetated space, which will be planted with native and adapted plants, such as tall trees and bushes, and which will be irrigated with harvested rainwater and recycled wastewater. Trees inside the development footprint and next to the buildings will provide shade (e.g. reduce non-roof heat island effect), reduce noise and will evaporate captured stormwater (e.g. part of the non-structural BMPs).

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

PETER B. CARLISLE, MAYOR

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Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager

February 3, 2011

Letter No.1

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Your Letter Dated January 24, 2011 Requesting Comments on the Draft Environmental Impact Statement for the Proposed Kapaa Light Industrial Park in Kailua, TMK: 4-2-15:1, 6, 8

Thank you for the opportunity to comment on the proposed light industrial park.

The existing water system is presently adequate to accommodate the proposed development. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of your building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

The Board of Water Supply Rules and Regulations require the use of nonpotable water for the irrigation of large landscaped areas, if a suitable supply is available.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

PAUL S. KIKUCHI
Chief Financial Officer
Customer Care Division

cc: Mr. Mike Watkins, Department of Planning & Permitting

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
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Response to letter No. 1

September 14, 2011

Mr. Paul S. Kikuchi, Chief Financial Officer
Board of Water Supply, City and County of Honolulu, Customer Care Division
630 South Beretania Street
Honolulu, HI 96843

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to the BWS letter dated February 3, 2011

Dear Mr. Kikuchi,
Thank you for your comments in your subject letter.

We offer the following responses to your comments and recommendations:

- The applicant will submit all required applications in time before commencement of construction and will pay the applicable fees.
- As per you instructions, the applicant will coordinate the fire protection requirement with the Honolulu Fire Department.
- The applicant will use sustainable design standards for the building, site development and landscaping and will extensively use non-potable water as well as reclaimed wastewater for irrigation. A part of the proposed development will be designed and constructed in accordance to requirements to achieve LEED Silver certification upon completion of construction. For about 23 acres of the proposed development, which includes about 10 acres of vegetated open and vegetated open space and restored habitat, it is planned that no potable water will be used for irrigation of landscaped areas.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or email at sustainabledc@gmail.com. Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

KAPOLEI HALE, 1000 ULUOHIA STREET, STE. 309 • KAPOLEI, HAWAII 96707
Phone: (808) 768-3003 • FAX: (808) 768-3053 • Internet: www.honolulu.gov

PETER B. CARLISLE
MAYOR

GARY B. CABATO
ACTING DIRECTOR

ALBERT TUFONO
DEPUTY DIRECTOR

Letter No.2

February 3, 2011

Mr. Manfred Zapka, PhD, PE, LEED-AP, CEM
Principal and Senior Consultant
Sustainable Design and Consulting LLC
P. O. Box 283267
Honolulu, Hawaii 96828

Dear Mr. Zapka:

Subject: Draft Environmental Assessment
Kapaa Light Industrial Park in Kailua, Oahu, Hawaii

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the Kapaa Light Industrial Park in Kailua.

The Department of Parks and Recreation has no comment, as the proposed project will not impact any program or facility. You may remove us as a consulted party to the balance of the EIS process.

Should you have any questions, please contact Mr. John Reid, Planner, at 768-3017.

Sincerely,

GARY B. CABATO
Acting Director

GBC:jr
(400827)

cc: Mr. Mike Watkins, Department of Planning and Permitting

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
www.sustain-HI.com

Response to letter No. 2

September 14, 2011

Mr. Gary B. Cabato, Director
Department of Parks and Recreation, City and County of Honolulu
1000 Uluohia Street Suite 309
Kapolei, HI 96707

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated February 3, 2011

Dear Mr. Cabato,

Thank you for your comments on our DEIS in your subject letter.

We understand that your department has no comments. As you suggest we will remove you as a consulted party to the remaining EIS process.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or email at sustainabledc@gmail.com. Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

PETER B. CARLISLE
MAYOR

LOUIS M. KEALOHA
CHIEF

DELBERT T. TATSUYAMA
RANDAL K. MACADANGDANG
DEPUTY CHIEFS

OUR REFERENCE DMK-LS

Letter No.3

February 10, 2011

TO: DAVID K. TANOUE, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

ATTN: MICHAEL WATKINS, PLANNER

FROM: LOUIS M. KEALOHA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR KAPA'A LIGHT INDUSTRIAL PARK IN KAILUA, OAHU, HAWAII

Thank you for the opportunity to review the subject project.

During the construction phase as well as after its completion, this project will have a negative impact on the services provided by the Honolulu Police Department. The increase in traffic will cause a rise in the number of calls for service received by our department. The main roads surrounding the site are already taxed to their capacity. The increase in traffic may be more than these streets can handle.

Kapa'a Quarry Road is desperately in need of repair. The road is long and winding with hills, dips, and limited visibility. It has been the site of traffic fatalities in the past due to vehicles using it as a raceway.

We would like to recommend that the contractor call Major Susan Ballard of District 4 at 247-2166 to review the traffic plans after they have been completed.

If there are any questions, please have a member of your staff contact Major Ballard at the number above.

LOUIS M. KEALOHA
Chief of Police

By
DAVE M. KAJIHIRO
Assistant Chief of Police
Support Services Bureau

cc: Dr. Manfred Zapka, Sustainable
Design and Consulting, LLC

Serving and Protecting With Aloha

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
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September 14, 2011

Response to letter No. 3

Mr. Louis M. Kealoha, Chief of Police
Police Department, City and County of Honolulu
801 South Beretania Street,
Honolulu, Hawaii 96813
Attention: Mr. Dave M. Kajihiro, Assistant Chief of Police

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated February 10, 2011
Your reference: DMK-LS

Dear Mr. Kealoha,

Thank you for your comments in your subject letter. We also appreciate your department's willingness to discuss your comments and concerns further in the meeting we held in early June 2011.

We offer the following responses to your comments and recommendations:

We understand and agree with you that the probability of traffic incidents increases with increases in traffic volume on the roadways adjacent to and at intersections directly affected by the proposed project. This will have an impact on services provided by the Honolulu Police Department as the HPD receives more calls for assistance.

In a follow-up communication with HPD, it was discussed that high rates of serious accidents on the Kapa'a Quarry Road occur at night or during off-peak hours, when the quarry road is used as a "raceway". These time periods of the day or week are not likely the same time periods when most of the employees and customers of companies in the proposed light industrial park would use the road. Therefore, these serious traffic accidents cannot directly attributed to the proposed industrial development in the Kapa'a Valley, and we think that the rate at which serious traffic accidents would increase would be not at the same rate as the traffic increases due to the proposed project. Nevertheless, the probability of increased traffic accidents needs to be seriously considered and we have changed the text of the FEIS accordingly to include your comments.

The FEIS contains a traffic impact analysis report (TIAR) that predicts future traffic volumes and resulting level of service (LOS) for the roads and intersections that are directly affected by the proposed project. The results of the current TIAR indicate that the LOS levels of the affected roads and intersections would decline but that traffic mitigation measures would not be required before project midpoint, which is anticipated for 2016 or 2017. At project midpoint a new, updated TIAR, including a new traffic count, will be performed in order to identify and select effective traffic mitigation measures to be implemented before the project reaches full build-out.

As state in the FEIS, in the new Section Six “unresolved issues”, the State Department of Transportation (DoT) has requested that the current TIAR be revised. The DoT has agreed that the revisions to the current TIAR can be carried out in conjunction with zone change request. The revisions to the current TIAR will use news project design information to be developed in the updated project Masterplan for the zone change request.

Traffic analysis on the basis of LOS does not necessarily address all adverse traffic conditions on the Kapa’a Quarry Road that can affect road safety. As part of the Masterplan for the zone change an analysis of the current condition will identify what improvements could be selected to provide mitigation of the conditions which, as you state, are in desperate need of repair. As the project moves forward to the zone change application the applicant will be working with the HPD to develop the solutions that are best for the community and the project.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

PETER B. CARLISLE
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ROLLAND J. HARVEST
DEPUTY FIRE CHIEF

Letter No.4

February 16, 2011

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Draft Environmental Impact Statement
Kapa'a Light Industrial Park
Kailua, Oahu, Hawaii

In response to your letter of January 24, 2011, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from a fire apparatus access road as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1.)

2. Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

   On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the

exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2, as amended.)

3. Submit civil drawings to the HFD for review and approval.

Should you have any questions, please call Acting Battalion Chief Gary Lum of our Fire Prevention Bureau at 723-7152.

Sincerely,

KENNETH G. SILVA
Fire Chief

KGS/KT:bh

cc: Mike Watkins, Department of Planning and Permitting

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Response to letter No.4

September 14, 2011

Mr. Kenneth G. Silva, Fire Chief
Honolulu Fire Department, City and County of Honolulu
636 South Street
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated February 13, 2011

Dear Chief Silva,

Thank you for your comments in your subject letter. We offer the following responses to your comments and recommendations:

The applicant will comply with the requirements stated in your letter as follows:

1. Fire apparatus access roads will be provided for every facility, building or portion of the building in accordance with the stated 1997 Uniform Fire Code

2. The existing industrial warehouse development is equipped with a fire water supply, including a 10-inch fire main that connects the fire water systems of the existing industrial development with the Board of Water Supply water main. The required firewater volume is available as required by local code. The fire water supply system of the proposed light industrial park will connect to the existing fire water supply using lateral mains. Sufficient fire hydrants will be installed in accordance with the stated 1997 Uniform Fire Code.

3. The applicant will submit civil drawings to the HFD for review and approval.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
ACTING DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

LUD 1 4 2 015 001-ID607
DEIS Kapaa Light Ind Park

February 22, 2011

Letter No.5

Mr. Manfred Zapka, PhD, PE, LEED-AP, CEM
Principal and Senior Consultant
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Mr. Zapka:

Subject: Draft Environmental Impact Statement (DEIS)
Kapaa Light Industrial Park in Kailua, Oahu, Hawaii
905 Kalanianaole Highway, Kailua, Oahu, Hawaii 96734 TMK (1) 4-2-015: 001

Thank you for allowing us the opportunity to review the subject document which proposes development of the Kapaa Light Industrial Park in Kailua, Oahu. We have the following information to offer.

The subject project is located in the critical wastewater disposal area as determined by the Oahu Wastewater Advisory Committee. We do not have any individual wastewater system (IWS) information on file for this property and the property is also not connected to the City and County of Honolulu sewer service system. However, we understand there are existing warehouses on the property.

Hawaii Administrative Rules, Chapter 11-62, Wastewater Systems, section 11-62-31.1(2)(B) states that for developments involving buildings other than dwellings, the total wastewater flow of the development shall not exceed 15,000 gallons per day. Based on the information provided in the document, it appears that the wastewater flow for the entire development may exceed 15,000 gallons per day. The installation of septic tank systems may not be allowed once design flows exceed 15,000 gallons per day. In other words, we cannot approve more than fifteen (15) IWSs designed at 1,000 gallons per day for the entire development. This number will include any existing septic tank systems and cesspools that are currently installed at the development site. A wastewater treatment plant may be required to be installed to handle the additional flows generated from the development.

Please provide our office with an inventory of the existing cesspools and septic tank systems located on the subject property. The information should include all of the businesses that the IWSs are currently serving and the estimated wastewater flows being discharged into each of the IWSs. A plot plan of the existing warehouses and locations of all existing IWSs should also be provided. Existing Cesspool Information Forms should be filled out and submitted to our office for documentation of all existing cesspools. As-built drawings of all existing septic tank systems should also be submitted. An Existing Cesspool Information Form is attached for your use. For the new proposed development, please provide the design calculations for the projected wastewater flows.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at 586-4294 or fax to 586-4300.

Sincerely,

MARSHALL LUM, P.E., ACTING CHIEF
Wastewater Branch

LM:lmj

Attachment

c: DOH's Environmental Planning Office (EPO 11-006)
Mr. Mike Watkins, C&C of Honolulu, Dept. of Planning & Permitting

Sustainable Design & Consulting LLC
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September 14, 2011

Response to letter No.5

Mr. Marshall Lum, Acting Chief
State of Hawaii, Department of Health, Wastewater Branch
P.O. Box 3378
Honolulu, Hawaii 96801-3378

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated February 22, 2011
Reference LUD 1 4 2 015 001-ID607 DEIS Kapa'a Light Industrial Park

Dear Mr. Lum,

Thank you for your comments in your subject letter.

We offer the following responses to your comments and recommendations:

In the follow-up meeting to your letter at the Department of Health – Wastewater Branch (DoH-WWB) office on March 24, 2011, the following comments were discussed with you staff and the following conclusions were reached:

1. We confirm the DoH-WWB statement that the site is not connected to the City and County of Honolulu sewer service systems, and that there are existing warehouses on the property, which have individual wastewater systems (IWS).

2. DoH-WWB indicated that the 15,000 gallon per day limit of total wastewater flow, stated in the letter dated February 22, 2011, applies to one land parcel only. The proposed site, however, will have structures on three land parcels (e.g. TMK 4-2-15:001 (portion of), 006 and 008). Therefore the overall limit for the three parcels would be 45,000 gallons per day (e.g. 3 x 15,000 gpd) of total wastewater flow.

3. The anticipated wastewater flow will be significantly less than the 45,000 gpd limit flow rate and will therefore remain well under the limits. Therefore, the applicant will be able to use less than the allowable maximum of 15 IWSs on each land parcel to treat the wastewater from both the existing and the proposed industrial development.

4. As we indicated to you, the applicant will use water saving fixtures (i.e. such fixtures that comply with the EPA WaterSense requirements) in order to lower the water consumption in the buildings, which will result in lower wastewater volumes to be disposed of through the individual wastewater systems (IWS). The limit of daily wastewater flow into individual IWSs is 1,000 gpd as stated in the applicable State regulations.

5. Based on the information presented in our concept design of the proposed site (described in the DEIS) and discussed at the meeting, DoH-WWB would accept an "alternative" onsite wastewater treatment system in the lower portion of the proposed site that would include alternative septic system components. The objectives of using an "alternative septic system" is to significantly improve the effluent quality of the septic tanks by adding additional aerobic, filtration and denitrification treatment processes (e.g., significant reductions in BoD, nutrient, coliform bacteria, and TSS) before the effluent is released into an underground injection field or used in irrigation. The proposed concept design for the development in the lower portion of the site considers underground irrigation methods, in accordance with applicable State regulations of gray water and treated wastewater disposal in Hawaii.

6. DoH-WWB will be receiving documentation (including as-built drawings) of existing cesspools and septic tank systems located at the three parcels, as requested in subject letter.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Uluohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

PETER B. CARLISLE
MAYOR

GEORGE "KEOKI" MIYAMOTO
ACTING DIRECTOR

IN REPLY REFER TO:
DRM 11-117

Letter No.6

February 24, 2011

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Draft Environmental Impact Statement (DEIS)
Kapaa Light Industrial Park, Kailua, Oahu, Hawaii

Thank you for the opportunity to review and comment on the DEIS dated January 2011 for the proposed Kapaa Light Industrial Park project.

The majority of the proposed improvements will be located within privately-owned property and will have negligible impact on our facilities and operations.

It is our understanding that the proposed on-site project roadways, parking areas, drainage system, storm water detention basins and other roadway improvements will be privately owned and maintained and will not be dedicated to the City.

Should you have any questions, please call Charles Pignataro of the Division of Road Maintenance, at 768-3697.

Sincerely,

George "Keoki" Miyamoto
Acting Director

c: Department of Planning and Permitting – (Attn: Mike Watkins)

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
www.sustain-HI.com

September 14, 2011

Response to letter No.6

Mr. George Miyamoto, Deputy Director
Dept. of Facility Maintenance, City and County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, HI 96707

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated February 24, 2011
Reference DRM 11-117

Dear Mr. Miyamoto,

Thank you for your comments in your subject letter. We offer the following responses to your comments and recommendations:

We confirm that the majority of the proposed improvements will be located within privately owned land and will be privately owned and maintained. Furthermore, we confirm that the proposed on-site roadways, parking areas, drainage systems, stormwater detention basins and other roadway improvements will be privately owned and maintained and will not be dedicated to the City and County.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha
Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

March 7, 2011

Regulatory Branch

File Number POH-2010-00186

Letter No.7

Sustainable Design & Consulting, LLC
Attention: Dr. Manfred Zapka
Post Office Box 283267
Honolulu, Hawaii 96828

NO PERMIT REQUIRED

Dear Dr. Zapka:

We have received your letter dated January 24, 2011 requesting Department of the Army (DA) review and comment on the Draft Environmental Impact Statement (DEIS) for activities to develop the proposed Kapaa Light Industrial Park at TMKs (1) 4-2-015:008, 001 (portion) & 006 (por.) in Kailua, Island of Oahu, Hawaii.

We have completed our review of the submitted document pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) and have determined the submitted documents accurately identify waters of the U.S., subject to U.S. Army Corps of Engineers (Corps) jurisdiction.

For your information, Section 10 requires that a DA permit be obtained from the Corps prior to undertaking any construction, dredging, or other activity occurring in, over, or under or affecting navigable waters of the U.S. For tidal waters, the shoreward limit of the Corps' jurisdiction extends to the Mean High Water Mark. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredged and/or fill material into waters of the U.S., including wetlands. For tidally influenced waters, in the absence of adjacent wetlands, the shoreward limit of the Corps' jurisdiction extends to the High Tide Line, which in Hawai'i may be approximated by reference to the Mean Higher High Water Mark. For non-tidal waters, the lateral limits of the Corps' jurisdiction extend to the Ordinary High Water Mark or the approved delineated boundary of any adjacent wetlands.

The Kapaa Stream, with end terminus in Kailua Bay (a navigable water), including all adjacent wetlands are as such, waters of the U.S. under the regulatory jurisdiction of the Corps. Based on the information submitted in the DEIS, it appears these waters of the U.S. are not located within the limits of the proposed project boundary for development. We anticipate construction associated with **the proposed development and expansion of the industrial park will not result in the discharge of fill material into waters of the U.S. therefore, a DA permit will not be required.** We advise your client consult with this office prior to undertaking any other construction resulting in the discharge of fill material waterward of the Ordinary High Water Mark of the Kapaa Stream or the below the delineated boundaries of the adjacent wetlands. This determination does not relieve you of the responsibility to obtain any other permits, licenses, or approvals that may be required under County, State, or Federal law for your proposed work.

Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via e-mail at *Jessie.K.Paahana@usace.army.mil*. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

for George P. Young, P.E.
Chief, Regulatory Branch

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
www.sustain-HI.com

September 14, 2011

Response to letter No.7

Mr. George P. Young, P.E., Chief, Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 7, 2011
Reference Your File Number: POH-2010-00186

Dear Mr. Young,

Thank you for your comments in your subject letter.

We offer the following responses to your comments and recommendations:

- We appreciate your concurrence that our documents have accurately identified water of the U.S., subject to the U.S. Army Corps of Engineers jurisdiction.
- We confirm that waters of the U.S., as identified in your letter, are not located within the limits of the proposed development.
- We will advise the applicant to consult with your office prior of undertaking any construction resulting in the discharge of fill material waterwards of the ordinary high water mark of Kapa'a Stream or below the delineated boundaries of adjacent wetlands.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha
Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

KAILUA NEIGHBORHOOD BOARD NO. 31

519 WANAAO ROAD • KAILUA, HAWAII 96734
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET: http://www.honolulu.gov
prentissc001@hawaii.rr.com.

March 12, 2011

Letter No.8

Mr. Mike Watkins
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P O Box 283267
Honolulu, Hawaii 96828

Subject: Draft Environmental Impact Statement
Kapa`a Light Industrial park in Kailua

At the March 3, 2011 Kailua Neighborhood Board meeting the Board approved the following comments on the DEIS.

1. The drainage canal next to the quarry road will be the receiving area for runoff from the industrial park. That canal currently overflows in moderate rain events and during heavy rain Kapa`a Quarry Road is closed due to flooding. To what size will the canal be enlarged to accommodate the new flow from the rooftops and the increased impervious surfaces, as well as the existing deficiency in water storage capacity?
2. The DEIS did not discuss the possibility of the industrial park, proposed and existing, hooking up to the municipal wastewater system. Given the impaired condition of Kapa`a Stream, flooding conditions along Kapa`a Quarry Road and close proximity to Kawainui Marsh, ***a RAMSAR Wetland of International Importance and home to four endangered water birds***, discussion is needed on that alternative. This information must be provided in the FEIS.
3. The DEIS was deficient in its discussion on to what extent the proposed sewage system will remove contaminants including industrial waste. This must be discussed in the FEIS.
4. The DEIS section on view plans did not include the primary views from the H-3 Freeway and other view planes in Kailua. This must be contained in the FEIS.
5. The explanation that the LEED certification is only being sought for the lower 44-acre parcel and not the upper 11-acre parcel because of expenses and paperwork ignores the cumulative impact of the *entire* industrial park, existing and proposed on Kapa`a Stream and Kawainui Marsh. The FEIS must explain, other than costs, why LEED certification cannot be sought for the entire development.
6. The DEIS was silent on re-use of wastewater for the upper portion. Why wasn't water reuse discussed and evaluated for the upper portion of the site?

7. The DEIS states that a more detailed drainage study will be performed to determine the best method of water quality improvements for the upper portion of the site. Why wasn't that study conducted for this DEIS? If this DEIS is accepted will a supplemental EIS be required once such a study is completed?
8. The DEIS did not discuss the possibility of treating and reusing all storm water on site at both the upper and lower parcels instead of discharging into Kapa`a Stream and canal. Could all on-site storm water (both upper and lower) be treated and reused on site?
9. Currently Kapa`a Quarry Road does not have any bicycle lanes or road shoulders for bicyclists to safely ride on. So is it appropriate for the applicant to claim LEED points for on-site bicycle facilities for something that may or may not happen?
10. Kapa`a Quarry Road is already heavily used by heavy trucks going to and from the quarry, transfer station and the existing industrial park. It was recently mentioned that trucks loaded with blue rock from the Kailua/Kaneohe Wastewater Conveyance and Treatment Facilities tunnel through Oneawa Hill would take the rock to the Quarry. The DEIS is silent on the impact of additional heavy trucks on the Kapa`a Quarry Road in general and specifically on the slowly sinking area next to the canal and just below the proposed expansion.
11. Other than traffic counts why wasn't a study conducted on the safety, condition and stability of Kapa`a Quarry Road fronting the project? This information must be in the FEIS.
12. Why wasn't a study conducted on the cumulative impacts from the additional 600 employees by 2026, the estimated visitors to industrial businesses and all users of the road on Kawainui Marsh and the canal? This seems essential and relatively easy since the applicant John King owns the canal and that portion of the road?
13. Kawainui Marsh is already overwhelmed with runoff and leaching from the old landfill (model airplane field) in the marsh, the current landfill at the transfer station, the old landfill next the quarry road (built to capture contaminates), the Quarry, runoff from Kapa`a Quarry Road and H-3 and the existing 27.3 acre industrial park. Yet, the city has not monitored migration of ground water into the marsh since 2000 for toxic matter and whether there have been acute/chronic impacts upon the health and safety of the public, wild life and the environment.
14. Before this DEIS is accepted the applicant should install and pay for monitoring wells mauka of the canal and have government approved mitigation plans in place to prevent contaminants from reaching Kawainui Marsh and Kapa`a Stream. Since all water in Kawainui eventually migrates into Kailua Bay this data and action plan(s) is needed to protect human health, wildlife, Kawainui Marsh and the environment.
15. The DEIS does not evaluate the cumulative impacts of increased impervious surfaces, increased erosion, construction and dewatering activities over a 18 year period, increased deposit of storm and wastewater into Kapa`a Stream and Kawainui Marsh, cumulative visual impacts as industrial warehouses are added, or cumulative impacts from additional cars and trucks as workers and visitors go to the expanded industrial park. To state 'there are no other major projects planned in the vicinity and therefore there should be no significant cumulative impacts' is not sufficient. All the above mentioned impacts must be evaluated for their cumulative effects on air quality, traffic, view planes, Kawainui Marsh and Kapa`a Stream and mitigation in place before this DEIS can be accepted.
16. The DEIS did not adequately address single and cumulative impacts how dust created by earth moving equipment over 15 to 18 years, day-to-day fumes from paint, varnish, aerosol sprays and other solvents used in industrial and commercial activities will be prevented from

migrating into Kapa`a Stream and Kawainui Marsh. The applicant should have put in several air monitoring stations near Kapa`a Stream and Kawainui Marsh to understand how and to where toxic substances will travel. These monitoring stations must be in place, data evaluated and mitigation plans in place before this DEIS can be accepted.

17. The DEIS did not address the load-supporting capacity of either site especially the lower portion which is predominately landfill material. A load bearing study must be completed and evaluated before this DEIS can be accepted.
18. The DEIS does not identify the location of the leaching fields associated with the septic tanks or the capacity of each. This information must be in the FEIS and the sites evaluated for impacts on Kapa`a Stream and Kawainui Marsh.
19. The DEIS failed to conduct a thorough on-site aquatic resource survey describing wetlands, drainage ditches, gulches, gullies and streams and anticipated impacts from project components. This survey must be conducted before the DEIS is accepted.

Charles A. Prentiss, Ph.D
Chairperson

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
www.sustain-HI.com

September 14, 2011

Response to letter No.8

Dr. Charles A. Prentiss, Chairperson
Kailua Neighborhood Board No. 31
519 Wanaao Road
Kailua, Hawaii 96734

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 12, 2011

Dear Dr. Prentiss,

We thank you for your subject letter in which you provided us with your comments on the Draft Environmental Impact Statement.

Our responses to your comments and recommendations are presented in the list starting on page two of this letter. For your convenience and ease of review we quote your specific questions followed by our responses.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

Question 1. *The drainage canal next to the quarry road will be the receiving area for runoff from the industrial park. That canal currently overflows in moderate rain events and during heavy rain Kapa'a Quarry Road is closed due to flooding. To what size will the canal be enlarged to accommodate the new flow from the rooftops and the increased impervious surfaces, as well as the existing deficiency in water storage capacity?*

Answer to question 1. There are currently no plans to change the dimensions of the canal. Under the proposed design for the lower portion of the project site, e.g., the portion of the project that is adjacent to the drainage canal, the canal remains outside the development site boundary of the project. Therefore the geometry of the canal will not be altered, except for some minor construction to install the new stormwater release pipe or swale.

At present the canal receives seepage from the upper areas (e.g. the lower portion of the site) as well as some volume of surface runoff from the adjacent roadways either as subsurface infiltration or surface flow, respectively. This drainage situation is delineated in the watershed hydrological model developed and analyzed by the DoH (DoH 2007) as well as from qualitative onsite observation.

Under the Preferred Alternative less water would be flowing into the drainage canal during moderate or heavy rain events. During moderate rain events a significant portion of the rainwater would be harvested from the rooftops and sections of impermeable roads and stored in below ground cisterns to be used for irrigation on approximately eight acres of restored habitat that surrounds the development footprint of the lower portion of the site as well as inside the development. Therefore a significant portion of the precipitation would be applied to vegetated areas, and water would also be lost through evapotranspiration.

At the present time, the highly pervious gravel surface of the landfill area results in rapid infiltration of a larger portion of precipitation and little is lost to evaporation. Under the proposed drainage systems a detention pond would be installed to reduce high discharge flow rates and release stormwater over a period of 24 to 48 hours after the rain event. This structural BMP would alleviate flooding of the canal and related impacts to the quarry road. In heavy rain events water flow in the Kapa'a Stream increases many times above the base flow rate, resulting, at times, in flooding of the areas close to the culvert under the quarry road. The proposed stormwater management system would alleviate the flood occurrence resulting from typical rain events, flooding of the lower sections

of the Kapa'a Stream can be attributed to heavy rain events when high discharge resulting from the entire watershed hydrology and not only to the proposed site requires appropriate discharge into the adjacent wetland area.

While the proposed drainage system of the preferred alternative would alleviate the currently observed flood events in the vicinity of the drainage canal there might be measures to alleviate flooding even more by modifying the canal in the confluence of the canal with the Kapa'a Stream. It has been observed that the canal bed contains significant deposits just upstream of the confluence that impede discharge of water from the canal to the Kapa'a Stream.

Alterations of the any stream bed in the vicinity of the proposed site, including the drainage canal, are not intended or anticipated within the scope of the propose project.

Question 2. *The DEIS did not discuss the possibility of the industrial park, proposed and existing, hooking up to the municipal wastewater system. Given the impaired condition of Kapa'a Stream, flooding conditions along Kapa'a Quarry Road and close proximity to Kawainui Marsh, a RAMSAR Wetland of International Importance and home to four endangered water birds, discussion is needed on that alternative. This information must be provided in the FEIS.*

Answer to question 2. The FEIS includes a discussion of why onsite wastewater treatment is preferred. The possibility of a forced sewer that conveys wastewater from the proposed site to the municipal wastewater treatment plant was initially considered but not pursued further, since on-site wastewater treatment was found to result in no significant impacts. The selected onsite wastewater treatment technologies selected are especially environmentally friendly since they are part of a comprehensive water management approach of the sustainable design for the proposed project. With regard to wastewater treatment, the preferred alternative uses a comprehensive wastewater management approach as part of the LEED Silver certification plan that comprises the use of non-potable water for sewage conveyance and the onsite infiltration of all reclaimed wastewater.

The Preferred Alternative includes the use of a septic tank effluent pumping (STEP) system in the lower portion of the proposed project site to convey the effluent of approximately 8 to 10 septic tanks near individual warehouses to two to more alternative septic systems, which would be located at the perimeter of the development footprint. These alternative septic systems would feature advanced wastewater treatment process consisting of

recirculating sand filters to treat the septic tank effluent using aerobic decomposition, filtration and adsorption processes. An alternative septic system would also include an anaerobic pump well that receives the effluent from all connected septic tanks as well as the discharge of the recirculating sand filters. Since the pump well has sufficient organics (from the effluent of the septic tanks) as well as sufficiently nitrification of the effluent in the upstream sand filter, the pump well can functions as an effective denitrification process chamber. The alternative septic systems would thus remove significantly more nutrients than can be achieved in regular septic systems. Most of the wastewater in the alternative septic systems is circulated over the sand filter and a small portion of the circulating wastewater is continuously withdrawn from the systems and is discharged to below ground irrigation areas. As described in the FEIS, the effectiveness of removal of BoD, TSS and nutrients in the alternative septic systems is sufficient to ensure safe infiltration and subsequent release to the adjacent receiving waters (e.g. Kapa'a Stream and wetland areas). The FEIS elaborates on the high achievable removal rates for the indicated pollutants of such systems, which are confirmed by the EPA (see EIs for references).

The alternative of a forced wastewater main serving the proposed project would pump raw sewage to the municipal sewer system. At the point of injection into the municipal sewer systems, the wastewater from the proposed development would represent a significant point source of most likely anaerobic wastewater volumes. The forced wastewater main would require a significant amount of energy during operation and would deprive the area at the site of a significant volume of reclaimed wastewater for irrigation purposes. The onsite wastewater treatment and usage of reclaimed wastewater on-site can be considered as the preferred solution to treat the wastewater from the proposed development in an environmentally responsible way.

Therefore the alternative of a forced main from the proposed site to the closest or most appropriate take-over-point (TOP) of the municipal system is not selected.

Question 3. *The DEIS was deficient In Its discussion on to what extent the proposed sewage system will remove contaminants including industrial waste. This must be discussed in the FEIS.*

Answer to question 3. The type of wastewater that will be admitted into the on-site wastewater system will be wastewater suited for typical septic systems; e.g. building occupants will be advised not to discharge harmful agents and objects that

could clog the septic system. As is presently the established procedure in the existing warehouse development, tenants are required to discharge wastewater containing harmful substance in an environmentally and occupationally safe way. For example, waste water, which contains waste oil or grease (e.g. from motor washing or car maintenance areas) needs to be collected in a receiving and storage tank that has effective oil separation capabilities, before the treated water can be safely discharged while the separated oil and grease is separately disposed of.

Question 4. *The DEIS section on view plans did not include the primary views from the H-3 Freeway and other view planes in Kailua. This must be contained in the FEIS.*

Answer to question 4. A comprehensive visual impact analysis is provided in Appendix 8 of the DEIS. The visual impact analysis presents an assessment of primary views from the H-3 and other view planes in Kailua. The assessment uses eight prominent view planes at roads, public places and two Heiaus to conduct a thorough analysis of visual impacts from the proposed development. The visual impact assessment of the FEIS was appended to incorporate one additional viewplane from the trail along the flood control levee. The appended visual impact analysis report is presented in the FEIS.

Question 5. *The explanation that the LEED certification is only being sought for the lower 44-acre parcel and not the upper 1-acre parcel because of expenses and paperwork ignores the cumulative impact of the entire industrial park, existing and proposed on Kapa'a Stream and Kawainui Marsh. The FEIS must explain, other than costs, why LEED certification cannot be sought for the entire development.*

Answer to question 5. The primary objective of the applicant is to concentrate the implementation of sustainable building and site development to the lower portion of the site which is directly adjacent to environmentally sensitive areas, such as the Kawainui Marsh and the designated wetland area in the Kapa'a Stream corridor. The LEED certification approach of the project has two key objectives:

> Objective 1: To develop and implement an integrated systems approach of low impact development technologies to mitigate those impacts of the proposed project that need foremost impact mitigation. At the top of the list of impacts are water related impacts, due to the close proximity to the marsh and wetland areas; followed by other impacts such as

reduction of light pollution and reduction of traffic through fostering alternative modes of transportation. The proposed sustainable design approach of the proposed project that will satisfy the requirement for LEED Silver certification has therefore strategically selected low impact development measures for optimized impact mitigation.

Objective 2: The LEED certification goal of "Silver" is a significant commitment of the applicant to develop in a way that supports the "Triple Bottom Line", which is to optimize and balance benefits to the environment, the community and the economy. With committing to developing the site according to LEED Silver certification requirements the applicant is pursuing a third party review of design and construction that the targeted impact mitigation strategy is indeed implemented. Thus, the community can rely on more than verbal commitment of "developing green", to make sure that the project will indeed be developed in accordance to low impact development goals.

Under LEED certification standards the applicant can choose which credit categories will be used to arrive at the required number of credit points for the LEED Silver certification. As mentioned earlier, the choice of credit points in the LEED certification strategy of the proposed project, however, concentrates on those credit points which will result in the mitigation of impacts that are most important for the adjacent wetland and marsh areas. For the lower portion of the proposed site, the most immediate and important impacts to the marsh are water related. Mitigating water related impacts in the lower portion of the site requires using more advanced green building and site development technologies and methods than the upper portion of the site. This is due to the following facts:

- The vertical and horizontal distance from the point of injection of the septic leach fields to saturated or impermeable soil layers and the receiving waters, respectively, is significantly larger in the upper portion. In the lower portion of the site the vertical and horizontal distances are smaller and therefore removal rates of pollutants in the septic tank effluent must be thoroughly treated by effective mitigation before the wastewater is released into the soil. The advanced septic systems of the on-site wastewater treatment systems in the lower portion of the site will ensure that risks of contamination by organic pollutants, suspended solids and nutrient in the effluent will be effectively mitigated.
- As part of the sustainable design approach of the development footprint within the lower portion of the proposed site will be surrounded by several acres of open land that will be upgraded to

restored habitat conditions by using native or adapted plants. Irrigation of selected parts of the restored habitat areas will either use harvested rainwater, gray water or reclaimed wastewater. The gray water and reclaimed wastewater (e.g. effluent from the alternative septic systems) will be used in below ground irrigation systems. This larger area of open land is not available at the boundaries of the development footprint of the upper portion of the proposed site.

- The close proximity of the lower portion of the proposed site to the marsh requires highly effective systems of stormwater treatment and both structural and non-structural BMPs will be used to enhance quantitative and qualitative quality of the stormwater discharge from the site.

In addition to the water related impact mitigation measures, the sustainable design approach and the LEED certification strategy of the development has selected other credits that will significantly reduce impacts to the marsh and community. These selected credit categories include reduction of light pollution to reduce impacts on the bird population and the night sky quality, avoiding building and cleaning materials that contain harmful agents, strict avoidance of any littering and implementing a comprehensive recycling program, and promoting the use of low emitting vehicles and carpools to lower traffic impact.

The applicant is not opposed to developing the entire park to LEED certification requirements. The intended design approach will use measures of low impact design and construction whether LEED certification will be sought for the upper portion of the site or not. Designing the upper portion of the site in accordance to the requirements of LEED certification would not include the same impact mitigation strategy as used in the lower portion of the site. The upper portion of the site could however be designed “green” and be eligible for LEED certification without the need for a verifiable mitigation strategy through a LEED certification. The applicant will determine what low impact development measures and technologies will be used for the final design.

Question 6. *The DEIS was silent on re-use of wastewater for the upper portion. Why wasn't water reuse discussed and evaluated for the upper portion of the site?*

Answer to question 6. There are several reasons why re-use of wastewater is not considered in the upper portion of the site, such as:

- The distance between injection point and water table in the upper portion is sufficiently large to ensure that a thorough treatment of the septic tank effluent occurs within the leach fields of the upper portion of the site. Therefore conventional septic systems will be sufficient to remove pollutants from the wastewater.
- The upper portion of the site lacks surrounding vegetated areas that could be used for controlled below-ground irrigation. The lower portion of the site, on the other side, will have about 10 acres of restored habitat and open space, including vegetative buffer zones, in which the discharge from the alternative septic systems will be distributed through below ground irrigation and disposal.

The alternative septic systems that treat the wastewater in the lower portion of the site are part of the sustainable design approach and exemplary performance credit is sought under the LEED Silver certification approach for the lower portion of the site.

Question 7. *The DEIS states that a more detailed drainage study will be performed to determine the best method of water quality improvements for the upper portion of the site. Why wasn't that study conducted for this DEIS? If this DEIS is accepted will a supplemental EIS be required once such a study is completed?*

Answer to question 7. The current stormwater management approach will result in a comprehensive treatment of stromwater discharges from the lower and upper portions of the site. Assessments in the DEIS have concluded that stormwater discharges from the future development will be lower than the quantity and quality of stormwater discharge of the present conditions.

The final drainage system will depend on the final layout of the industrial park and might have slight modifications relative to the stormwater management system proposed in the DEIS. Final site drainage systems that deviate from the proposed system that is presented in the DEIS will be assessed in regard to their efficiency of removing pollutants and shaving off

high peak discharge rates. When it can be shown, by analysis, that drainage systems which are different from the drainage systems design proposed in the DEIS will result in lower impacts to the environment then no supplemental EIS will be required.

An updated project Masterplan will be developed for the zone change request. This updated Masterplan will contain a revised layout of the proposed project and a revised drainage plan. Some parts of the drainage systems have been changed from the original design concept, which is presented in the FEIS, since several low impact development features have been added. An example is the design update to place basins for stormwater detention and rainwater catchment below-ground detention ponds to avoid attraction of endangered water birds to the project site. The updated Masterplan is listed under unresolved issues in the FEIS.

Question 8. *The DEIS did not discuss the possibility of treating and reusing all storm water onsite at both the upper and lower parcels instead of discharging into Kapa'a Stream and canal. Could all on-site storm water (both upper and lower) be treated and reused on Site?*

Answer to question 8. Under the present design of the proposed light industrial park stormwater would not be reused in the upper portion to the same extent as panned for the lower portion. The applicant has, however, not ruled out to capture and use rainwater within the upper portion of the site and use the water for certain applications, such as sewage conveyance, custodial use, and small area irrigation.

If the need for irrigation of the lower portion of the site proves to be larger than can be provided by rainwater harvesting from warehouse roofs and sections of the roads in the lower portion of the site, then rainwater might also be harvested on roofs in the upper portion of the site and conveyed to application points in the restored habitat surrounding the lower portion. One area that would benefit from harvesting rainwater in the upper portion of the site would be the area between the upper and lower portion of the site, which contains the steep area that will be converted to restored habitat. A decision about these possible design changes of the drainage systems will be made in the final design phase.

Question 9. *Currently Kapa'a Quarry Road does not have any bicycle lanes or road shoulders for bicyclists to safely ride on. So is it appropriate for the applicant to claim LEED points or on-site bicycle facilities for something that may or may not happen?*

Answer to question 9. The LEED certification approach considers a range of alternative transportation strategies, including promoting the use of bicycles to commute and visit the proposed site. Measures to promote bicycle use would include providing a bicycle friendly infrastructure within the proposed warehouse development with secure bike racks and shower facilities, as required under the attempted LEED credit.

Long term plans in the Koolaupoko Sustainability Plan call for promoting the use of bicycles and the proposed project is supporting this goal for alternative transportation in the region. Therefore it is a prudent design approach to foster the implementation of a wide range of alternative transportation mode and incentives.

As you indicate in your letter, there is “bicycle unfriendly” situation along the quarry road. The applicant agrees to that the situation for bikers along the quarry road and around the marsh needs to be improved.

One promising way of providing a safe and attractive bike way would be the construction of the proposed marsh perimeter pathway, which could be used by bicyclists to reach the proposed site in a safe manner. The masterplan of the proposed marsh perimeter path suggests that about 1,300 feet of this path would be situation over the property of the applicant. The applicant has indicated that he would provide easement and/or donate land for the construction of the marsh perimeter pathway in this section. This section of the proposed perimeter pathway alignment is directly adjacent to the proposed site and on land that is currently occupied by the drainage canal. The drainage canal could be modified (i.e. partially or total filled) to allow installation of the bikeway and/or a widening of the quarry road in this section. There are no current plans existing that would alter the drainage canal and any alternatives of the drainage canal would have to occur under a separate project.

Question 10. *Kapa'a Quarry Road is already heavily used by heavy trucks going to and from the quarry, transfer station and the existing industrial park. It was recently mentioned that trucks loaded with blue rock from the Kailua/Kaneohe Wastewater Conveyance and Treatment facilities tunnel through Oneawa Hill would take the rock to the Quarry. The DEIS is silent on the impact of additional heavy trucks on the Kapa'a Quarry Road in general and specifically on the slowly sinking area next to the canal and just below the proposed expansion.*

Answer to question 10. The TIAR indicates the predicted increase of heavy truck traffic and the resulting impacts on the quarry road. The FEIS also evaluates the impact of increased traffic with regard to of noise and air pollution. Heavy truck traffic impacts created by other possible future projects that would affect the level of service on the streets adjacent to the proposed project are discussed under cumulative impacts in the FEIS (see the newly added Chapter Six in the FEIS).

In regard to your specific questions:

<u>Possibility of taking spoil of the Kaneohe/Kailua Wastewater Conveyance and Treatment project to the quarry:</u> While it is not yet definitely decided what alternative route will be used for the Kaneohe/Kailua Wastewater Conveyance and Treatment project, the gravity tunnel through Oneawa Hills would produce more spoil that has to transported and removed from the construction sites in Kaneohe and Kailua. Based upon communication with and publication by the County Department of Transportation Services (e.g. FEIS for the Kaneohe-Kailua Sewage Conveyance Facility) it is unlikely that muck and spoil of the tunnel construction would be transported to any facility or land within the Kapa'a Valley. The spoil and muck from the construction of the tunnel represent useful construction material and fill material that could be sold or given away by the contractor. At the present it appears that the likely use of spoil and muck would be for the Waimanalo Gulch Sanitary Landfill. The transport of the material to this end use destination would be over the H3-Freeway and would not directly affect the quarry road and its two intersections at Kalanianaole Highway and Mokapu Boulevard.

<u>Allegedly sinking area of quarry road next to the canal:</u> Communication with the City and County indicates that the referred to road segment is structurally stable after a restoration in the 1980s. At that time fill was placed into the drainage canal which slightly widened the road and

provided shoulder area as well as provided more lateral stability of the road base course body. The FEIS concludes that there are no current stability problems of the sections of the road that are next to the drainage canal.

Question 11. *Other than traffic counts, why wasn't a study conducted on the safety, condition and stability of Kapa'a Quarry Road fronting the project? This information must be in the FEIS*

Answer to question 11. A traffic count was conducted as a required project task of a comprehensive traffic impact analysis report (TIAR) study in order to determine the present traffic conditions at the roads adjacent to the proposed site and at intersections that would be affected by the proposed development. The traffic count was then used to establish the existing (baseline) traffic conditions for both cars and light trucks as well as for heavy trucks and quantify and qualify the traffic generated by the existing warehouse development.

Future traffic volumes were assessed by a process that uses trip generation rates for the intended land use (e.g. warehouse operations) for the proposed project. This process calculates anticipated future project generated traffic volumes by applying a unit factor of traffic volume rates per unit of space with the planned space. Another part of future traffic is the background traffic, this means the traffic that would be present without the proposed project and which develops independently of the project. The background traffic is expected to grow at a certain rate per year in the coming decades; these growth rate assumptions are referenced in the TIAR. The overall expected traffic volume in the future is a superposition of the anticipated future background traffic and the traffic generated by the proposed project.

The results of the TIAR showed that the level of service (LOS) on the affected roads would not fall below LOS D. In fact the roads remain at a higher LOS at the time of full built. This suggests that, on the basis of traffic volume, the traffic conditions on the roads adjacent would not be expected deteriorate below unsatisfactory conditions. The result of the TIAR for the three intersections, which would be affected by the proposed projects, showed that some form of traffic impact mitigation measure would be recommended, such as additional right or left turn and deceleration lanes, by the time of full build.

The TIAR delineates the expected traffic conditions for two different times

during the development of the proposed project. These two points in time, which are major project development milestones, are represented by (1) the completion of the development in the upper portion of the proposed site (around 2016) and (2) the completion of the lower portion of the site, which is also the completion of the entire project (around 2026). This timeline of anticipated development milestones is based on the anticipated absorption rate of the newly developed industrial space of the proposed project.

The TIAR recommends that a new, updated TIAR be conducted after the anticipated completion of the milestone (1), e.g. completion of the upper portion of the site, in order to refine the predictions for the traffic conditions at time of full build out and use actual traffic development from the present to milestone (1) to revise the traffic trip generation rates and the actual growth in background traffic.

The TIAR anticipates that no mitigation measures will be required before the completion of milestone (1), e.g. completion of the upper portion of the site. The TIAR suggests some possible traffic mitigation measures for the time of full build, but these traffic mitigation measures are only for illustration since the new TIAR would conclude and propose traffic mitigation measures at a later stage.

The State Department of Transportation has requested a revised TIAR to be submitted as part of the zone change permit application. The revised TIAR will be developed using the updated design information in the updated Masterplan for the zone change permit application. In addition to the LOS-based analysis in the TIAR an analysis of the current traffic problems on the quarry road will be conducted as part of the updated Masterplan. The completion of the revised TIAR and the analysis of road problems are described in the section “unresolved issues” in the FEIS.

Question 12. *Why wasn't a study conducted on the cumulative impacts from the additional 600 employees by 2026, the estimated visitors to industrial businesses and all users of the road on Kawainui Marsh and the canal? This seems essential and relatively easy since the applicant John King owns the canal and that portion of the road?*

Answer to question 12. The DEIS has evaluated and assessed impacts from increased employment in the proposed light industrial development. Impacts on the region from the new residents moving into the region as a result of new employment in the proposed light industrial park could include impacts on public services.

New demographic data (submitted by DPP) suggests that the Koolaupoko region is expected to have very little population change in the next 20 years (e.g. 2010 through 2030) when compared with other areas of Oahu (please refer to Section Three of the FEIS). It is estimated that the number of residents in the region will decrease by about 1,000 residents, due to lower birth rates, higher death rates and out-migration from the region. Based on the market study and a survey of existing employment characteristics an analysis in the EIS indicates that a maximum of 260 new and out-of-the-region employees would find work in the proposed light industrial park. Of these 260 future employees only a fraction is expected to move into the region. Based on these predicted population changes it can be deduced that the project related in-migration of residents into the Koolaupoko region would not result in a significant changes in population, in fact given the project alone there would still be a decrease in population numbers. It is therefore not expected that the project would have significant impacts on the quality and availability of public service in the region.

An assessment of cumulative impacts is presented in the FEIS.

Question 13. *Kawainui Marsh is already overwhelmed with runoff and leaching from the old landfill (model airplane field) in the marsh, the current landfill at the transfer station, the landfill next the quarry road (built to capture contaminates), the Quarry, runoff from Kapa'a Quarry Road and H-3 and the existing 27.3 acre industrial park. Yet, the city has not monitored migration of ground water into the marsh since 2000 for toxic matter and whether there have been acute/chronic impacts upon the health and safety of the public, wild life and the environment.*

Answer to question 13. The comprehensive stormwater drainage approach of the proposed project, which is part of the sustainable design approach, will decrease impacts and not increase impacts on the receiving waters. Decreasing impacts from the proposed site will decrease the overall watershed impacts on the Kapa'a Stream and consequently the Kawainui Marsh. The pertinent analyses in the EIS are based on the water quality model in the 2007 TDML study of the DoH (DoH, 2007).

Question 14. *Before this DEIS is accepted the applicant should install and pay for monitoring wells mauka of the canal and have government approved mitigation plans in place to prevent contaminants from reaching Kawainui Marsh and Kapa'a Stream. Since all water in Kawainui eventually migrates into Kailua Bay this data and action plan(s) is needed to protect human health, wildlife, Kawainui Marsh and the environment.*

Answer to question 14. We have been in communication with the DoH wastewater branch and our on-site wastewater treatment approach has been approved. The selected septic system with septic tank eluent pumping (STEP) systems and centralized alternative septic system treatment will significantly remove harmful components of the wastewater onsite. The comprehensive stormwater approach will effectively mitigate impacts and will reduce rather than increase runoff loading for TSS, nutrients, and other pollutants. Under the new drainage system, less stormwater will infiltrate into the ground and therefore less water will migrate towards the Kawainui Marsh. As a result of the of the sustainable design approach a significant part of the stormwater will not infiltrate in the 23 acres landfill area (the area which is the lower portion of the proposed site) but will be diverted to effective stromwater treatment and rainwater harvesting with subsequent irrigation and loss of stormwater through evapotranspiration.

The applicant will work with the DoH or other agencies if the installation of monitoring wells will be a requirement of applicable permits. Your request to install monitoring wells is also discussed in the section "unresolved issues" of the FEIS.

Question 15. *The DEIS does not evaluate the cumulative impacts of increased impervious surfaces, increased erosion, construction and dewatering activities over a 18 year period, increased deposits of storm and wastewater into Kapa'a Stream and Kawainui Marsh, cumulative visual impacts as industrial warehouses are added, or cumulative impacts from additional cars and trucks as workers and visitors go to the expanded industrial park. To state there are no other major projects planned in the vicinity and therefore there should be no significant cumulative impacts' is not sufficient. All the above mentioned impacts must be evaluated for their cumulative effects on air quality; traffic, view planes, Kawainui Marsh and Kapa'a Stream and mitigation in place before this DEIS can be accepted.*

Answer to question 15. Cumulative impacts and their proposed mitigation are discussed in new Section Six of the FEIS.

Question 16. The DEIS did not adequately address single and cumulative impacts how dust created earth moving equipment over 15 to 18 years, day-to-day fumes from paint, varnish, aerosol sprays and other solvents used in industrial and commercial activities will be prevented from migrating into Kapa'a Stream and Kawainui Marsh. The applicant should have put several air monitoring stations near Kapa'a Stream and Kawainui Marsh to understand how and to where toxic substances will travel. These monitoring stations must be in place, data evaluated and mitigation plans in place before this DEIS can be accepted.

Answer to question 16. Possible dust associated with construction activities construction would primarily occur during the grading and site development, at the start of the development. In the upper portion of the site there will be only limited grading since the site have been graded before and the final grade will only vary slightly from the present grade. Therefore the development of dust from grading in the upper portion of the site will be limited to only several weeks. In addition, effective best practices will be required by the contractor as part of the contract, in order to reduce the dust generation.

In the lower portion of the site construction activities that would generate dust, such as grading and construction of roads and other infrastructure, would be conducted within 6 – 9 months' timeframe and not over a period as long as 18 years. As pointed out in the DEIS, the development of the lower portion of the site would commence with the construction of the construction of the earth berms and planting of tree and bushes at the perimeter of the lower site. With these perimeter zones in place the site would be graded

with effective and completed perimeter containment in place. This containment would hold back contaminated surface runoff from site during construction and would also help to mitigate air and noise impacts. During earth work activities effective dust mitigation measures would be employed. Impact from dust during operation should therefore be limited to the initial construction phase.

After final grade has been established, soil areas will be stabilized until the individual warehouses will be built within the site limits. The construction of the individual warehouses would not create significant dust emission.

Best management strategies will be part of the construction management plan and measures described therein will be enforced during the construction. Such measures would effectively mitigate the release of hazardous agents as a result of spills or leaks, so that no hazardous agents would be accidentally released to the adjacent aquatic bodies.

Emissions of hazardous agents, such as day-to-day fumes from paint, varnish, aerosol sprays and other solvents would be effectively mitigated and minimized in accordance to low impact development LEED certification requirements and applicable county and state codes. The LEED certification approach used for the warehouse development requires the use of low VOC materials, paints, solvents and other agents. Tenants leasing space within the proposed warehouse development would be required by contractual agreements to abide by an environmentally friendly operation within the proposed light industrial park.

Question 17. *The DEIS did not address the load-supporting capacity of either site especially the lower portion which is predominately landfill material. A load bearing study must be completed and evaluated before this DEIS can be accepted.*

Answer to question 17. An analysis of the load bearing capacity of the soil and the resulting requirements for the foundation of the buildings will be conducted in the detailed design phase of the project. The updated Masterplan for the zone change request will contain a discussion about load bearing capacities of former landfills and specific construction techniques for buildings situated on formatter landfills. The issue of loadbearing capacity of the proposed site is described in the section “unresolved issues” in the FEIS.

Question 18. *The DEIS does not identify the location of the leaching fields associated with the septic tanks or the capacity of each. This information must be in the FEIS and the sites evaluated for impacts on Kapa'a Stream and Kawainui Marsh.*

Answer to question 18. For the upper portion of the site the septic systems (tanks and leach fields) will be located next to the warehouses, following the design approach used for the existing septic systems in the upper portion of the site.

In the lower portion the septic tanks will be located next to the warehouses and a STEP system will convey the effluent of individual septic tanks next to the warehouses to multiple alternative septic systems, which will be located at the perimeter of the site. The pollutant removal efficiency of the effluent of the alternative septic treatment systems (e.g. recirculating sand filters) is sufficiently high so that the treated wastewater can be re-used for below ground irrigation at the perimeter of the site.

The final locations of the alternative septic systems would be decided in the final design; though it has been decided that these locations would be at the perimeter of the development footprint of the lower portion of the site, e.g. next to or within the vegetated buffer zones which surround the development footprint. Although the alternative septic systems produce wastewater effluent that has a high quality than the effluent of typical municipal wastewater plants and therefore causes fewer impacts, the final locations of the alternative septic systems would be with at least a 100-foot set back from wetland areas and other water bodies.

The updated layout of the proposed project, which will contain the locations of the leach fields, will be contained in the updated Masterplan of the zone change request. Refer also to the section “unresolved issues” in the FEIS.

Question 19. *The DEIS failed to conduct a thorough on-site aquatic resource survey describing wetlands, drainage ditches, gulches, gullies and streams and anticipated impacts from project components. This survey must be conducted before the DEIS is accepted.*

Answer to question 19. A comprehensive water resources investigation was conducted on the request of USA-CoE, which approved the field investigation. The aquatic water resources study is presented in Appendix 7 of the EIS.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Letter No.9

March 21, 2011

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Draft Environmental Impact Statement for the Kapa'a Light Industrial Park in Kailua, Oahu

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Engineering Division, Division of State Parks, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0414. Thank you.

Sincerely,

Charlene E. Unoki

for Russell Y. Tsuji
Administrator

Cc: Department of Planning & Permitting

54p3

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
INTERIM CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809
Phone: (808) 587-0433
Fax: (808) 587-0455

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January 27, 2011

Attachment to Letter No.9

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
x Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
__Land Division –
x Historic Preservation

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STATE OF HAWAII

Charlene

FROM: Charlene Unoki, Assistant Administrator
SUBJECT: Draft Environmental Impact Statement for Kapaa Light Industrial park
LOCATION: Island of Oahu
APPLICANT: Sustainable Design & Consulting LLC on behalf of Kapa'a I, LLC

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by March 20, 2011.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: [signature]
Date: 2/15/11

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
INTERIM CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
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STATE OF HAWAII

January 27, 2011

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
x Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
__Land Division –
x Historic Preservation

Attachment to Letter No.9

Charlene

FROM: Charlene Unoki, Assistant Administrator
SUBJECT: Draft Environmental Impact Statement for Kapaa Light Industrial park
LOCATION: Island of Oahu
APPLICANT: Sustainable Design & Consulting LLC on behalf of Kapa'a I, LLC

'11 FEB 02 PM 02:32 ENGINEERING

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by March 20, 2011.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: _____
Date: 2/17/11

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/CharleneUnoki
Ref: DEISKapaaLightIndustrialPark
Oahu.823

COMMENTS

(X) **We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zones D, X and A. The National Flood Insurance Program does not have any regulations for developments within Zones D and X, however, it does regulate developments within Zone A as indicated in bold letters below.**

( ) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

(X) **Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.**

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

(X) **Mr. Robert Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.**

( ) Mr. Carter Romero at (808) 961-8943 of the County of Hawaii, Department of Public Works.

( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.

( ) Ms. Wynne Ushigome at (808) 241-4980 of the County of Kauai, Department of Public Works.

( ) The applicant should include water demands and infrastructure required to meet project needs. Please note that projects within State lands requiring water service from the Honolulu Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments:_____

_____

( ) Other: _____

_____

Should you have any questions, please call Ms. Suzie Agraan of the Planning Branch at 587-0258.

Signed:_____
CARTY CHANG, CHIEF ENGINEER

Date: 2/17/11

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
www.sustain-HI.com

September 14, 2011

Response to letter No.9

Mr. Russel Y. Tsuji, Administrator
State of Hawaii, Department of Land and Natural Resources
Land Division
P.O. Box 621
Kapolei, Hawaii 96809

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 21, 2011

Dear Mr. Tsuji,

Thank you for your comments in your subject letter. We offer the following responses to your comments and recommendations:

We confirm that other than the comments from Engineering Division and Division of State Parks, the Department of Land and Natural Resources has no further comments.

- Engineering Division: The proposed project development will comply with regulations of Flood Insurance Rate Map (FIRM) Zone A and specifically with rules and regulations of the National Flood Insurance Program (NFIP) and 44 CFR.
- Division of State Parks: We confirm that the Division of State Parks does not have any comments on the DEIS.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Letter No.10

April 19, 2011

Dr. Manifred Zapka
Sustainable Design & Consulting, LLC
Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Draft Environmental Impact Statement for the Kapa'a Light Industrial Park in Kailua, Oahu

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to Division of Aquatic Resources for their review and comment.

The Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0414. Thank you.

Sincerely,

Charlene Unoki
Assistant Administrator

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
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BOARD OF LAND AND NATURAL RESOURCES
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Fax: (808) 587-0455

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January 27, 2011

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
x Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
__Land Division –
x Historic Preservation

Charlene

FROM: Charlene Unoki, Assistant Administrator
SUBJECT: Draft Environmental Impact Statement for Kapaa Light Industrial park
LOCATION: Island of Oahu
APPLICANT: Sustainable Design & Consulting LLC on behalf of Kapa'a I, LLC

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by March 20, 2011.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: _____
Date: 13 Apr 2011

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STATE OF HAWAII
Department of Land and Natural Resources
DIVISION OF AQUATIC RESOURCES

MEMORANDUM

TO: Robert T. Nishimoto, Environmental Program Manager
FROM: Glenn R. Higashi, Aquatic Biologist GRH
SUBJECT: Draft Environmental Impact Statement for Kapa'a Light Industrial Park
Comments Requested By: Charlene Unoki, Assistant Administrator
Land Division
Date of Request: 1/27/11 Date Received: 2/8/11

Summary of Project

Title: Draft Environmental Impact Statement for Kapa'a Light Industrial Park
Project By: Sustainable Design & Consulting LLC on behalf of Kapa'a I, LLC
Location: Kapa'a Valley, Kailua, Island of O'ahu – TMK 4-2-15:001 (portion of), 006 and 008

Brief Description:

The applicant, Sustainable Design & Consulting LLC on behalf of Kapa'a I, LLC is proposing the development, construction and operation of a proposed light industrial park, the Kapa'a Light Industrial Park in Kailua, Island of Oahu. The Preferred Alternative would add approximately 606,000 square feet of industrial space to an already 283,000 square feet existing warehouse development at the site. The proposed industrial space would provide much needed industrial space to the Koolaupoko region and would result in an increase in the workforce of approximately 600 new employees at the site. The Preferred Alternative would develop approximately 60 percent of proposed site with a low impact development approach designed to achieve LEED Silver certification. The low impact development approach will greatly reduce impact to environmentally sensitive adjacent wetlands and streams.

Comments:

The proposed project is not expected to have any significant impact on the aquatic resource values in the area if the applicant follows the Preferred Alternative approach. By committing to design and construction of the proposed project to the requirements of the U.S. Green Building Council's Leadership in Environmental and Energy Design (LEED) rating system and achieving LEED Silver certification for the portions of the site that are closest to the most environmentally sensitive portions of the proposed site, it would insure the largest commitment of environmental mitigation measures and protect the aquatic ecosystem. Mitigation measures should be implemented to avoid any significant impacts to the environment and community, such as measures to protect and monitor the water quality in the Kapa'a Stream and adjacent wetland.

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
www.sustain-HI.com

September 14, 2011

Response to letter No.10

Ms. Charlene Unoki, Assistant Administrator
State of Hawaii, Department of Land and Natural Resources
Land Division
P.O. Box 621
Kapolei, Hawaii 96809

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated April 19, 2011

Dear Ms. Unoki,

Thank you for your comments in your subject letter. We offer the following responses to your comments and recommendations:

We confirm that other than the comments from Division of Aquatic resources, the Department of Land and Natural Resources has no further comments.

- Division of Aquatic Resources: The applicant greatly appreciates your endorsement of the measures contained in the sustainable design approach for the proposed project. As you point out, the project will design and construct areas that are closest to environmentally sensitive portions of the proposed site with sustainable building and site development technologies. These sustainable design and construction measures were selected both to satisfy requirements under the LEED Silver certification standard and to mitigate those types of impacts, e.g. impact to water resources, which are most important to the adjacent Kawainui Marsh and other aquatic bodies. For years the applicant has been actively supporting the community to improve the wetland areas adjacent to his property, for example by sponsoring community initiatives and by removing large debris (i.e. abandoned cars) at the perimeter of the Kawainui Marsh that could threaten the aquatic resources. The applicant greatly appreciates your support for measures to develop the proposed light industrial park using effective mitigation measures to protect the interests of the community and the environment.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

PETER B. CARLISLE
MAYOR

COLLINS D LAM, P.E.
ACTING DIRECTOR

LORITA M. KAHIKINA, P.E.
DEPUTY DIRECTOR

Letter No.11

March 22, 2011

Dr. Manfred Zapka
Sustainable Design & Consuting, LLC
P.O. Box 283 267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

Subject: Draft Environmental Impact Statement (DEIS)
Kapaa Light Industrial Park in Kailua, Oahu, Hawaii

Thank you for inviting us to review the above Draft Environmental Impact Statement (DEIS) for the Kapaa Light Industrial Park in Kailua. The Department of Design and Construction has the following comment:

Regarding Table 4-12, Expected LOS for Background Traffic plus Project Related Traffic, will the increase in LOS on the adjacent public roadways require the installation of street lights and other traffic control devices in the development of this project?

Should you have any questions, please contact Gerald Hamada at 768-8427.

Very truly yours,

for Collins D. Lam P.E.
Director

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September 14, 2011

Response to letter No.11

Mr. Collins D. Lam, P.E., Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 22, 2011

Dear Mr. Lam,

Thank you for your comments in your subject letter. We offer the following responses to your comments and recommendations:

The Traffic Impact Assessment Report (TIAR), conducted for the environmental review of the proposed project, suggests that no traffic mitigation measure are required as a result of level-of-service (LOS), at least until the major first phase of development has been completed (e.g. at the projected midpoint of the project development schedule, e.g. 2016 to 2017, or when about 50% of the planned floor space has been added). The current TIAR recommends that a new, updated TIAR should be conducted at that point in time to ascertain if the projected traffic volumes have indeed grown as expected. Conducting a new TIAR at this point in the future would provide better information about the actual development of the traffic around the proposed project and facilitate the choice if and what traffic mitigation measures should be applied as the project is heading to full completion.

The State Department of Transportation (DoT) has requested that the current TIAR be revised and agreed that the revisions be carried in conjunction with the zone change application. The revised TIAR will use design information of the updated Masterplan for the zone change request.

Without committing to a specific traffic mitigation plan at this time, installing street lights or other control devices, as suggested in the letter, might be appropriate traffic impact mitigation measures. A further analysis in conjunction with the new TIAR would have to address if such control devises and strategies are applicable given the close proximity to the marsh.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM

CC: Department of Planning and Permitting, Mr. Mike Watkins

THE LANI-KAILUA OUTDOOR CIRCLE
P.O. Box 261
Kailua, Hawaii 96734

Letter No.12

March 24, 2011

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, HI 96828

Mr Mike Watkins
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, HI 96813

Dear Dr. Zapka,
Dear Mr. Watkins,

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for Kapa'a Light Industrial Park in Kailua, Oahu.

The Lani-Kailua Outdoor Circle Board has considered the proposed zoning change and potential impact the zone change and expansion would have on Kawai Nui Marsh. As you may know, the Kawai Nui/Hamakua Complex was designated a Ramsar Wetland of International Importance in 2005 after a collaborative effort led by one of our members, Muriel Sato.

After considerable review, the Lani-Kailua Outdoor Circle supports the "No-Action Alternative" of no further addition of warehouse space on the portions of the site covered in the Kapa'a Light Industrial Park (KLIP) project DEIS.

This decision is based on:
1. the need to maintain Preservation zoning to protect our watersheds, in particular, Kawai Nui Marsh and Kapa'a Stream that drains into Kawai Nui Marsh and
2. the determination that sediment and contaminant run off from the Kapa'a Light Industrial Park during its construction and operation would have unavoidable, detrimental and long term negative impacts on Kaiwai Nui Marsh, Kapa'a Stream and Kailua Bay

COMMENTS

1. Protecting Preservation zoned land is essential to maintaining Kapa'a Valley, Kapa'a Stream and Kawai Nui Marsh watershed's function as a water purification system.

The water flowing from Kapa'a Valley headwaters passes through the proposed development site, so reduction in water quality along the route would reduce water quality in Kawai Nui Marsh and Kailua Bay.

Kawai Nui marsh provides critical habitat for terrestrial and wetland animal species including endemic endangered waterfowl such as the Hawaiian Coot, the Hawaiian Stilt, the Hawaiian Moorhen and the Hawaiian Duck.

2. Although the plan proposes a comprehensive design approach to achieve LEED Silver Certification within the lower portion of the proposed site, underground seepage is less manageable especially in this former landfill and the proposed technical remediation options cannot control forces of nature such as extreme floods and earthquakes, or prevent unintended consequences due to mismanagement or lack of compliance by future lessees.

Extreme flooding of Kapa'a Quarry Road occurred as recently as February 2011. (Ref: "Flooding Closes Kapaa Quarry Road in Kailua, Star Advertiser February 11, 2011)

3. Catastrophic septic tank failure while "very uncommon" cannot be ruled out nor can the failure of the leach field. Due to its proximity to Kaiwai Nui Marsh, the environmental consequences of a system failure would be severe.

4. Construction on compromised unstable former landfill sites would further compound existing environmental hazards.

Development of parcel TMK 4-2-015:006 would unearth an old landfill covering a residential dump, and development of a segment of TMK 4-2-015:008 would disturb a plateau constructed from tailings and overburden from the original Kapa'a Quarry operation.
(http://.aecos.com/KOOLA/Kapaa_subbasins.html).
Run-off would enter Kawai Nui Marsh, which is downhill from both construction sites.

5. Kapa'a Quarry Road cannot safely handle the increase in traffic.

At build out, the proposed project would have double the number of warehouses and triple the industrial space and workforce (estimated aprox. 600 employees).
Kapa'a Quarry Road is a historically dangerous road with narrow lanes used by residential and commercial traffic.
(Ref: "Kailua Residents React to Another Fatal Accident on Kapaa Quarry Road", Report by Leland Kim for KHNL Hawaii News)

7. An Industrial Park would have a negative visual effect by altering expansive mauka and wetland views from H3, the Pali and Kaha Park.

Very Truly Yours,

Joan W. Fleming

Joan W. Fleming, President
Lani-Kailua Outdoor Circle

cc: Gary Gill, David Smith, Chuck Prentiss, Jill Tokuda, Ikaika Anderson, Pono Chong, Chris Lee, Cynthia Thielen, Pohai Ryan

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September 14, 2011

Response to letter No.12

Ms. Joan W. Fleming, President
Lani-Kailua Outdoor Circle
P.O. Box 261
Kailua, Hawaii 96734

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 24, 2011

Dear Ms. Fleming,

We thank you for your subject letter in which you provided us with your comments on the Draft Environmental Impact Statement.

Our responses to your comments and recommendations are presented in the list starting on page two of this letter. For your convenience and ease of review we follow the order of your specific questions with our responses to each.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

Responses to your comments and recommendations in your letter dated March 24, 2011

First of all the applicant and we, the consultants, fully share your concern for the wellbeing of the community and the environment. In particular, your dedicated focus is on the preservation of a valuable Kawainui Marsh, a wetland area that has been recognized by being listed in the Ramsar List of Wetlands of International Importance.

The applicant fully supports community efforts to preserve the environment and he has been financially supporting community groups (i.e. donating funds and land to create a pathway at the perimeter of the marsh) and has also donated personnel and heavy equipment to clean the marsh (i.e. in 2010 removing close to 50 abandoned cars along the marsh perimeter between the proposed site and Kalanianaole Highway). The applicant has committed to design and build the proposed light industrial park with low impact and sustainable building and site development technologies. In order to strengthen his commitment to developing “green”, the applicant has chosen to design and construct the portions of the proposed light industrial park that are closest to environmentally sensitive land, in accordance to the requirements of the Leadership in Energy and Environmental Design (LEED) Silver certification standard.

The LEED Silver certification will not merely serve as a convenient “marketing” plaque, but the LEED Silver certification is intended by the applicant as an important indicator to guarantee to the community that low impact development approaches are indeed used in the development as promised. As you might know, a design and construction project needs to qualify and be awarded a certain number of credit points within the LEED certification system to qualify for four LEED certification levels upon completion of the project. The applicant has decided that he will pursue the LEED Silver certification goal, which represents an advanced certification level and therefore a design that conforms to an advanced degree of using low impact development technologies and approaches.

The LEED certification procedure also entails an independent audit by a third party to ensure that the design and construction has indeed been carried out to strict certification standards.

In the LEED certification process the applicant is free to select those credit points that he deems most important and effective. For the proposed project the applicant has selected credits that will effectively mitigate such impacts that are most important to the adjacent marsh as well as the Kapa’a Stream and adjacent delineated wetland area. In doing so the sustainable design approach for the development is strategically aligned with the need to emphasize the mitigation of certain impacts to preserve a healthy environment around the

proposed site. The specific LEED certification approach of the proposed project will first of all satisfy all water resources related credit points (including pursuing two bonus points for exemplary performance e for innovative wastewater systems and comprehensive stormwater treatment) as well as reduction of light pollution, lowering the traffic by supporting alternative modes of transportation, avoidance of impacts from waste and trash, avoidance in use of hazardous construction and cleaning agents, and lowering energy and water usage, to name the most important mitigation measures, which directly result from pursuing the LEED approach of the proposed project.

The proposed development footprint is strictly confined to previously developed land (e.g. graded) and no presently open land with natural vegetated land will be used to build structures. The conversion of Preservation zoned land will be confined to landfill areas that are bare and graded at present, without any permanent vegetation and that do not currently represent habitat for endangered species. In fact, as part of the sustainable design approach, approximately about eight acres of land surrounding the development footprint of the portion of the site that is closest to the marsh will be converted to restored habitat featuring native and adaptive plants. Some of the land that will be restored habitat in the future is barren and not vegetated landfill area today. Therefore, the proposed project will not convert precious naturally vegetated land; rather the development will use land that has been degraded in the past by landfill over the Kapa'a valley.

Developing landfill area is typically more costly and technically demanding than a regular construction site. Developing landfill areas instead of open space, however, is preferable for the community, since it converts land to land uses that are of more use and value to the community than the status quo.

By selecting those sustainable technologies, which can best mitigate key site specific impacts, the proposed development will be reducing selected impacts rather than increasing them. Specifically, the design of the proposed light industrial park will ensure that effective Best Management Practices (BMPs) will be implemented, both during the construction phase as well as during regular operations. For example, the vegetative buffer zone around the development footprint of the lower portion of the site, which will contain an earth berm with dense vegetation including tall trees and bushes, will be constructed before the mass grading of the site occurs. Therefore, the berms will create a physical containment on all side of the project side and runoff, and with it all suspended solids and pollutants, will be effectively retained on the site and not flow untreated into the receiving waters.

The proposed light industrial park will benefit the Koolaupoko region by strengthening its economic infrastructure and improving the local economy. As mentioned in the DEIS, the

Koolaupoko region is lacking an adequate supply of industrial space, which causes companies serving the windward side and residents residing in this region to cope with long drives and commutes. In fact, the Koolaupoko region has only approximately 20% of the island wide per capital allowance of industrial space. Even at full build the proposed project will increase the per capita allowance for the region to a mere 40%.

As the era of cheap energy comes to an end Hawaii's future will pivot around a more effective use of fossil energy and, increasingly, clean and renewable energy. An important ingredient of a sustainable future of Hawaii will be locating places of employment, commerce and recreation closer to the communities and foster food and light manufacturing closer to the consumer. Such economic development will necessitate a robust light industrial infrastructure, such as the proposed light industrial park, to provide support and appropriately designed and located space to the many local companies, many of them "home grown", within the region.

In the following we offer our responses to your specific comments. We have numbered the responses in accordance to your numbering conventions;

1. Protecting preservation zoned land:

As delineated in the EIS the applicant intends to apply for a zone change only for those portions of land that are presently developed, e.g. which are graded and are not open space. No presently naturally vegetated land will be used for the development. Rather, the proposed sustainable design approach will convert approximately eight acres of land that is either graded but not vegetated or that presently has low quality vegetation (e.g. with invasive plant species) to restored habitat with native or adapted plant species. No parts of the proposed foot print will occupy land that can be regarded as habitat for endangered water birds.

The present runoff conditions from the site will be improved through a comprehensive system to minimize or treat stormwater runoff. The comprehensive measures to mitigate specifically aquatic resources, which are integral part of the sustainable design approach, will assist in improving the water quality in the receiving waters, which include the Kapa'a Stream and the Kawainui Marsh. Our conclusion that water quality in the Kapa'a Stream can indeed be improved by our proposed sustainable design approach used baseline data, analysis and hydrological models of the Kapa'a watershed performed by the State of Hawaii, Department of Health (DoH).

The applicant is working with the U.S. Fish and Wildlife Service to develop and implement site specific mitigation measures that will avoid endangered water birds from seeking

habitat in the new development, thus exposing them to increased predation risk by feral cats and other non-native predators. The design of the proposed project will include the avoidance of ponds with free water surfaces which could attract endangered water birds. At present the proposed project site is not habitat of endangered species and the future development will not endanger or encroach on important wildlife habitats.

2. Flooding of quarry road and seepage from the landfill:

The comprehensive stormwater plan for the site provides an effective mitigation approach against impacts from stormwater runoff. In the lower portion of the proposed site the comprehensive measures under the proposed stormwater system design includes measures to decrease stormwater runoff by collecting rainwater from roofs and sections of the road and using the harvested rainwater for irrigation of landscaped areas that surround the development. Infiltration of water in this restored vegetated areas as well as evapotranspiration will reduce the direct runoff into the receiving waters. Furthermore, by creating impermeable areas and fully treating the runoff or using it for irrigation, the amount of water that infiltrates into the landfill area of the lower portion of the site will reduce seepage from that landfill body. As delineated in the EIS the design approach for the portion of the site that is closest to sensitive wetland areas is using design strategies of the "sealed tomb" type of landfills, where infiltration into the landfill body is curbed by portions of impermeable surface layers of the landfill area. The proposed layout of the site would still allow some infiltration of precipitation, but this would be within the densely vegetated areas at the site perimeters, where water is held in the upper layers of top soil and much of the water would be lost through evapotranspiration.

It is acknowledged that natural occurrences of extreme floods might overcome any drainage systems. The prevailing design standard for drainage systems applies a "design rain" with defined recurrence intervals, for example a 10- or 20 years design rain. The proposed development would similarly apply such standards to size the drainage system. The often cited flooding of sections of the quarry road, which necessitates road closure, can be primarily attributed to the specific drainage condition of the Kapa'a watershed. The Kapa'a Stream is the drainage conduit for approximately 90% of the Kapa'a Valley. The streambed of the Kapa'a Stream has been changed due to landfill over the past several decades and the increased amount of runoff from land within the Kapa'a valley has resulted in changed hydrological conditions and a higher probability of flooding. During extreme storm events the stream flow increases significantly causing flooding condition upstream of the culvert under the quarry road. A remedy of such adverse condition requires a broader approach than just an optimization of the drainage of the proposed site. Specifically, while the expected significant improvements of the site drainage under the proposed design approach of the project will lower stormwater impacts from the proposed site, such

improvement cannot compensate for causes that result from other areas within the Kapa'a watershed.

3. Catastrophic failure of the leach field:

The DEIS discusses at length mechanisms, which are most responsible for a "catastrophic" failure of the septic system. As pointed out in the DEIS, the main culprit of septic system failure is not the structural failure of the septic tank but a failure of the leach field. Catastrophic failure of septic tanks, such as rupturing of the tank shell, is quite rare, if the septic tank is adequately dimensioned, fabricated and installed. Failure probability of the tank structure is furthermore significantly reduced by regular and maintenance of septic systems professionals.

According to the US-EPA, failure of a septic system is more frequently caused by failure of the underground injection field, or "leach fields". Failure modes are addressed in the DEIS and include mainly organic overloading, which results in clogging, inadequate and non-uniform distribution of the wastewater in the field. Other failure modes can be attributed to limited distance of the injection point of the septic system effluent to the receiving water or, in vertical direction, to the water table or impermeable strata. All possible failure modes have been considered for the proposed onsite wastewater systems and the resulting approach of onsite wastewater treatment systems significantly lowers any failure potential.

For the upper portion of the proposed site the horizontal and vertical distances between point of injection and receiving water or water table is significantly larger than the minimum requirements, therefore conventional septic systems are used and are considered a safe and adequate way to treat the wastewater onsite.

For the lower portion of the proposed site, which is closest to environmentally sensitive wetland areas, advanced septic systems are used that include individual septic tank close to the warehouses and a septic effluent tank pumping (STEP) systems that conveys the effluent of the septic tank overflow to multiple alternative septic systems at the perimeter of the site. The alternative septic systems have significantly higher treatment efficiencies than conventional septic systems since they add aerobic, filtering and denitrification treatment process steps. According the EPA the average effluent of the type of alternative septic systems (e.g. recirculating sand filters) that is selected for the proposed project is lower than in typical municipal wastewater systems. Especially important for the site is the fact that the type of alternative septic system selected for the proposed project decreases the amount of nutrients in the effluent to much higher degree than conventional septic systems or typical municipal wastewater plants. A high removal rate of nutrients is important since the site is close to aquatic bodies and sensitive wetland areas.

Since the treated wastewater effluent of the alternative septic systems has high treatment efficiency, the effluent can be used in below ground irrigation, besides being disposed of in conventional leach fields. It is also important to bear in mind that the cleaner wastewater effluent from the alternative septic systems significantly reduces the risk of a failure of leach fields since the effluent has a significantly lower organic concentration and is essentially free of suspended particles.

By using innovative wastewater approaches the applicant wants to ensure that the environment is effectively protected from wastewater that has not been properly treated before its release to the receiving waters.

4. Construction on former landfill area

The development footprint of the proposed project will only use land that is on existing landfill area. No parts of the proposed project will be built on land that presently has natural vegetation, including large and mature trees, designated wetland areas and aquatic bodies.

The selected design approach of the proposed project comprises a grading approach under which the cut and fill budget of grading would be made neutral, which means that limited volumes of soil will be removed from or brought to the project site. The landfill material consists mostly of quarry tailings and overburden and therefore most of the land fill material could be used to form the final topography.

Top soil would be used to form a certain amount of landscaped area, such as between and around the warehouses, where a significant amount of the required would be taken from green waste conversion, which is presently ongoing at the site. The rest of the development footprint of the proposed site would be covered with impermeable pavement of traffic areas and impermeable roof areas of the warehouses. Other areas within the development footprint would be either landscaped or will have open grid pavement (e.g. pavement which has at least 50% space that are occupied with vegetation). The result of the grading and development of the site would be comprehensive soil stabilization.

The potential or soil erosion and contaminated runoff are typically highest during the construction phase. In the upper portion of the site the extent of required grading is very limited since the land has already been converted to an about level plateau. Therefore the amount of contaminated runoff will be limited and can be managed with conventional BMPs. The lower portion of the site has a higher potential of run off because more grading is required and because the land has more slope. The design approach for the lower portion of the site surrounds the site with about 1,500 feet of stabilized earth dam, which would serve as a vegetated buffer zone around the site and would be planted with larger trees and shrubs. These earth dams would provide a containment structure to keep runoff

on the site during grading and site development. This approach would significantly reduce the likelihood of untreated runoff being discharged from the site during storm events.

5. Traffic impacts

The Traffic Impacts Assessment Report (TIAR) conducted for the environmental review of the project has determined that the roads affected by the project are sufficient to ensure no unsatisfactory decrease of level-of-service (LOS). As discussed with the Honolulu Police Department (HPD) there are certain safety concerns with traffic on the quarry road, particularly when drivers surpass the speed limits and “use the road as a raceway” (quote). Most of the serious accidents are result of unsafe driving during the off-peak evening hours or at night. At those times the proposed project does not contribute significantly to the traffic volume on the quarry road.

Appropriate and effective mitigation measures to improve the traffic safety on the quarry road, especially in the vicinity of the proposed project site could include road surface improvements, changes of the road geometry and strict enforcement of the speed limits on the quarry road by other than static traffic control measures, as well as possible structural changes of the affected intersections.

The State Department of Transportation has requested that the current TIAR be revised during the zone change application process. The revised TIAR will use design information of the updated Masterplan for the zone change request. In addition to the revision of the TIAR an analysis of current problems and possible improvements of the Kapa’a Quarry Road will be carried out in conjunction with the updated Masterplan for the zone change request.

7. Visual Impacts:

The FEIS (Appendix 8) contains a comprehensive visual impact analysis. The proposed visual impact mitigation strategy will include installing vegetative buffer zones with tall trees on all sides of the development, trees and so-called “green walls” (e.g. walls of buildings that feature a lattice as a support for plants growing p along the walls) inside the development and appropriate color scheme for the warehouse and other ancillary structures to blend into the natural surroundings as much as possible. The visual impacts analysis has identified that the proposed measures, listed above, are indeed very effective to mitigate the visual impacts from more distant viewplanes that have a line-of-sight toward the proposed site.

When the visual impact mitigation measures are fully developed (e.g. the trees around the site have to grow, which requires a couple of years) the proposed development will be nearly "invisible" from view planes around the marsh, especially from popular sites, public parks and two Heiaus. The proposed construction of the site will be visible to some extent from a short section of the H3-Freeway, where there are breaks in the otherwise dense vegetated buffer on the southern side of the H3-Freeway.

With regard to close-up views of the proposed development, there are two locations of interest. First, motorists on the quarry road passing the site will not see the warehouses within the lower portion of the site, since the structures would be hidden behind the vegetated buffer zone along the quarry road and the quarry access road. The upper portion of the site is presently not visible to passing motorists on the quarry road and would remain "invisible" in the future. Second, visitors to the model airplane park, which is adjacent to the project site, might see the rooftops of some of the warehouses in the lower portion, which are closest to the quarry road. The proposed vegetated buffer zone would be a very effective visual impact mitigation measure to hide the rest of the buildings. The remaining visual impact of the top section of the front row of warehouses could be further reduced by using "green walls" on the warehouse walls that face the quarry road. The applicant will implement significant structural and passive measures to lower the visual impact to the extent possible.

Summarizing, we hope that our response has addressed all of your important comments and recommendations. As pointed out, the applicant has and will continue to support activities of community groups to protect and preserve the environmentally sensitive areas around his property. For many decades the applicant has been part of the Windward community, and is committed to his responsibility to the community and the environment while pursuing his commercial goals, which will support the local economy.

Water Resources Research Center
Environmental Center

UNIVERSITY of HAWAI'I®
MĀNOA

March 25, 2011
RE: 0806

Letter No.13

Kapaa I, LLC
c/o John King
905 Kalanianaole Highway
Kailua, HI 96734

Dear Mr. King,

Draft Environmental Impact Statement
Kapaa Light Industrial Park, Kailua, Koolaupoko, Oahu

Kapaa I, LLC proposes to rezone fifty-five acres adjoining Kawainui Marsh from P-2 General Preservation to I-1 Industrial, and construct thirty new warehouses—with a total area of about 606,000 square feet—on this acreage and an adjoining twenty-two acre parcel that is zoned I-2, yielding a total developed area of twenty-seven acres.

This review of Kapaa I, LLC's Draft Environmental Impact Statement (DEIS) is a service activity of the Environmental Center to help determine and maintain the optimum quality of the environment. It is not intended to represent the official views of the University of Hawaii. The objectives of our review process are to enhance environmental consciousness, encourage cooperation and coordination, and facilitate public participation. These comments were drafted with the assistance of David Penn, Environmental Center.

General Comments

The proposed action would intensify the industrial usage of Kapaa valley and produce long-term impacts on vehicular traffic, utility systems, utilization of resources, noise levels, local social services, visual character and ambiance, and land surface permeability and hydrologic response. Even with mitigation, it appears that the impacts on vehicular traffic and visual character and ambiance would be particularly obvious. Therefore, we suggest that the FEIS highlight these components of the analysis in ways that best help the approving agencies to make their decisions about the relationship between the environmental costs and social benefits of the proposed action.

The proposed development approach incorporates numerous assumptions about the expected performance of various environmental management measures, many of which are relatively untested in a local setting. As you implement these kinds of measures on-site, we suggest that you collaborate with neighboring landowners and resource managers, other

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watershed health and low-impact development practitioners, the University of Hawaii, and our wider island community in order to generate quantitative information about the environmental results obtained that can be used to support islandwide sustainable development efforts. However, along with this suggestion comes our concern that the FEIS provide greater detail about how long-term maintenance of pervious pavement, drainage filtration systems, underground catchments and traps, and extended detention ponds will be accomplished, including the disposal of recovered material.

In addition to our general comments, we have a few specific comments about alternatives analysis and LEED certification strategy; pace of development and nature of businesses; wastewater treatment and disposal; NPDES permits for discharges of stormwater associated with industrial activities; stormwater and non-stormwater discharges from other point and nonpoint sources; and uncertainty of site details, input rates, and cumulative impacts.

Alternatives Analysis and LEED Certification Strategy

The DEIS suggests that "the lower portion of the site has the largest need for effective and comprehensive impact mitigation" because it is closer to Kawainui Marsh and is partially within the SMA (p. ES-5). However, the upper portion of the site may experience higher and more intense rainfall than the lower site; has steeper and larger streamside hillslopes, and steeper stream gradients, than the lower site; and allows heavier industries (I-2 zoning) than the lower site. Therefore, we suggest that the FEIS further explore the possibility that more intensive mitigation measures, such as LEED certification, may have greater positive impact when implemented on the upper portion of the site.

Previous investigations suggest that the fill underlying at least part of the upper portion of the site consists of quarry tailings and overburden, not trash (Walter Lum Associates, Inc., 1983, Kapaa Valley Industrial Development Preliminary Soil Reconnaissance, cited on page 3-13 of the 2007 Kapaa Stream TMDL, State Department of Health). Therefore, we suggest that the FEIS provide additional empirical information about the nature of the fill material underlying the upper portion of the site. If this fill is relatively clean, then we suggest that the FEIS address an alternative that would take greater advantage of the permeability and filtering capability of this fill for drainage purposes, potentially reducing the need for more intensive drainage management solutions on this portion of the site.

Pace of Development and Nature of Businesses

The DEIS proposes that "by stretching out the development over 15 to 17 years, impact will be limited and the effectiveness of mitigation measures can be continuously examined and streamlined to ensure effective impact mitigation" (p.ES-4). We suggest that FEIS (1) include greater detail about how this would be accomplished, and (2) address the possibility that a

combination of market forces and developer finances might cause this development timeline to be compressed.

The DEIS states that "[t]he proposed project intends to primarily serve local and subregional demand of industrial services or small manufacturing companies. It is not the intention of the proposed project to lease space to companies that serve an island-wide market, or whose operations would include handling, manufacturing or transporting materials or products that have a high risk of adverse impacts to the environment" (p. ES-6). These are laudable intentions, and we suggest that the FEIS identify what assurances would be available to ensure that they are carried out.

Wastewater Treatment and Disposal

The existing and proposed installation of septic systems in quarry and trash-derived fill raises important questions about treatment efficacy and pollutant transport and fate. Therefore, in order to provide greater transparency about the individual wastewater system (IWS) approval process that would be conducted by the State Department of Health (DOH) we suggest that the FEIS include (1) percolation test results from a range of existing and potential on-site disposal systems (OSDS) installation locations, and (2) a recitation of how the proposed leach fields would comply with DOH requirements for minimum lot size, maximum density, and stream setbacks.

NPDES Permits for Discharges of Stormwater Associated with Industrial Activities

Under the Clean Water Act, business activities conducted in an industrial park may require NPDES general permit coverage for discharges of stormwater associated with industrial activities, as determined by the Standard Industry Code (SIC) of the business activity and the extent of its exposure to direct rainfall. We suggest that the FEIS discuss the extent to which such permit coverage is or may be required within the industrial pack, including an inventory of SICs associated with existing and proposed businesses on site that identifies (1) those SICs that require this type of NPDES coverage, and (2) existing businesses that were issued or require this type of NPDES coverage.

Stormwater and Non-stormwater Discharges from other Point and Nonpoint Sources

A need for underground injection control (UIC) permits is noted on page ES-6 of the DEIS, and UIC is included in the list of permits and approvals on pages 308-309. However, it is unclear exactly what kinds of flows and materials would be discharged into the proposed injection wells, and what other kinds of unregulated fluid disposal methods would be used. For example, would any of the proposed subsurface drainage collection and treatment devices trigger UIC permitting requirements? To what extent what would these devices, or other collection and disposal methods (e.g. seepage pits, trenches) be used for managing non-

stormwater discharges, such as process water and wash water generated by industrial park tenants?

Because of the interconnectedness of drainage system architecture and runoff impacts in the Kapaa watershed, we suggest that the FEIS give greater prominence to explaining how the operation of the proposed site drainage and stormwater management system will be coordinated with related efforts of other parties (particularly NPDES permittees) to achieve overall water quality goals in Kapaa Stream and the greater Kailua Bay watershed.

Uncertainty of site details, input rates, and cumulative impacts

We suggest that the FEIS utilize additional details about site characteristics and estimated pollutant input rates to finalize the impact analysis and to specify selected alternatives. For example, page E-6 of the DEIS suggests that either two detention ponds or an existing drainage area would be used for stormwater management, but we are uncertain about the final decision and its potential impacts.

We also suggest that the FEIS adopt a more holistic approach to cumulative impact assessment. Just because "[t]here are no other major projects planned in the vicinity of the site does not necessarily mean that "there should be no significant cumulative impacts" (page ES-10). Cumulative impacts accumulate over time as well as in space, therefore we suggest that cumulative impact assessment consider how the weight of the proposed action (1) adds to and augments the impacts accrued by major projects that were already developed in the area, and (2) would grow and change during and beyond the industrial park's usable life.

Thank you for the opportunity to comment on this Draft Environmental Impact Statement (DEIS). We hope that our comments will help the City & County of Honolulu to weigh carefully whether the social benefits of the proposed action would justify the environmental impacts that would likely occur. When the Final EIS is distributed, please send one printed copy to the Environmental Center.

Sincerely,

Philip Moravcik
Water Resources Research Center

cc: State of Hawaii Office of Environmental Quality Control (OEQC)
Chittaranjan Ray, Interim Director, Water Resources Research Center, UH Manoa
Mike Watkins, City & County of Honolulu Department of Planning & Permitting
Manfred Zapka, Sustainable Design & Consulting LLC

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
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September 14, 2011

Response to letter No.13

Mr. Philip Moravcik
Water Resources Research Center / Environmental Center
University of Hawaii at Manoa
2500 Dole Street, Krauss Annex 19
Honolulu, Hawaii 96822

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letters dated March 25, 2011
Reference 0806

Dear Mr. Moravcik,

We would like to thank you and Mr. Penn for your comprehensive comments and recommendations in your subject letter. We greatly value your comments and recommendations which will assist us to further refine our approach and consider effective impact mitigation.

We would like to offer the following responses to your comments and recommendations, in the same order as presented in your letter:

General Comments:

All impacts, which you delineate in your letter, have been addressed in the DEIS. The two impacts which, as you state, would be particularly obvious, even with mitigation, are vehicular traffic and visual ambiance.

With regard to vehicular traffic, the applicant has committed to implement measures that would reduce the projected trip generation from the proposed project. Such measures are alternative modes of transportation for employees and visitors to the proposed industrial park. The LEED strategy for the proposed project incorporates alternative modes of transportation as an important part of the sustainable site development. The applicant supports that the public transportation system will connect the Kapa'a valley to the island public transportation system. Since no such plans by the transportation authority on Oahu exist at the present time, the applicant would consider installing a private shuttle service at the time when development of the park has progressed and there is enough demand for a shuttle service by the future tenants.

As part of the LEED certification approach, the proposed development would also provide bicycle friendly facilities. Although the quarry road is at present not an easy route for bicyclists, it is hoped that at some time in the future there will be a safe and attractive way for bicycles and pedestrians to reach the Kapa'a valley and the proposed project site, from the South and/or North, e.g. from the Kalanianaole Highway and/or Mokapu Boulevard, respectively. One possible and possibly preferable way to realize safe driving conditions for bicyclists would occur if the long-planned marsh perimeter path is realized soon. This path would connect the proposed site with Kailua by means of a safe and scenically beautiful path to bike and walk.

In addition to bicycle friendly facilities and access to alternative modes of transportation, and also as part of the LEED certification strategy, the applicant will be providing preferred parking for car and van pools as well as for low–emitting vehicles. The applicant has been installing a significant number of photovoltaic (PV) panels and the park might offer day-time charging of electric vehicles, as part of the green development strategy of the proposed site. (To lead by example, the applicant has been using an all-electric personal vehicle for a couple of years.)

The traffic impact analysis report (TIAR) conducted for the environmental review indicates that the affect roads would remain above a level-of-service (LOS) that is defined as providing satisfactory traffic conditions. The State Department of Transportation has requested that the current TIAR, which is submitted with this FEIS, be revised in conjunction with the zone change request. The revised TIAR will be based on design information in the updated Masterplan for the zone change request. In addition to the LOS based analysis an analysis of existing traffic problems on the quarry road will be carried out in conjunction

The mitigation of the visual impact is a key objective of the applicant. As a minimum, the applicant has committed to install vegetative buffer zones around the development, especially around the lower portion of the site, which is closest to environmentally sensitive areas and to the Kailua community. The vegetative buffer zones would have a dense screen of trees and shrubs, which would provide effective visual impact mitigation for mostly lateral views. In addition to the trees at the perimeter of the development, the applicant plans to plant trees in the interior of the development. While trees within the development would lower non-roof heat island effects, the trees would also provide visual impact and help to blend the warehouses into the surrounding area. As an additional measure to lower the visual impact, the applicant is considering "green walls" for the walls facing east for buildings closest to the quarry road. Our visual impact analysis (Appendix 8

of the DEIS) shows that visual impact could be indeed significantly mitigated with the selected mitigation measures.

It is, however, not possible to “hide” all of the structures of the proposed development behind a continuous screen of trees and other natural vegetation, especially from a more oblique view plane, such as from parts of the H3-Freeway. The ambiance of the Kapa’a Valley is characterized by open space, vegetated areas consisting of tall trees and wetland vegetation areas, existing structures and some larger process facilities (i.e. transfer station, the existing warehouse development and the quarry processing plant) as well as the H3-Freeway. The design approach of the project endeavors to blend the structures and other features of the proposed into the existing ambiance at the site as much as possible.

The LEED strategy for the proposed development has emphasized the water resources credit categories. The water resources mitigation measures selected for the LEED approach will implement effective impact mitigation measures for the aquatic bodies, especially the wetlands adjacent to the proposed site. In the selected LEED certification approach all credit points of the water resource category will be attempted; in fact the proposed measures under the stormwater and wastewater credit categories will qualify the project to receive exemplary performance bonus credits for the comprehensive stormwater management plan and innovative wastewater technologies.

All measures that are selected for the sustainable design approach are based on proven technologies and operational procedures. No “exotic” new sustainable technologies are selected that might bear risk of performance below expectations. The assumptions made in the DEIS about the effectiveness of certain sustainable technologies are conservative, and therefore the applicant is not promising more than can be safely achieved with the design and the technology selected in the basic design.

The long-term maintenance of the selected low impact technologies will be carried out by the applicant or his designated operator. Without exception, the selected low impact technologies are operationally mature and tested technologies. The projected effectiveness of these technologies and processes used in the analysis for the DEIS is baked by reported experiences by the vendor or independent agencies, such as the EPA.

For example, the maintenance of pervious pavement, e.g. mostly open grid for parking areas, requires no special maintenance know-how, since it is used in many site development projects. Another example is the planned drainage infiltration procedure of the alternative septic systems effluent by means of below ground irrigation systems, which is a proven technology for on-site wastewater and gray water disposal. A third example is

the type of pretreatment units for the storm water runoff treatment, which will be installed upstream of the detention ponds. Such pre-treatment units are sediment, debris and nutrient catchment units, which are installed throughout the nation. The fourth example is the type of alternative septic system, which far outperforms the treatment effectiveness of conventional septic systems. These systems have been installed in larger numbers and represent a proven technology with EPA reporting on the high treatment efficiencies. Presently, the applicant operates a number of septic tanks which are pumped at shorter intervals, where the septic sludge is being disposed of by a certified pumper in accordance with county ordinances.

Alternatives Analysis and LEED certification strategy

The decision to develop the lower portion of the site to LEED Silver certification standards was motivated by the objective to ensure that a comprehensive mitigation strategy is employed for those areas of the proposed site that are closest to sensitive areas (e.g. Kawainui Marsh and the wetland area in the Kapa'a Stream corridor). The applicant is pursuing a strategy of focusing the bulk of sustainable development measures in the lower portion of the site. The fact that the lower but not the upper portion of the site is within the SMA district emphasizes the need that the lower portion be developed with low impact building technologies and site development measures. The applicant is not, however, opposed to consider LEED certification for the upper portion of the site.

Development and Nature of Business:

The predicted length of the development of the proposed project to full build-out is approximately 15 to 17 years. This length of development is based on the predicted time period it will take the Koolaupoko region to absorb the approximately 600,000 square foot of additional industrial space. It is planned to develop the proposed project in a series of phases, where the two major development milestones are the development of the upper and the lower portion of the site.

In both the upper and lower portion of the site the sequence of construction will be similar, which first entails the site preparation, including establishing final grade, installing roadways, parking areas and landscaped areas, followed by the construction of individual warehouse structures. The extent of the site preparation is different for the upper and the lower portions of the site. In the upper portion of the site the existing grade is very close to the final grade, thus site preparation would require only very limited grading. Grading in the lower portion of the site would be more extensive.

Once the site is prepared, individual warehouses and ancillary structures, as needed, will be built in accordance of the actual absorption rate of the industrial space in the region.

Since the site preparation, including grading, road construction and infrastructure development, at the beginning of the project will cause more impacts than the construction of individual warehouses, the overall impacts will not differ significantly between scenarios that differ in the date of full built out. A longer development period, as delineated in the EIS, has benefits of specifically reducing traffic impacts and implementing traffic impact mitigation measures over time and adapting the traffic mitigation the actual traffic situation.

But again, if the development time were ten years rather than 15 years there would be little consequence on the ability to mitigate impacts. The one obvious consequence would be to conduct a new traffic impact assessment not after about seven years, e.g. at project midpoint, but maybe already after four to five years. The new TIAR would then be used to strategically design and implement traffic mitigation measures, if they are deemed necessary at this time.

The intended market of the proposed light industrial park are new companies, companies that are relocating and new branch operations from existing companies. One important objective for these companies is being able to serve the windward from a place of operation within the region. A survey conducted for the EIS indicated that close to 60% of the employees of companies that lease industrial space in the existing warehouse development reside in the greater Kailua–Kaneohe region. Furthermore, about 85% of the companies presently leasing space are smaller companies with up to nine employees. Those companies typically operate closer to the place of residence of the proprietor. It is expected that this trend will continue also in the future. There can of course be no assurance that companies which serve an island market will not seek space in the proposed industrial park. In the end, the location of the park and the resulting advantages in regard to costs and convenience of employment and service providers closer to home, will be the determinate factors that mostly windward companies will seek to lease space in the proposed light industrial park.

Speaking about the future of business cannot be done without considering initiatives to develop Hawaii in a more sustainable manner. Among many other good strategies to implement more sustainability in Hawaii's economy and way-of-life, it is important to bring the place of employment, commerce and recreation closer to the residents. Increased food production in Hawaii and using more indigenous forms of energy will lower the amount of shipping outside products and energy to the islands. Lowering transportation fuel in the future will be a key objective as the world transitions away from conventional forms of energy; where petroleum plays a key role. Since Hawaii is enormously dependent on imported petroleum such measures that decrease transportation fuel and fuel for electricity generation will need to be implemented at a larger scale in Hawaii. The proposed project

of providing more industrial space at a location where it is urgently needed will assist Hawaii's economy and residence in reaching more sustainability.

The key challenge for the proposed light industrial park is to implement the project, which obviously creates significant benefits of the community, using low impact building technologies and thereby lowering the impacts to the environment and the community as much as is economically feasible.

Wastewater treatment and Disposal

Consultations with the DoH wastewater branch have determined that the proposed on-site wastewater treatment design would be consistent with standards and that a system using the proposed number of individual treatment units would approved. The current on-site wastewater treatment for existing warehouses within the upper portion of the site is using conventional septic systems. The new warehouse that will be built within the upper portion of the site will also treat the wastewater with conventional septic tanks. Percolation tests have been conducted before construction of these septic systems and the tank capacity and dimensions (e.g. hydraulic loading) of the leach fields concur with the code requirements.

For the lower portion of the proposed site warehouses will collect wastewater in conventional septic tank, one septic tank per approximately two warehouses (depending on the size of the warehouses). The individual septic tanks will be connected via a septic tank effluent pumping (STEP) systems. The effluent within the STEP system will be conveyed to two or more alternative septic systems at the perimeter of the development footprint in the lower portion of the site. The type of alternative septic system selected for the lower portion of the proposed site will use recirculating sand filters, which add aerobic digestion, filtration and adsorption processes to the treatment steps in conventional septic systems. Alternative septic systems with recirculating sand filters and an anaerobic sump pump are highly efficient and robust wastewater treatment systems, which, according to the EPA, have significantly higher BOD, TSS and nutrient removal rates than conventional septic systems.

Furthermore, since the treated wastewater effluent will be used for drip irrigation as the preferred below ground disposal technology of choice, the filtered effluent will offer little operational difficulties such as clogging and poor distribution due to organic overloading. As pointed out in the DEIS the location of effluent injection, e.g. application in irrigation, will be at the perimeter of the lower portion of the site. Landscaping will occur in these

perimeter areas and the configuration of the effluent injection fields will be in accordance with standard requirements, including the require setback from wetlands and streams.

NPDES Permits for Discharges of Stormwater Associated with Industrial Activities

The EIS discussed issues of stormwater associated with industrial activities and states that no business activities in the future development would have pollutants exposed to direct rainfall, since all business activity would be conducted within the warehouses, and therefore businesses would be exempt from the NPDES permit requirement of stormwater discharge that is associated with industrial activity. In cases where precipitation could come into contact with listed equipment and/or stored agents the operator will need to communicate with DoH to satisfy all NPDES permit requirements.

Stormwater and Non-stormwater discharges from other Point and Nonpoint Sources

The EIS listed the underground injection control as a “possible” permit requirement. At this point it is not anticipated that such a permit will be required under the current design of the proposed light industrial park. Therefore the underground injection permit will be removed from the list of possible permits.

Uncertainties of the site details, input rates and cumulative impacts

The expected quantitative and qualitative levels of impacts delineated in the EIS are based on the layout and configuration of the proposed project resented in the concept design of the EIS. Since the EIS is only the first step in the permitting process the project design will be refined for the subsequent zone change request and SMA permit application.

Specifically, an updated Materplan will be developed in conjunction with the zone change request. The updated Masterplan will be provided more detailed design information than the concept design of the proposed light industrial park, such as updated site plans, updated drainage system, revised traffic analysis, rainwater harvesting system, identification of the load bearing capacity of the soil on the former landfill, and assessing the capacity of installed photovoltaic energy generation. The updated Masterplan is delineated in the FEIS as an “unresolved issue”.

Furthermore, as you recommended, the FEIS contains a discussion of cumulative impacts. This discussion is resented in the new Section Six of the FEIS.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

Hawaii's Thousand Friends

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March 28, 2011

Letter No.14

Mr. Mike Watkins
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Subject: Kapa`a Light Industrial Park in Kailua
Draft Environmental Impact Statement

Hawaii's Thousand Friends has the following comments, questions and concerns regarding environmental impacts from the proposed industrial park expansion and zone change requested in this DEIS.

To understand the single and cumulative environmental impacts on Kapa`a Stream and Kawainui Marsh it is important to know the history of the 853-acre Kapa`a Valley where the Kapa`a Industrial Park is located.

- In 1949 Kapa`a Quarry operations began and farming was still active.
- In 1952, a raised roadbed Kapa`a Quarry Road segregates approximately 35 acres of wetland from the main Kawainui Marsh.
- In1965 now fallow agriculture land and enclosed 35-acre wetland area became a refuse dump. Overburden from the quarry was used to cover the refuse. The fill raised the land level an estimated 6-20 feet over about 23 of the 35 acres in the lower wetland area. Immediately south of this filled refuse area, overburden from the quarry created a flat 22-acre plateau at an elevation of about 40 feet over the previous agricultural lands and stream channel. The fill pushed the streambed near its present course and isolated the drainage canal/pit along the quarry road from any surface water flow. This is the area the applicant is seeking rezoning from P-2 to I-1.
- 1970, City and County opened a controlled Kapa`a landfill within the old quarry excavation. This landfill received about 4.5 million tons of municipal solid waste until closure in 1996.

- In 1972, H-3 construction filled the eastern side of Kapa`a streambed. Numerous drainage crossings were made through the foundation of the freeway. When the section of freeway through the valley was completed, it created approximately 13 acres (2% of the watershed) of additional impermeable surface.

- In 1975 (approx.), first 2 warehouse buildings were constructed on the 22-acre quarry-fill plateau. This is the beginning of the Kapa`a Industrial Park.

- In 1990s, a dozen 2000 sq. ft. Quonset huts were constructed on the quarry-fill plateau.

- In 2010 there were 31warehouses with 283,00 sq. ft. of leasable space on the existing I-2 (Intensive Industrial) zoned 27.3 acre industrial park.

- In 2011 the applicant is seeking to expand the existing industrial park, which is zoned I-2 (heavy industrial) by requesting a zoning change from P-2 (General Preservation) to I-1 (Light industrial) for two parcels an 11-acrea area by H-3 and a 44-acre parcel next to Kapa`a Quarry Road

- The new development would add 35 new warehouses and approximately 606,000 sq. ft of industrial space and at build out the estimated added work force would be approximately 600 employees, double the number of warehouses and triple the industrial space and workforce currently there.

Kapa`a Stream

The two mile long Kapa`a Stream, adjacent to Kapa`a Industrial Park and the receiving water body for runoff and effluent from the industrial park, flows to Kawainui Marsh and beyond to the Oneawa Canal, Kailua Bay, and Pacific Ocean, has a baseflow averaging about 1 cubic foot per second beginning at an elevation of about 115 feet near the central part of the 825-acre Kapa`a watershed. During non-runoff conditions this baseflow is sufficient to feed at least two year-round pools along its length before entering a permanent channel at sea level of Kawainui Marsh.

Kapa`a Stream is a Class 2 Inland Stream (DOH Water Quality Standards §11-54-5.1). The objectives of Class 2 waters, as they apply to Kapa`a Stream, are to protect its uses for recreational purposes, the support and propagation of fish and other aquatic life, and agricultural.

Kapa`a is identified as a TMDL (Total Maximum Daily Load) Stream in order to achieve and maintain water quality standards and identify the total loads of suspended solids, nitrogen, phosphorus, and metals that can be delivered to Kapa`a Stream without violating Hawaii's water quality standards.

The 2004 DOH List of Impaired Waters prepared under Clean Water Act §303(d) identified water quality in Kapa`a Stream as impaired because of elevated concentrations of turbidity, total suspended solids, nutrients, and metals in the stream. High levels of turbidity and suspended solids have historically resulted from storm runoff and discharges of wash water from the quarry. With nutrient (nitrogen & phosphorus) and metals contamination have been found in monitoring wells around the unlined landfills adjacent to the stream. Other water contamination sources include light industry operations and erosion in upstream conservation lands.

Development in the Kapa`a 850 acre watershed in past 60 years has included:

- Major quarry activities in 2 locations
- Two municipal landfills
- One unrecorded County refuse disposal landfill
- Deposition of quarry materials over wetlands and mid-valley stream course, construction of H-3 through the center of the valley, development of Kapa`a Quarry Road and development of multiple light industrial business uses on lands filled over the historical streambed.

All these activities have had significant impacts on the stream and water quality and it is doubtful that any significant length of the present streambed is in its original condition or location.

The 2006 DOH Total Maximum Daily Loads (TMDLs) for Total Suspended Solids, Nitrogen and Phosphorus in Kapa`a Stream Report set forth a roadmap to improve water quality by requiring the respective permittees, the City and State DOT, to develop Wasteload Allocation (WLA) implementation and monitoring plans for no more than one newly approved TMDL submittal per year.

Given the protected status of the Kapa`a Steam and receiving waters of Kawainui Marsh and the magnitude of government and community resources already dedicated to repairing and managing these wetlands, it was hoped that the permittees would address each of the Wasteload Allocations (WLA) identified in the report within one year of the approval of the TMDLs.

Each of the WLA was to identify specific actions targeted to achieving the needed reductions of total suspended solids, total nitrogen, and total phosphorus. Each of the WLA monitoring plans is required to specify the water quality monitoring and activity tracking necessary to demonstrate compliance with the assigned WLAs.

In addition the 2006 report recommended that other NPDES permits that regulate discharge to Kapa`a Stream be revised to incorporate provisions consistent with the WLAs.

The DEIS does not discuss the industrial parks current storm water discharge amounts and contents that discharge into Kapa`a Steam. Nor does the DEIS provide an inventory of tenants of who are covered by or required to be covered by NPDES permits especially those with related industrial discharges. Is the industrial park required to

develop Wasteload Allocation implementation and monitoring plan(s)? If yes, is that plan(s) available for review? If not, the applicant must explain why a WLA is not required for the industrial park and individual businesses. Until this information is provided this DEIS cannot be accepted.

2.9.2 Making Changes to the Drainage Canal Along the Quarry Road

The space mauka of the Quarry Road, illustrated by Figure 2-12, holding extraordinarily pollute waters and algae has never been described as a "canal" or "drainage canal" in other projects or proposed actions taken or to be taken at this location by its earlier owner/users, such as Ameron Kapa`a Quarry (formerly located at the proposed site), or the Honolulu Department of Public Works (DPW) who used the former quarry pit and the adjacent Kapa`a hillside for the Kapa`a landfill, beginning in 1972. Indeed, this label was not given to these stagnant, fetid waters mauka of the Quarry Road in the federally funded Coastal Zone Management Fund, entitled as the "Kawainui Management Plan" created by the State Department of Planning and Economic, Development (chaired by the state's chief planner, Hideto Kono), aided by representatives of the Army Corps of Engineers, the State agencies of DOFAW and the Historic Preservation Office, with citizen groups such as The Outdoor Circle and the Congress of the Hawaiian People. Hawaii's Thousand Friends is unaware that any of the subsequent Kawainui Plans created jointly by the U.S. Army Corps of Engineers and the State lead agency, DOFAW, have ever called these waters a canal.

The waters are there because DPW, in order for them to be in concert with the federal Clean Water Act, were required to prepare lined pits below the monumental landfill, to allow liquid drainage from the landfill to be scientifically tested regularly in order that its many and varied pollutants were known and dealt with in order that they might not reach the Kawainui Wetlands. The materials contained in the landfill were known to contain materials no longer legal to be placed in landfills.

Ownership of the responsibility to protect Kawainui's waters go with the land owner, and we further believe these pits (NOT a canal) need to continue to be re-lined (to prevent leaching) and that samples be taken for laboratory testing on a regular basis; the results to be provided to state and federal agencies charged with protection of the Kawainui waters, and to the benefit of the public investment in the area. The Marsh was purchased with federal funds on behalf of the four endangered wildlife species whose habitat it is. Additional public funding has been provided to DOFAW and the COE for long-range planning for limited public use at Kawainui. Thus, tax-supported agencies have embarked on marsh restoration through eliminating uses harmful to its waters. Heretofore, the County has NOT spent "public money ... continuously.... to improve its appearance," but because it was mandated to prevent leaching or run-off of contaminants into the protected wetlands. The public federal and state funds already expended for the purchase and protection of the Kawainui Wetlands and its waters, which drain to the sea, cannot be compromised for an adjacent and private profit purpose.

That the alternative the present landowner requests, to fill the existing drainage pits (NOT a canal!) and manipulate the waters via "A drainage pipe ... installed at the bottom of the canal trough to collect and convey drainage water towards the Kapa`a Stream" is wholly unacceptable. His intention to "beautify" an area of interest to him begs his larger need to protect public property and to realistically deal with the undesirable fact that this great landfill will continue to leach its noxious pollutants into the marsh for years to come, facts he must accept and deal with. His proposal, in effect, is an opportunistic request that he be allowed to shirk his own responsibility for protecting Kawainui from further man-initiated damage.

This plan will not enhance the decades-long public expectations for the publicly-owned and revered "Kawainui Cultural, Archaeological and Historic District," now also recognized under the Ramsar Convention as *A Wetland of International Importance*.

Specific Questions

1. The DEIS is silent on whether all or portions of the industrial park businesses will be opened 24 hours or what the hours of lighting at the park would be. How might 24 hour lighting affect migrating water birds and birds in Kawainui Marsh? How would 24-hour noise pollution affect nesting birds?
2. Since Koolaupoko is projected for negative growth for the foreseeable future where is the need to change a 22-acre area and a 44-acre parcel from P-2 to 1-1 Light Industrial and what population will the new industrial park serve?
3. The DEIS states "Air quality impacts would be primarily from increased traffic. Some minor air impacts within the proposed project could result from dust and the operation of engines. Major air impacts are expected from diesel operated vehicles."

   This statement seems to only refer to projected traffic within an expanded industrial park and trucks that currently use Kapa`a Quarry Road. There is no mention of other Quarry Road users and the cumulative impacts such as the possible 100 trucks operating 20 hours a day for 6 months carrying blue rock to Kapa`a Quarry from the Kaneohe-Kailua Wastewater Conveyance and Treatment facilities Project if the Oneawa Hills alternative is chosen. Before the DEIS is approved **all** cumulative impacts from diesel operated vehicles on air quality must be evaluated for impacts to Kapa`a Stream and Kawainui Marsh

4. The DEIS states that "The development of the landfill area will reduce problems of soil erosion and resulting runoff" but fails to explain how soil erosion and runoff will be reduced when the current pervious surface will be converted to a impervious surface. Since soil runoff eventually ends up in Kapa`a Stream and Kawainui Marsh a comprehensive explanation of this statement must be provided before this DEIS can be accepted.
5. The DEIS states "Drainage will be by shallow swales in the roadways, below ground pipes and channels. There will be two detention ponds, sized according to code, which will drain the storm water from primary treatment in the detention

ponds into the open space north of the existing development" but fails to identify where the "open space" is and whether the open space is Kapa`a Stream corridor as is now the practice.

6. Section **2.9.6 Development of the upper portion without approved zone change** identifies 6.2 acres of presently graded land in TMK 4-2-15:008 and zoned I-2 (Intensive Industrial) that could be paved and 9 new warehouses could be built adding a total floor space of 182,000 sq. ft. In other words if this DEIS and the re-zoning are not approved the landowner is not denied use of his property.
7. The DEIS states that the industrial park is not connected to the municipal sewer system since there is no gravity sewer or forced wastewater main serving the property or along Quarry Road. If the Oneawa Hills route is selected for the Kaneohe-Kailua force main then there is an opportunity for the industrial park to hook up to that force main. This opportunity must be explored before this DEIS is accepted because wastewater cannot continue to be dumped into Kapa`a Stream and migrate to Kawainui Marsh and Kailua Bay.
8. The DEIS states that that there will be regular inspection of erosion and sediment control BMPs especially after each rainfall but is silent on who will conduct the inspection and what is the course of action if any of the containment procedures is breached. Before this DEIS is accepted this information must be provided to ensure that Kapa`a Stream and Kawainui Marsh are protected against any adverse and unnecessary sediment loading.
9. The DEIS states that 21.7 acres would be converted from pervious to impervious surfaces – 10.6 in the upper section and 11.1 in the lower portion and that rain and runoff from "impervious surfaces in the upper portion would be directed to the Kapaa Stream corridor where the water would infiltrate and recharge the groundwater table in the wetland area". It is unacceptable to keep directing polluted runoff into Kapa`a Stream. As an impaired waterbody under the Clean Water Act and a TMDL site all efforts must be made to improve Kapa`a Stream water quality and reduce total suspended solids, total nitrogen, and total phosphorus levels. Kapa` a Stream cannot continue to be the repository for polluted runoff and effluent.
10. The DEIS states that the lower 44-acre portion is a mixture of landfill and quarry material. So the acknowledgement that "Potential building limitations for soils might include limitations to load-supporting capacity of soil within the lower portion" leads us to believe that soil testing for stability, depth and weight capacity for this and other areas has not been conducted. In other words the applicant is seeking a zone change before know if the ground is suitable for development. Information on the stability of the soil is vital and must be provided before this DEIS is accepted and zoning changes approved. This information is vital because once zoning is changed to allow industrial uses there is no denying development no matter how unstable the soil.
11. The DEIS states "It is **assumed** that the overall removal rate of storm water pollutants by the combined system of pre-treatment units and extended detention ponds would exceed 80%." (Emphasis added). The DEIS is a disclosure document and outcomes should not be assumed but only facts should be presented. Before this DEIS is accepted a comprehensive analysis of ALL pre-treatment units and detention ponds must be conducted and included in the FEIS.

12. The DEIS acknowledges that the "US Fish and Wildlife Service has indicated the possibility of an impact on the water bird community, especially attracting endangered water bird species to water ponds even those ponds which have only intermittent free water surfaces. The final design of the detention ponds would consider mitigation and avoidance measures to counter attraction to the detention ponds" yet there is no description of the types of mitigation and avoidance measures that would be used. As more and more waterbirds are attracted to newly created wetlands and habitat in Kawainui Marsh the more likely the waterbirds are to be attracted to the detention ponds. Before this DEIS is accepted a full and comprehensive description of mitigation and avoidance measures must be provided, reviewed and accepted by the U.S. Fish and Wildlife Service.
13. Section **4.8.2 Impacts on Wastewater System** states that septic tanks with leach fields will be used but the DEIS does not identify where the leach fields will be located and their impact(s) on the environment. This information must be provided and evaluated for impacts to the environment before the DEIS is accepted.

This information is critical in light of another statement in the DEIS that "On site wastewater treatment systems in the lower portion would be closer to surface and ground water than such systems in the upper portion. The infiltration points of several leach fields in the lower portion of the site would have short vertical and horizontal distances to travel, and there would be a <u>probability of insufficiently treated wastewater reaching the ground table and/or seeping into the Kapaa stream corridor or drainage canal</u>." (Emphasis added)

With information in the DEIS suggesting that "insufficiently treated wastewater" could reach Kapa`a Stream or the "drainage canal"/pit which leaches into Kawainui Marsh Hawaii's Thousand Friends once again stresses the importance of the industrial park hooking up to the City's municipal sewage system.

It is the City and the landowner's, applicant, responsibility to ensure that the "drainage canal"/pit is lined and the water tested so that pollutants are prevented from entering Kawainui Marsh and eventually migrating into Kailua Bay. It crucial for the City and the applicant to create a plan outlining a water testing schedule and explaining how and when the canal/pit will be lined before the DEIS is accepted.

14. The DEIS clearly misses the point of assessing cumulative impacts from not only within the project area and but also including actions/projects around the study area when it states "Both action alternatives could potentially result in cumulative impacts if they were adding to impacts generated by other future projects" and "Since no additional project of the nature of the proposed project or other development project is known that might be implemented in the vicinity of the proposed project no cumulative impacts are expected under both action alternatives."

The DEIS does not take into consideration cumulative impacts from construction of restrooms with leachfields and truck traffic associated with the expansion of the

model airplane park directly across Kapa`a Quarry Road from the proposed industrial park expansion and within the boundary of Kawainui wetland.

Nor does the DEIS consider additional heavy truck traffic from the Kaneohe-Kailua Wastewater Conveyance and Treatment Facilities Project should Oneawa Hills be selected as the preferred alternative or increased truck and car traffic as DLNR's project to open wetlands at Kawainui Marsh for waterbird habitat proceeds and more and more people visit the newly created wetlands.

The DEIS does not take into consideration traffic to and from the existing transfer station and quarry nor does it explore the cumulative impacts should Kapa`a Quarry be chosen as the next landfill site.

Before the DEIS can be accepted all impacts from within the existing industrial park and proposed expansion and outside current uses and proposed projects must be evaluated for their cumulative impacts on Kawainui Marsh.

15. In a 7/28/10 letter the Army Corp recommended that a thorough aquatic resource survey, describing any wetlands, drainage ditches, gulches, gullies, streams on-site. Was such a survey conducted?

16. In a **8/11/10 letter the DOH Safe Drink Water Branch** recommends that the drinking water and non-potable irrigation water systems be carefully designed and operated to prevent cross-connections and backflow conditions. They went on to "strongly encourage" the project owners to develop a water system management plan detailing the quality of the non-potable water, who will be responsible for and how the drinking water and non-potable systems will be operated and actively managed. Did the applicant create the recommended plan? It was not in the DEIS.

17. **It is unacceptable to state,** "Due to the considerable dimensions of the marsh, most of the environmental consequences of the proposed project would only affect a small part of the marsh. The impacts and mitigation measures discussed hereafter are therefore only limited to an area of the marsh that is directly adjacent to the proposed site."

    This comment treats Kawainui, the receiving water body for all of Kapa`a Valley, like it is an inanimate object and not influenced by actions mauka of the marsh. This is totally wrong.

    While separated from what is now considered Kawainui Marsh, there once was a 35-acre wetland mauka of Kapa`a Quarry Road which was part of the same wetland now called Kawainui Marsh. In the 1960s the 35-acre wetland was used as a landfill and now the applicant is seeking to use this former wetland turned landfill as an industrial park. Though artificially bifurcated by Kapa`a Quarry Road Kawainui is still connected by tidal action and water leaching under Kapa`a Quarry Road.

At about 1,000 acres Kawainui is the largest remaining emergent wetland in Hawai`i and Hawaii's largest ancient freshwater fishpond. Kawainui provides habitat for four of Hawaii's endemic and endangered waterbirds, and a migration path from the ocean to mountain streams for indigenous and endemic amphidromous fish and crustaceans, including indigenous goby, endemic goby, endemic eleotrid and endemic shrimp. Kawainui contains archaeological and cultural resources, including ancient lo`i and is eligible for listing on the National Register of Historic Places. Kawainui/Hamakua Marsh Complex is Hawaii's and the Pacific's only *Wetland of International Importance* under the Ramsar Convention.

Kawainui has undergone significant decline in area and quality. In general, neither the quality of water of the streams entering Kawainui nor the quality of the estuarine water draining the marsh meet Hawaii's Water Quality Standards. In addition the marsh contains heavy metals, including chromium, lead, and mercury.

Needless to say this DEIS and the project that is proposed is totally deficient in scope and understanding of the surrounding environment. With this statement there is no way this DEIS can be accepted as complete and comprehensive.

In conclusion, it is unwise to sacrifice the public interest that is vested in preservation land, Kapa`a Stream and Kawainui Marsh in order to simply accommodate financial interests. Note that no matter what the promises of the petitioner are, there is no control over anything once the re-zoning is granted. All and any uses under I-1 Industrial are allowed.

The risks to Kawainui Marsh and Kapa`a Stream are manifold and Hawaii's Thousand Friends does not see how they can be mitigated. Traffic impacts on Kawainui cannot be mitigated and neither can the impact on the view plains.

Increased runoff and effluent continually 365 days a year migrating forever into Kapa`a Stream and Kawainui Marsh cannot be mitigated.

Hawaii's Thousand Friends cannot support giving over preservation land to help destroy what is a scenic resource and expose Kawainui Marsh a *Wetland of International Importance* under the Ramsar Convention to the pollution risks associated with the proposed expansion of industrial use. Future generations would be sure to exclaim, "How could they let that happen." And the "they" would be us.

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September 14, 2011

Response to letter No.14

Hawaii's Thousand Friends
25 Maluniu Avenue, Suite 102, PMB 282
Kailua, Hawaii 96734

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letters dated March 28, 2011

Dear Sir or Madam,

Thank you for your comments and recommendations in your subject letter.

In this letter we offer our responses to your comments and recommendations, grouped according to the issues discussed in your letter.

The applicant is a strong supporter of community activities that preserve the environment and particularly the Kawainui Marsh and the adjacent land and wetland areas, since they are important for our community. On many occasions the applicant has donated financial and logistic assistance to community groups who work for improvements and conservation of the environment and foster public information and educational opportunities.

While the applicant wants to develop the proposed site into a light industrial park that can provide urgently needed industrially zoned land to businesses in the greater Kailua and Kaneohe region, he has committed to develop the proposed industrial park along comprehensive low impact development plan, that is designed to achieve the Leadership in Environmental and Energy Design (LEED) Silver certification, in order to minimize impacts to the environment and community to the extent possible.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins.

The following are our responses to the comments in your subject letter, grouped according to the issues discussed in your letter.

On the first two pages you provide a description of the historic development of the Kapa'a valley, including the proposed site, and the proposed development goals of the proposed project, the Kapa'a Light Industrial Park. We would like to add to your description that the of the applicant intends to build a light industrial park on about 26.5 acres of land that is located within approximately 58 acres of land that is currently zoned as General Preservation. In addition, the applicant plans to expand the existing industrial warehouse development because the Koolaupoko region is significantly undersupplied with industrial zoned land and many windward companies cannot find space to expand and relocate within the region.

On page two and three your letter discusses the Kapa'a Stream with regard to its function as the main discharge for the Kapa'a watershed area. Your letter quotes the 2006 State of Hawaii Department of Health (DoH) Total Maximum Daily Loads (TMDLs) for Total Suspended Solids, Nitrogen and Phosphorus in Kapa'a Stream report and suggests the implications of the TDML program for the Kapa'a Stream. Our analysis of the contribution of the proposed site to the overall discharge in the Kapa'a watershed and the Kapa'a Stream uses data on the hydraulic model, assumptions and result reported in this 2006 DoH Study. The quantity and quality of stormwater runoff from the proposed site would be significantly reduced in comparison to the current situation because presently un-stabilized soil areas would be either stabilized with added vegetation or with pervious and impervious pavement and a host of structural BMPs would be installed, as further delineated later in this letter.

Under the Preferred Alternative of the proposed project and in the lower portion of the site, where the soil erosion potential is larger than in the upper portion of the site, analysis of the future runoff indicates that the TSS loading would be reduced by at least 80% relative to the current levels of TSS. This reduction of runoff loading is achieved by a combination of structural and non-structural BMPs. The non-structural measures include comprehensive soil stabilization on all parts of the development. Under the current situation all soil in the lower portion of the site is not stabilized. This can result in soil erosion, entrainment and subsequent discharge of suspended solids into receiving water (e.g. Kapa'a Stream and wetland area). Structural BMPs will comprise inlet filter basins and sedimentation traps that will also remove all floatables and oil and grease from the runoff before the runoff enters detention ponds (e.g. the below ground detention ponds which also function as rainwater catchment).

Stormwater runoff stored in the detention ponds is then released to the receiving water with low discharge rates over a 24 to 48 hour period, thus in a manner the shaves off high run and thus significantly reduces streambed erosion and subsequent sedimentation. As a change from the original concept design the applicant will now utilize below-ground detention basins since all open water surface ponds should be avoided to protect endangered water birds.

The analysis conducted for the EIS shows that the discharge of TSS and nutrients will be reduced to such a level that conforms to the objectives of the TDML study and program. The applicant supports effective initiatives and programs to improve the quality of aquatic water bodies in the vicinity of the proposed site, especially the Kapa'a Stream which runs through the applicant's property for approximately one fifth of its entire stream length.

The applicant was in contact with the DoH and discussed proposals to improve the quality of the Kapa'a Stream corridor by means of a restored wetland area and an integrated wildlife habitat. This project was discontinued because of concerns that the removal of a significant amount of wetland vegetation would decrease the water treatment capacity of the lower stretches of the Kapa'a Stream. The applicant is still very interested and will continue to work with the community as well as the state and federal agencies to implement initiatives that improve the environmental and water quality of the land and he aquatic bodies in the vicinity of the proposed projects site.

Page 4 – Making Changes to the Drainage canal Along the Quarry Road

We understand that you do not agree with our use of the designator "canal" for the open drainage feature along the quarry road, just adjacent to the proposed site. We believe that our use of the term "canal" to describe this water body is consistent with literature cited in the DEIS. Furthermore, our use of the term "canal" or "drainage canal" has not been objected to in communication with other County, State or Federal groups.

The drainage canal is referred as a "canal" in the 2006 TDML report issued by the DoH (DoH, 2006); this report that has been quoted by you above. The purpose of the canal, in the watershed model of the DoH report 2006, is to drain stormwater from the sub-basin K of the watershed to the Kapa'a Stream. The sub-basin K represents the lower portion of the proposed site. In the hydraulic model of the DoH report the stormwater flows from the canal to the Kapa'a Stream, where the confluence of the drainage canal and the Kapa'a Stream is just upstream of the culvert under the Kapa'a Quarry Road.

Discussions with environmental experts, such as the University of Hawaii, Water Resources center, have corroborated our understanding that the current function of the drainage canal

is to drain stormwater from the area mauka and adjacent to the lower portion of the proposed project site and convey it to the Kapa'a Stream, from where it drains into the Kawainui Marsh. We could not ascertain if the initial intent of the drainage canal at the time of its construction was different from the current function as an unlined drainage canal.

Moreover, your reference to the canal as a lined pit into which water would drain and be contained, without drainage, raises the question of how the water captured in the lined pit would be removed. Since the lining would prevent infiltration and there would apparently be no direct exchange with the Kapa'a Stream, the only way to remove water volume, other than periodic removal of water from the area by means of a tanker truck, would be by means of evaporation. Since it has been reported that surface runoff from the adjacent roads and the site enters the currently unlined drainage canal and causes flooding on adjacent roadways, it appears that lining and hydraulically isolating the "pit" would create more problems rather than improve the situation.

Under the Preferred Alternative less water will infiltrate into the landfill area and thus less seepage can be expected to leave the landfill body and enter the drainage canal. Therefore less potentially contaminated waters would enter the canal and eventually flow towards the Kapa'a Stream.

The referred to "alternative" of replacing the canal with the drainage pipe that would discharge seepage and surface runoff to a point just upstream of the confluence of the Kapa'a Stream and the drainage canal is a possible future scenario that has only been stated as a possible scenario. The applicant does not intend to further analyze or implement such a scenario, since the applicant does not intend to alter the dimensions and geometry of the drainage canal. Thus, the "alternative" is a hypothetical situation introduced by the applicant in conjunction with plans by the community to build a marsh perimeter bike and pedestrian pathway within the space that is currently occupied by the canal.

To reiterate, the current development would not seek any changes to the drainage canal. A possible future alternative configuration of the drainage canal, e.g. placing a drainage pipe in the gravel filled current canal bed, would focus on increasing the safety of the quarry road and creating space for the planned Kawainui Marsh perimeter pathway. The marsh perimeter path masterplan suggests that a portion of the perimeter pathway would use land that is currently occupied by the drainage canal. The applicant would support and potentially co-fund to install an approximate 1,300 long portion of the marsh perimeter path on his property along the drainage canal.

The applicant will not seek any changes to the drainage canal against the expressed intentions of the community. The assertions made in the letter that the applicant is using an

"opportunistic request" to change the drainage canal in his favor portrays the applicant in an unduly negative light. It should be noted that the applicant has been actively supporting community efforts to improve the marsh and mitigate impacts. For example, in 2010 the applicant used his personnel and heavy equipment to remove about 40 abandoned cars along the quarry road and therefore avoid potential oil and other pollutants entering the marsh.

The applicant also recently donated about two acres of his property for the use of a community group that provides educational and recreational opportunities at the south western perimeter of the marsh. He actively supports the initiative to develop a cultural center at the perimeter of the marsh that would provide educational facilities and opportunities to residents and visitors alike. Therefore, while your letter might suggest that the applicant's plan to develop a portion of his property as a light industrial park is not enhancing public expectations for the revered "Kawainui Cultural, Archaeological and Historical District", the active support of the applicant for such initiatives and his commitment to develop with low impact technologies is a clear indication of his intentions to conserve our precious natural resources. The applicant appreciate if his intentions to invest in "green" developments were well received by the community and groups such as Hawaii's Thousand Friends.

Specific questions:

Question 1	The DEIS is silent on whether all or portions of the industrial park will be opened 24 hours or what the hours of lighting at the park would be. How might 24 hours lighting affect migrating water birds and birds in the Kawainui Marsh? How would 24-hours noise pollution affect nesting birds?
Our response	The future composition of tenants (e.g. businesses) in the proposed extension of the existing industrial park is expected to be similar to the current mix of tenants and businesses. The current tenants represent businesses, which operate mostly during the day, such as small wood manufacturing, building service and repair shops/businesses. While a certain level of activities during the night cannot be ruled out there should be very limited activities in the industrial park during the night, thus noise impacts should be very low and light pollution impacts should be limited, further reduced by the planned mitigation measures. The proposed development will implement active mitigation measures to

reduce light pollution as part of the LEED Silver certification goal of the development. The sustainable design approach of the EIS delineates mitigation measures how light pollution from interior and exterior light sources will avoided to achieve the most stringent light pollution reduction standard (e.g. IESNA RP-33 standard LZ zone "dark") set forth by the Illuminating Engineering Society of North America (IESNA). Typical developments in urban areas (e.g. the propose site is located in the State Urban district) would require less stringent light pollution mitigation efforts to achieve LEED credit, but the applicant has opted to go beyond the standard mitigation strategies for urban developments since the proposed development is close to the Kawainui Marsh.

Question 2	Since Koolaupoko is projected for negative growth for the foreseeable future where is the need to change a 22-acres area and a 44-acre parcel from P-2 to L-1 Light Industrial and what population will the new industrial park serve?
Our response	According to a recent estimate by DPP the Koolaupoko population will shrink by about 1,000 residents through the year 2030, due to outmigration from the area and other demographic changes in the population of the region (i.e. lower birth and increased death rates per number of residents due to an older population). This is a noticeable but not a significant change from the present approximately 118,000 residents that reside in the Koolaupoko region. The need for the proposed project is not motivated by a significant increase in population but by the fact that the Koolaupoko region is currently significantly undersupplied with industrial space. Such industrial space is needed by companies that provide typical services to the region from within the region. According to the market study conducted for this EIS process the Koolaupoko region provides only about 20% of Oahu's average per capital allowance of industrial space (Note: Oahu's per capita allowance is the available industrial space on Oahu divided by the number of residents). Using Oahu's average allowance of industrial space of approximately 39 square foot per resident the existing industrial space in the Koolaupoko

region serves only about approximately 24,000 residents. Thus at present there is an amount of industrial zoned space missing in the region that is equal to serving about 90,000 residents. Adding the approximately 600,000 square feet of industrial space in the proposed light industrial park would lower the under supply from 90,000 to 75,000 residents. Therefore the proposed addition of 606,000 would serve approximately 15,500 additional residents in the region, using the average Oahu availability of industrial space. In summary, the proposed addition of approximately 606,000 square feet of industrial space would still not be enough to provide the service required to adequately supply the region.

Direct consequences for companies, which wish or serve the region but do not have their place of business within the region, are long commutes and drives for their employees and customers who are residing in the Koolaupoko region, respectively.

Impacts that result from long commutes and trips required to reach businesses that cannot find adequate space within the region include, among others, increased traffic with associated discharge of greenhouse gases and consumption of petroleum as well as increased costs for businesses employees and customers.

Question 3	Recommendation to address cumulative impacts
Our response	Cumulative impacts have been be addressed in the new comprehensive Section 6 of the FEIS.
Question 4	The DEIS states that, quote:"The development of the landfill area will reduce problems of soil erosion and resulting runoff' but fails to explain how soil erosion and runoff will be reduced when the current pervious surface will be converted to an impervious surface. Since soil runoff eventually end up in Kapa'a Stream and Kawainui Marsh a comprehensive explanation of this statement must be provided before the DEIS can be accepted.

Our response

The sustainable design approach for the lower portion of the proposed light industrial park delineates the measures that will be used to significantly reduce soil erosion and avoid polluted run-off from entering the receiving waters without adequate treatment. At present the pervious surface in the lower portion of the proposed site does not have permanent vegetation, thus making the soil prone to erosion and increasing the probability of runoff containing entrained soil particles at locations of significant slopes and surface water flow in storm events.

The proposed measures to avoid soil erosion and entrainment of soil and their subsequent discharge to the receiving waters include comprehensive vegetative cover for soil stabilization, installation of sedimentation traps that also remove all floatables and oil from the runoff, detention ponds and catching a significant portion of regular storm events and using it for irrigation and thus stimulating evapotranspiration rather than runoff. All of the proposed measures working in concert offer an advanced and comprehensive strategy of stormwater treatment; the measures are described in detail in the DEIS.

When referring to stormwater runoff there are two parameters, quality and quantity of stormwater runoff that affect the overall magnitude of the stormwater impact:

Quality of stormwater runoff: Measures to limit the pollution of the stormwater runoff are reduction of entrainment and elimination of entrained material from the runoff. Reduction of entrainment is achieved by stabilizing soil areas as well as avoidance of solid debris and harmful liquid substances that can be entrained. Elimination of the entrained material can be achieved by installing the proposed pre-treatment units upstream of the detention ponds, which eliminate all floatable debris, settable sediments and oil & grease contained in the runoff.

Quantity of stormwater runoff: Measures that are proposed for the development include detention ponds that catch high discharge rates and release water subsequently at lower discharge rates from the temporary storage volume of the detention ponds. Furthermore the proposed stormwater management includes catchment and use of stormwater for irrigation and disposal on vegetated areas, mainly at the perimeter of the development footprint (e.g. restored habitats) as well to less degree inside

the development for landscaped areas. In addition, some of the precipitation is harvested and used in the buildings for wastewater conveyance and other appropriate greywater applications. The wastewater is then treated and subsequently distributed on the vegetated area at the perimeter of the development. Water is lost by evapotranspiration and only a fraction of the water that is distributed on the vegetated area would be surface runoff; which in turn has passed through a biological filter of denser vegetation.

In addition to surface runoff also seepage out of the landfill can add to the overall stormwater impact. The proposed site is a former landfill area. Avoiding rainwater infiltration into the landfill would avoid problems with seepage running out of the landfill. Allowing water into a landfill is typically a means to accelerate decomposition of the organic waste and reach equilibrium in regard to chemical and biological processes within the landfill body. The landfill that will be the future project site was closed to landfill deposits of quarry and domestic waste several decades ago and therefore it can be assumed that the landfill body has reached a chemical and biological equilibrium with most of the organics being decomposed.

Infiltration of precipitation into the landfill would serve the function of avoiding high surface runoff rates and retaining the rainwater inside the landfill for subsequent release at lower discharge rates. Since the quality of the runoff out of the landfill body could entrain and transport smaller soil particles, especially at higher flow rates, it is of advantage to limit the amount of water that infiltrates into landfill body.

Therefore, a combination of controlling and treating all of the surface runoff, using captured rainwater for irrigation and allowing only a portion of the precipitation to infiltrate into the landfill is deemed the preferred approach to a low impact stormwater management system.

This comprehensive stormwater treatment approach is part of the sustainable design approach of the proposed development. In the LEED certification strategy the stormwater management approach will be submitted to earn exemplary performance credits for low impact use of important water resources.

Since the concept design, that has been developed for the EIS is being

elaborated and refined as the project progresses, an updated project Masterplan will be developed in conjunction with the zone change request. The identification of soil bearing capacity of the landfill in the lower portion of the site will be part of the updated project Masterplan.

Question 5	The DEBE states "quote: Drainage will be in shallow swales in the roadways, below ground pipes and channels. There will be two detention ponds, sized according to code, which will drain the stormwater from primary treatment in the detention ponds into open spaces north of the existing development" but fails to identify where the "open space" is and whether the open space is Kapa'a Stream corridor as is now the practice.
Our response	The proposed drainage system of the upper portion of the proposed site (e.g. portions of the parcels TMK 4-2-15:001 and 008) consists of a combination of stormwater surface swales or channels that convey the stormwater to a two-step treatment system consisting of pre-treatment catchment unit and detention ponds. Downstream of the detention pond the stormwater is then discharged to open space adjacent to the development. The current design calls for discharge of the stormwater from the detention pond into the Kapa'a Stream corridor, via an armored spillway to the valley floor in order to avoid erosion of the sloped area below the detention pond. The current design follows established good management practices and lowers the impacts of stormwater discharge into the receiving water. An alternative to discharging the stormwater from the detention pond into the Kapa'a Stream corridor would be to use the settlement/flood basin that is located at the north-west boundary of the proposed site, within parcel TMK 4-2-15:001. This area could receive stormwater runoff from the newly developed area of the upper portion of the site. The flood basin at the west boundary of the landfill area in parcel TMK 4-2-15:001 was used for the discharge of stormwater from the upstream quarry. The stormwater discharge from the quarry entered the parcel TMK 4-2-15:001 through an energy dissipation chute and dispersed on the settlement/flood basin where the discharges water infiltrated and flowed underground to the Kapa'a Stream.

Under this alternative stormwater management the stormwater from the entire or parts of the upper portion would be conveyed towards the settlement/flood basin. One or more pretreatment units would be installed just upstream of the discharge to the settlement/flood basin to remove all floatable debris as well as oil and grease from the stormwater runoff. Under this alternative a detention pond would not be required since the settlement basin would act as a natural flood plain.

At this point the current design approach is using the Kapa'a Stream corridor as the direct recipient of the stormwater discharge. The alternative approach of using the settling basin as the receiving area for the stormwater discharge is only mentioned as an alternative. The alternative approach has not been analyzed in detail, e.g. in regard to creating open water areas that could attract endangered water birds. It is planned to investigate this alternative drainage approach in the updated Masterplan for the zone change request.

Question 6	Development of the upper portion of the site without approved zone change – In other words if this DEIS and the re-zoning are not approved the landowner is not denied use of its property.
Our response	The applicant is presently using his property in accordance with the current land use ordinances. As the letter correctly points out, the development of industrial space within only parcel TMK 4-2-15:008 would not require a rezoning by the applicant. Limiting the development of industrial space to this parcel alone would, however, make the plan of a comprehensive industrial development impossible, thereby making it impossible to provide a significant amount of much needed industrial space to the Koolaupoko region. As a consequence of curbing the expansion of the park to only the upper portion of the park only 5,000 additional, rather than the 15,500 planned, resident equivalents in the Koolaupoko region could be served by companies leasing space in the newly developed warehouses within the already properly zoned parcel TMK 4-2-15:008. A somewhat minor remedy for the applicant would be to seek an "as high as possible" development density for the already zoned parcel to accommodate as

much industrial space as possible in accordance with land use ordinances. This approach would not be the preferred one since the project might have little space left to accommodate the sustainable and low impact building technologies that are planned under the proposed development approach.

The Koolaupoko Sustainable Community Plan has identified the need for more industrial space within the region and recommends using and expanding the area in the Kapa'a valley that is currently used for light industrial space. Therefore the plan of the applicant is in conformance with sustainability plans of the community.

While your assertion might be correct that the applicant will benefit from his commercial endeavor of developing new industrial space, it is also the community that will benefit directly from added industrial space and new businesses and keeping expanding businesses within the region. Limiting the development to only one parcel that is already zoned as industrial space would deprive the region of needed light industrial space. The key of creating a win-win situation is to react to the need for more light industrial space within the region AND to develop these industrial spaces with low impact development strategies to minimize the impacts to the environment and the community.

Question 7	Recommendation to investigate connecting the proposed site to the municipal sewage system
Our response	Connecting the proposed site to the municipal sewer system has been considered and analyzed; but is not considered as a viable alternative for the proposed project. The suggestion in your letter to connect the proposed industrial park to the new sewer conveyance that will connect the Kaneohe wastewater pre-treatment plant with the Kailua wastewater plant appears not to be technically feasible and would result in more rather fewer impacts (i.e. electric power, which is derived from imported oil, for pumping, trenching along the quarry road and through possibly residential areas, microtunneling to tie into the gravity tunnel, etc.). The anticipated completion date of the Kaneohe-Kailua wastewater treatment and conveyance project is around 2017 (according to

communication with the City and County of Honolulu Department of Environmental Services), which would make it impossible for the proposed development to have a final wastewater discharge in operation for several years. Furthermore the geometry and alignment of the gravity tunnel route below the Oneawa Hill route would require a very costly installation of an approximately 6-inch forced main. In addition to this, your suggested solution would require crossing of several streets and neighborhoods.

In the absence of a connection to the municipal sewage system, using septic systems for onsite wastewater treatment is a well-tested and reliable process of treating wastewater discharges. According to the EPA, well designed and constructed onsite wastewater treatment is a valid and environmentally friendly alternative of treating domestic and commercial wastewater.

An approximately 1.2 miles long forced wastewater main would require a significant amount of electricity (80% of the electricity in Hawaii is generated by imported oil) to pump the wastewater from the proposed site to an appropriate take-over-point of the municipal sewer systems. The effluent characteristics of the wastewater treated in the central wastewater plant would not guarantee a cleaner effluent.

Furthermore, the most likely take-over-point for the sewage that would be pumped from the proposed site would be approximately 400 feet mauka of the intersection Mokapu boulevard and Oneawa Street, at the terminus of the sewer main that serves the adjacent residential buildings. From an initial capacity estimate it is doubtful that the existing sewer system could easily accommodate the added sewage quantity.

An on-site wastewater treatment system offers advantages and environmentally friendly performance. Currently, there are seven operating septic systems in the upper portion of the development, each with an individual leach field. The vertical distance between the point of injection and saturated water layers is adequate to ensure good treatment effectiveness in the unsaturated soil below the point of injection. The additional septic systems in the upper portion of the proposed site will likewise offer appropriate site specific conditions for an effective on-site wastewater treatment using conventional septic systems. The proposed on-site wastewater system for the lower portion of the site will use septic

tank effluent pumping (STEP) systems where individual septic tanks will pump their effluent to several alternative septic systems at the perimeter of the development.

The type of alternative septic system that is proposed for the project includes aerobic and anaerobic treatment process steps in addition to the standard treatment process in conventional septic systems. According to US-EPA, the additional process steps result in removal effectiveness in regard to suspended solids, organic loading and nutrients that is higher than for standard municipal wastewater treatment plants.

Therefore, summarizing, connecting the proposed site to a central wastewater treatment facility via a long force wastewater main would not result in lower impact to the environment and community.

Question 8	About regular inspection of erosion and sediment control BMPs and procedures of rectifying any breach of the containment measures.
Our response	As described in the DEIS, a soil erosion management and control plan will be developed and submitted for approval by the contractor before construction can commence. The BMPs proposed for the construction will be described in this plan and responsibility and procedure for inspection and measures in case of failure will be delineated in the plan. The contractor will be responsible to adhering to the plans and the penalties for non-compliance are significant. The inspection and maintenance of the structural BMPs during operation of the park will be carried out by or on behalf of the park operator, e.g. the applicant. Maintenance of the proposed structural BMPs will include periodic pumping of the sediment traps, cleaning of the catchment basins to remove floatables and replacing filters that remove oil and grease from the runoff. Furthermore, the integrity of the vegetated area and other soil stabilization measures as well as the irrigation system, which will ensure by the landscape maintenance crew.
Question 9	About converting pervious to impervious surfaces and the need for

	comprehensive measures to improve the water quality of the Kapa'a Stream
Our response	The applicant fully agrees with the letter that is it unacceptable to direct polluted runoff into the Kapa'a Stream. Therefore a comprehensive stormwater management approach will ensure that runoff is thoroughly treated before the stormwater enters the Kapa'a Stream corridor. The comprehensive treatment approach under sustainable design approach will ensure that stormwater is treated and managed appropriately before discharge into the Kapa'a Stream corridor occurs. The non-structural and structural BMPs used in the comprehensive stormwater treatment approach are described in detail in the EIS. The sustainable design approach of the proposed site includes harvesting rainwater and using it for irrigation of the restored habitat at the perimeter of the development footprint. Using harvested rainwater and collected stormwater for irrigation will ensure that less and more thoroughly treated stormwater will enter the Kapa'a Stream and wetland areas adjacent to the proposed. Furthermore some volume of the harvested rainwater that is used for the irrigation will be lost by evapotranspiration, thus reducing the amount of stormwater that will be discharged to the receiving waters.
Question 10	Loadbearing capacity of the soil within the lower portion of the proposed site.
Our response	The proposed site is a former landfill area, which contains a combination of inert waste (i.e. tailings and overburden of the now discontinued quarry operations) and municipal solid waste (MSW). In accordance with literature reviewed for the EIS we understand that the landfill should be composed of mostly inert waste and some quantity of municipal waste. Redevelopment of landfill areas that consists mostly of inert material is perhaps the easiest type of landfill to redevelop as environmental problems are minimal and conventional geotechnical ground improvement techniques can be used. Landfills that consist mainly of MSW are the most common forms of landfill and redevelopment of this type of landfill needs to consider more engineering and environmental aspects, such as

differential settlement, decomposition of organics resulting in gaseous and liquid agents that leave the landfill and need to be mitigated with appropriate measures.

Redevelopment of landfills, both for inert waste material and MSW, can use a wide range of established building and development technologies, depending on the type of uses, such as soft (i.e. landscaping, parks, etc.) and hard uses (i.e. buildings, infrastructure), or the amount of gas and leachate generated in the landfill, among others design considerations.

The right foundation technology is dependent on the vertical and lateral load bearing capacity of the land fill material and whether or not landfill gas might migrate out of landfill body. As a rule of thumb, redevelopment of closed landfills for hard use, such as intended for the proposed project, should not start within 10 years of the closure of the land fill operations. For the proposed project landfill operation discontinued more than 40 years ago and therefore the landfill should have reached a degree of stability that is necessary to substantially mitigate the engineering and health and safety concerns associated with waste degradation.

In general, there are two types of foundations used in landfill redevelopment- deep and shallow foundations. The proposed warehouses are relative light structures that could use shallow foundations, such as raft foundations. If found necessary some form of deep foundation might be considered for selected buildings, though deep foundations using piles are not anticipated to be extensively used for the proposed site, if at all.

The soil bearing capacity in the upper portion of the site has been investigated and the experience with the existing buildings at the site indicates that normal foundations can be used on the structurally stable land.

The soil bearing capacity within the lower portion of the proposed site and the most suitable type of foundation will be determined before construction of the structures will commence. At that time it will be determined which approach will be most appropriate for the foundation of the planned traffic areas and warehouse buildings. In addition to the buildings, an appropriate building approach must also be applied to the paved traffic area to avoid possible problems arising from differential settling. Even if

differential settling might occur there are tested and state-of-the-art construction and building methods available to manage unfavorable site conditions, which might occur but which are not expected given the experiences with the existing use and structures within the lower portion of the proposed site.

It should be noted that the intended use of the proposed site will be warehouse structures and possibly smaller baseyard operations. The business plan of the applicant does not comprise any high rise buildings or process facility, which would require advanced load bearing capability. The intended structures for the proposed site will use conventional foundations, such as slab-on-grade foundation. The present use of the site has indicated that the sub-grade represents a stabilized body that is deemed suitable for the intended type of structures.

It should also be noted that construction on landfills typically requires more effort in design, construction and operation and redevelopment of landfills is more costly that developing regular construction sites. The big benefit to the community is that redeveloped landfill area frees more valuable land for other developments in the community and therefore reduces the urban sprawl and resulting ecological stress to the environment.

The updated project Masterplan will address issues of soil bearing capacity using the more detailed layout information of the project.

Question 11	The DEIS states "quote: It is **assumed** (emphasis added) that the overall removal rate of storm water pollutants by the combined systems of pre-treatment and extended detention ponds would exceed 80%. The DEIS is a disclosure document and outcomes should not be assumed but only facts should be presented.
Our response	The reference to the "assumed", "anticipated" or "expected" treatment effectiveness in the EIS does not suggest that uninformed estimates are being used. Rather, cited references have been used to select assumptions of the treatment effectiveness, which are then used in the analysis. This approach is a scientifically correct method and should not be confused with estimating possible outcomes without substantiating

references.

The degree of effectiveness of treatment systems, such as pre-treatment units, detention ponds or alternative septic systems can be assumed for the proposed application by using actual field data that has been collected (e.g. by the manufacturer with citing what method has been use) or by using "expected" efficiency rates stated in scientific literature (e.g. publication by the EPA). In conventional process modeling "expected" or "assumed" values of parameter are used and applied to the quantities of the case to be analyzed.

For the analysis of the proposed project, for example, a combination of pre-treatment and detention ponds should result in treatment efficiencies of about 90% removal rates. A more conservative 80% is assumed for the proposed treatment system since the requirement of LEED certification calls for an 80% removal rate; which will be surpassed by the actually expected treatment effectiveness.

Typically pollution removal effectiveness of treatment processes or equipment is given as a range of removal rates rather than one fixed removal rate. Thus, probability and not fixed numbers is the basis for the determination of removal effectiveness and no single tests. The determination of water quality in Hawaii is likewise based on a probabilistic approach and not on a single value determination.

The combination of extended detention ponds and pre-treatment sedimentation traps represents a treatment system for which the overall removal effectiveness has not been reported in the literature. Thus it is prudent and pragmatic to assume that the removal effectiveness of two treatment units, using different treatment processes, operating in series is higher than one unit by itself. More specifically, since the TSS removal rate of the pre-treatment units is approximately 80% and that of an extended detention pond approximately 50%-60%, it is legitimate to consider "or assume" that the overall removal rate of the two treatment units will be higher than the highest removal effectiveness of the two individual treatment units. Therefore the FEIS will retain the reference to "assumed" treatment effectiveness.

Question 12	Measures to be taken to avoid attracting water birds to the proposed detention ponds – mitigation and avoidance measures to be accepted by the U.S. Fish and Wildlife Service
Our response	Correspondence with the U.S. Fish and Wildlife Service (USFWS) has identified appropriate mitigation measures to avoid attracting endangered water birds to ponds, which have a free surface for a specified duration of time. As a result of the discussion with the USFWS and considerations of alternatives to conventional detention ponds with free surfaces the applicant now considers using underground detention and rainwater catchment basins, which would avoid ponds with free surfaces. The areas above these below ground water storage basins would be used as open space or as parking areas. The USFWS is in agreement that avoiding free water surfaces within the development would be an effective avoidance measure. The underground detention units would be designed to accommodate typical rain events and the stormwater collected within these underground storage volumes would be released within 2-3 days following the storm events. In case of larger storm events some volume of stormwater would overflow into smaller detention ponds with open water surfaces; such occurrences are anticipated about twice a year. Water in these open detention ponds would then be released within 12-24 hours of the rain event. Based upon communication with the USFWS, these infrequent instances of free water surfaces would be negligible and would not represent a persistent attraction to endangered water birds. Previous recommendations by the USFWS were to implement predator management programs where concerned with situations when frequent water surfaces would be present within the proposed development. By installing the proposed underground detention ponds the need for predator management to protect endangered wildlife is no longer required.
Question 13	Impacts on wastewater systems – identification of the location of the leach fields and their impact on the environment

Our response

The EIS describes in detail the treatment processes, removal effectiveness and proposed locations of the future septic systems. (Refer also to the sustainable design approach in the appendix of the DEIS).

As noted in the EIS the conventional septic systems in the upper portions of the proposed site will each have one septic tank and one leach field located next to each other. These septic systems will be located adjacent to the warehouses they serve.

In the lower portion of the proposed site the septic systems will be built and operated in the context of a septic tank effluent pumping (STEP) system. Under this system approach septic tanks will be located next to the warehouses and the effluent of each septic tank will be pumped to one or more advanced septic systems which will be located at the perimeter of the site. The treated wastewater of the alternative septic systems is suitable to be applied on land with below-surface irrigation systems within vegetative buffer zones and restored habitat areas.

The type of alternative septic system selected for the proposed development will include aerobic recirculating sand filters and an anaerobic denitrification process step. According to field tests referenced by US-EPA the effluent of the advanced septic systems has higher removal rates for TSS, BoD and nutrients than conventional municipal treatment plants.

The DEIS indicates that, according to guidelines published by the US-EPA for receiving waters that require advanced wastewater treatment, the nitrogen removal rate of the onsite wastewater treatment should be above 50%. This is not achievable by means of conventional septic systems but the advanced septic systems proposed by the applicant have nutrients removal rates around 70%, as referenced in the EIS.

Your letter makes reference to a statement in the EIS "There might be a possibility of insufficiently treated wastewater reaching the groundwater table and/or seeping into the Kapa'a Stream corridor or canal". The statement must be considered in the appropriate context since this statement indicates the applicant's motivation to hose alternative (advanced) septic tank treatment, which is possibility of insufficient vertical distance between the point of injection and groundwater table of

impermeable soil strata which would impede proper treatment efficiencies in the soil layers below leach fields.

Thus, the statement should not be read as an indication of insufficient attention to properly treat the wastewater at the site. Rather, since there might be some degree of probability that conventional septic systems with conventional leach field treatment process might not deliver the quality of onsite wastewater treatment that the applicant sees fit to mitigate wastewater related impacts, the applicant will employ more advanced wastewater treatment systems.

Our response to your comment about the necessity of lined drainage canal was already discussed earlier in this letter.

Question 14	Discussion of cumulative impacts
Our response	A more detailed discussion of cumulative impacts will be presented in the FEIS. With regard to your specific issues that would contribute to cumulative impacts, we offer you the following response: <u>Model Airfield:</u> It is our understanding that the expansion of the new restrooms at the model airfield is still under consideration and, if built, there would be only a very limited number of the restrooms added. <u>Kaneohe-Kailua Wastewater Conveyance and Treatment Facilities:</u> While it is not yet decided what alternative route will be used for the project, the gravity tunnel through Oneawa Hills is the design alternative that would produce more spoil which has to be removed from the construction sites in Kaneohe and Kailua. Based upon communication with and publication by the County Department of Transportation Services (e.g. FEIS for the Kaneohe-Kailua Sewage Conveyance Facility) it unlikely that spoil of the tunnel construction would be transported to any facility or land within the Kapa'a valley. The spoil and muck from the construction of the tunnel represent valuable construction and fill material that can be sold or given

away by the contractor. At the present it appears that the likely use of spoil and muck would be for the Waimanalo Gulch landfill. The transport of the material would be over the H3-Freeway and would not directly affect the quarry road and its two intersections at Kalanianaole Highway and Mokapu Boulevard.

The DLNR project to open wetland area in the Kawainui marsh: The proposed site of the wetland restoration area is at the southern end of the quarry road and close to the intersection with the Kalanianaole Highway. To our knowledge the project has not received final funding and it is not clear when the majority of actual project work would be carried out. After completion of the project it is expected that most of the visitors would reach the future site from the Kalanianaole Highway. Therefore most of the traffic would not affect the roads adjacent to the proposed light industrial park.

Kapa'a Transfer Station: According to communication with the City and County there no significant changes in traffic volume are anticipated for the transfer station.

Ameron Quarry as a possible future sanitary landfill: The City & County has been investigating alternative sites on Oahu for installing sanitary landfills. The Ameron quarry in the Kapa'a Valley has indicated as one possible alternative, but there are no plans at present to convert the quarry into a landfill.

Ameron Kapa'a quarry: Ameron uses the quarry and its facilities to mine and prepare aggregate for fill and produce ready concrete for delivery to construction sites. Communication with Ameron has indicated that no significant reductions or expansions of production facilities in the quarry are planned at this time. Therefore the traffic volume generated by the Ameron facilities on the quarry road and quarry access road is not expected to significantly change in the future. Changes in daily traffic volume depends on the amount of business rather than long-tem development plans.

Question 15	Aquatic resource survey recommended by the U.S. Army Corp of Engineers
Our response	An aquatic resource assessment was conducted and was presented in the Appendix of the DEIS. The U.S. Army Corp of Engineers (USACoE) has accepted the aquatic resource assessment presented in the DEIS.
Question 16	Letter of the DoH Safe Drinking Water Branch – designing, constructing and maintaining parallel potable and not potable systems in the buildings.
Our response	The project will use harvested rainwater, reclaimed wastewater and graywater to replace potable water for various water uses, such as custodial water use, sewage conveyance and irrigation. The final construction of the water systems will abide by all code requirements to separate and designate potable from non-potable water. These requirements will be specific on engineering drawings and design specifications. The sustainable design approach of the proposed project delineates the use of graywater and reclaimed wastewater. Detailed measures, such as clearly labeling pipe that convey non-potable water, will be part of the detailed design and the actual installation of the graywater systems. Furthermore the contractors will have to abide by the guidelines for use of graywater promulgated by the DoH.

Question 17	Unacceptable to treat the Kawainui Marsh as an inanimate object and not consider actions mauka of the marsh – Impacts not only localized but entire marsh has to be considered …
Our response	The applicant has committed to pursue a business development project in the most environmentally friendly way. In due process, the applicant has committed to developing the proposed light industrial park in accordance to state-of-the-art sustainable development technologies. The applicant has made his commitments to the environment and community quantifiable in the form of applying for LEED Silver certification (LEED typically awards certification only after completion of construction; but in the case of core-and-shell certifications which the proposed project is pursuing a so-called "pre-certification" is possible, which includes a third party review of the design approach). A LEED silver certification is considered an advanced approach to develop in a low impact development manner; such development is respectful to the environment and the community. Contrary to the statements in your letter, environmental impacts of the development have been addressed at length in the DEIS. The environmental review contained in the DEIS is fully cognizant of the surrounding environment and the mitigation measures and low impact development approach that is proposed for the light industrial park addresses impacts that are local, regional and even global (e.g. by way of energy reduction and associated greenhouse gas reduction). For example the applicant's installation of significant capacities of photovoltaic on the warehouses is not directly protecting the Kawainui Marsh, but directly helps to reduce Hawaii's high dependence on imported oil and reduces the discharge of greenhouse gases, all impacts that act statewide and on a global scale. We agree that the Marsh is a living ecosystem and that is why the applicant has proposed a sustainable design approach for the light industrial park. **The need to increase sustainable communities in Koolaupoko region:**

We full heartedly agree with your thoughtful and fitting sentence with which you are closing your letter. In this sentence, which truly summarizes the essence of proactive stewardship of the environment and community, you state that we need to judge our actions with taking responsibility for the coming generations. While there are many definitions of sustainability, the one we can most likely relate to suggests that sustainable systems provide for present needs without eroding the resource base to satisfy the needs of the coming generations. In regard to the Kawainui Marsh this means that every development that affects the marsh has to be carried out in a way that significantly minimizes those impacts to that might erode the marsh's ability to restore a natural equilibrium. But sustainability also relates to the ability of the community to provide for basic and important services to the population and support a healthy local economy, while resulting in a low ecological footprint.

Your letter correctly states that impacts do not stop at the site boundary or are only limited to the area nearby the development. As a consequence impact mitigation needs also to look at issues that go beyond the site and immediate adjacent areas. While using the LEED certification requirements as a quantifiable commitment to develop "green" and thus strategically mitigate such impacts that are the most important for the Kawainui marsh and the community, the sustainable design approach for the proposed development places a high importance on mitigating such impacts that affect the immediate areas around the site, while also giving due considerations for impacts that are more generic and not site specific, but more island-wide

Proposed mitigation measures that address impacts affecting the immediate areas around the site, e.g. the Kawainui Marsh, include most of all water related impacts. Effective mitigation measures selected for the project include a comprehensive stormwater treatment design. These measures address both quantitative and qualitative treatment parameters, such as high efficiency irrigation that includes a reduction of fertilizers and pesticides used for the landscaped areas, rainwater harvesting to lower the use of potable water, and innovative wastewater technologies, which significantly exceeds the treatment efficacy of conventional on-site wastewater systems. The water related mitigation measures mitigate mainly site adjacent impacts such as the avoidance of release of polluted

	water to the receiving waters, avoiding stream bed erosion and related sedimentation problems in the marsh and drastically lowering any remaining nutrients in wastewater. Other impacts of water related impact mitigation that are not limited to the immediate vicinity to the proposed site, is the significant (at least 40%) reduction of water consumption in the buildings. This impact mitigation serves to limit impacts on the site infrastructure but also, on a larger scale, lowers water consumption on an island-wide scope and therefore fosters the protection of Oahu's aquifers. Similarly, the LEED credit category "sustainable sites" provides for site specific and island-wide impact mitigation. Under this LEED category Site specific mitigation measures include restoration of habitat with native and adapted plant types, reduction of light pollution and avoiding the use of previously naturally vegetated area for the development. Under the LEED credit category "energy and atmosphere" category island wide impact mitigation address lowering of electricity consumption that is derived from the island grid (e.g. generated by fossil fuel, mainly imported oil), onsite electricity generation with renewable energy technologies and lowering the emission of greenhouse gases and substances that endanger the ozone layer. The LEED credit categories "materials" addresses the need for a responsible use of resources through recycling and reuse, as well as preferably using materials and goods that are manufactured or extracted locally, thus supporting the local economy and avoiding significant consumption of transportation fuels.
Conclusion	Public interest should not be sacrificed to financial interests – reference how future generations will see the project
Our response	The proposed project follows the "triple bottom line" of optimizing the interrelated benefits of economy, ecology and community. The triple bottom line is the basis for the LEED green development certification standard. Following the triple bottom line the applicant can pursue his commercial development in a manner that reduces the impacts on the community and the environment. The applicant understands the full weight of responsibility of developing

the proposed light industrial park with a high degree of sustainable design and construction technologies. The close distance to the Kawainui Marsh places a special requirement on effectively mitigating any water related impacts as well as other impacts that will result from the construction and operation of the proposed light industrial park close to the main population centers of the Koolaupoko region. The applicant will continue to work closely with the community to ensure that the community remains informed and will be able to give valuable input in the design of the light industrial park. The proposed project will serve the windward community for many decades to come and therefore a successful design of the project will benefit from a proactive working relationship with the community.

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HRD11/4147C

March 28, 2011

Letter No.15

Manfred Zapka
Sustainable Design & Consulting LLC
P.O. Box 283267
Honolulu, Hawai'i 96828

Re: Draft Environmental Impact Statement
Kapa'a Light Industrial Park
Kapa'a, Kailua, Island of O'ahu

Aloha e Manfred Zapka,

The Office of Hawaiian Affairs (OHA) is in receipt of your January 24, 2011 request for comments on a draft environmental impact statement (DEIS) to support the development of the proposed Kapa'a Light Industrial Park (project) in Kailua on the Island of O'ahu. The 27-acre project would be developed over the next 15-17 years on portions of three contiguous tax map key (TMK) parcels (parcels) owned by Kapa'a I, LLC (applicant). The project is considered an expansion of the existing 22-acre light industrial park which is situated on one of the three parcels. The entire project area is situated within the State Land Use Urban District, where the proposed light industrial uses are allowed. Approval of a City and County of Honolulu-Department of Permitting and Planning (DPP) Change in Zoning (CIZ) for two of the parcels from General Preservation (P-2) to Light Industrial (I-1) is required to facilitate the project. The DEIS is a primary support document for the CIZ and a Special Management Area Use Permit-Major which is also required.

A final environmental assessment (FEA) has been produced for the project. By letter dated May 27, 2010, the DPP determined that following a review of the FEA, an environmental impact statement is required. The CIZ originally proposed for two parcels (P-2 to Heavy Industrial (I-2)) in the FEA has been revised and the revision is explained in the DEIS (Chapter 2.9.1). A 15-acre "wildlife habitat and wetland restoration project" described in the FEA is no longer proposed by the applicant (DEIS, Chapter 1.5.3 and 2.9.3).

The DEIS (Chapter 3.10.5) details the traditional and historic land uses of Kapa'a, which includes the internationally recognized Kawainui Marsh. Quarry operations which began in the 1950's (and continue today) and a landfill (which was closed circa 1990 and replaced by a refuse transfer station) brought significant change as fill material became available and was used in the initial industrial development of Kapa'a in the mid-1970s (DEIS, Chapter 3.10.1 and 3.10.7). While OHA recognizes that the project will be developed on land created by fill material, any potential secondary and cumulative impacts of the project on stream water quality, wetlands and

Kawainui Marsh and the native species within them must be carefully considered. The best management practices and short and long term mitigation measures detailed in the DEIS (Chapter 4.1- 4.4) must be implemented and employed to their fullest potential to address this important issue.

OHA appreciates that the applicant assessed the potential direct impacts of the project on Pahukini Heiau, which is located outside of, but in the general proximity of the project area (DEIS, Chapter 4.5). We were especially interested to review the visual impact assessment (DEIS, Appendix 8) which was conducted for the project and described that the "direct line of sight" between the project and Pahukini Heiau is obstructed by trees and vegetation. From certain Native Hawaiian perspectives, the surrounding landscape is of critical importance for traditional cultural practitioners and this may be applicable for those with connections to Pahukini Heiau. While trees and vegetation currently obstruct the "direct line of sight" between the project area and Pahukini Heiau, we recommend coordination between the applicant and adjacent landowners to ensure that visual impacts on removing the trees and vegetation is assessed should it be considered in the future.

We applaud the applicant for their commitments to ensure the project is consistent with the long term vision, policies and guidelines of the Ko'olaupoko Sustainable Community Plan (DEIS, Chapter 5.3.2). OHA advocates that any specific comments and concerns expressed by the broad range of stakeholders (DEIS, Chapter 9) who were provided with the opportunity to review the DEIS are afforded consideration. Thank you for the opportunity to provide comments. Should you have any questions or concerns, please contact Keola Lindsey at 594-0244 or keolal@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Chief Executive Officer

C: Mike Watkins- City and County of Honolulu, Department of Permitting and Planning

Sustainable Design & Consulting LLC
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September 14, 2011

Response to letter No.15

Mr. Clyde W. Nãmu'o, Chief Executive Officer
State of Hawaii, Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Kapa'a, Kailua, Island of O'ahu
Response to your letter dated March 28, 2011
Reference HRD 11/4147C

Dear Mr. Nãmu'o,

Thank you for your comments in your subject letter. We offer the following responses to your comments and recommendations:

We confirm your summary of the proposed project and your understanding of the intent of the development of the light industrial park. As you note in your letter, the applicant has changed the original proposal of rezoning from P-2 to I-2 to P-2 to I-1. This significant change was a result of careful deliberation of the design team and the declared alignment of the proposed light industrial park as an industrial park that should serve the Koolaupoko region's need for local and light industrial activities; such as "buy and grow local".

The development approach of the applicant is solidly based on the need for sustainable solutions for the region. This includes bringing the place of employment, commerce and recreation closer to home and avoid impacts to the community and environment that is attributable to increased traffic. The proposed industrial park will provide much needed industrial space in the Koolaupoko region and will shorten long commutes and visits by customers to companies which presently serve the windward side from places of business on the leeward side. In doing so the proposed project will strengthen the region and will be consistent with goals and policies that promote a future of Hawaii that is more sustainable, which will include reductions in energy use for transportation and provide opportunities to produce and buy more goods and food "made in Hawaii".

While the proposed development will add to strengthening the long term goals of the region, the applicant is fully cognizant of his responsibility to the community and the natural environment to develop with the smallest impacts to the community and the environment. The applicant has decided to not only making verbal commitments about

environmental mitigation, but he has made a firm commitment to developing "green" by seeking Leadership in Environmental and Energy Design (LEED) Silver certification for the portion of the proposed site that is closest to the marsh and adjacent wetland areas. The

LEED Silver certification documents that the design and construction of the proposed project follows low impact development standards; and an independent third-party audit of design documents and completed construction will ensure that plans to build green are actually implemented as planned and in accordance with well established green building technologies.

The applicant is fully aware of his responsibility towards respecting and preserving cultural and natural treasures of the region. For years the applicant has worked with and supported local community groups to preserve the adjacent Kawainui Marsh. In 2010 the applicant contributed significantly to the cleanup of many abandoned cars along the Kapa'a Quarry Road. Also recently the applicant has actively supported community efforts to establish a nature trail and restored wetland within the marsh by donating land for a parking lot that can hold school buses.

As discussed in the DEIS, the proposed project will not directly affect any known cultural assets. In addition the park will not create visual impact from important historical places such as the adjacent Pahukini Heiau, nor will the proposed site be visible from more distant places of historical significance around the Kawainui Marsh, such as the Ulupo Heiau. The applicant takes considerable pride in your favorable review that his proposed project will positively affect the long term goals of a sustainable Koolaupoko region. The applicant is part of the community and will consider all input of the community and stakeholders, as you recommend in your letter.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha Manfred Zapka

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

NEAL ABERCROMBIE
Governor of Hawai'i

GARY HOOSER
Director

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Letter No.16

March 25, 2011

David K. Tanoue, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

Subject: Draft EIS for the Kapa'a Light Industrial Park, Kailua, Ko'olaupoko, O'ahu, TMK: 4-2-15: 1 (por.) 6 and 8

Dear Mr. Tanoue:

The Office of Environmental Quality Control published the subject draft EIS in The Environmental Notice on February 8, 2011. The proposed project will intensify light industry activity in Kapa'a Valley and inadvertently incur impacts to the surrounding environment. The Office of Environmental Quality offers these comments:

1. Please include a list of acronyms in the final EIS, preferably in the beginning, following the table of contents. For example, including biological oxygen demand for the acronym "BOD" on the second paragraph, page 15 (page 46 in the PDF version) would be helpful.

2. Section 3.10.1 on Land Use and Ownership, pages 140-141, discusses land use over the decades but mentions little about ownership; please include information about ownership over the decades or maybe delete ownership from the section.

3. We understand your reasoning about the Leadership in Energy and Environmental Design (LEED) certification for the lower portion only. However, because of the project's proximity to the wetland and marsh, acquiring LEED certification for the upper portion is practical in providing better protection from the development's impacts.

4. The first paragraph of page 171 discusses building limitations because of the soils load-supporting capacity at the lower portion. Please elaborate on the soil load-supporting capacity at the lower portion on the final EIS.

5. The second to the last paragraph on page 173 says, "If impacts would occur from construction activities, these are expected to be minor and of short duration, occurring primarily during storm events." We recommend extra attention to best management practices (BMPs) to mitigate adverse anticipated impacts during storm events.

6. Pages 179 and 180 discuss drainage design. The implication is that a final design has not been determined. Please include the final drainage design or plans of drainage alternatives on the final EIS.

7. The traffic studies evaluated levels of service up to 2026. We recommend implementation of traffic mitigation sooner than projected if impacts to the level of service worsen before 2026.

8. We encourage the applicant's option of providing a shuttle if no public transportation service is available, as discussed in section 4.9.9.

Finally, thank you for the opportunity to comment on this project. The impacts are significant but we hope that the applicant's continued dialogue with the permitting agencies and stake-holders will facilitate unresolved matters before the final EIS for the subject project. Feel free to contact us at (808) 586-4185 if you have further questions.

Sincerely,

Herman Tuiolosega
Planner

copy: Kapa'a I, LLC
Sustainable Design & Consulting, LLC

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September 14, 2011

Response to letter No.16

Mr. Herman Tuiolosega, Planner
State of Hawaii, Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
TMK 4-2-15: 001 (portion of), 006 and 008
Response to your letter dated March 25, 2011

Dear Mr. Tuiolosega,

Thank you for your comments in your subject letter.

We offer the following responses to your comments and recommendations, as they are numbered in your letter:

1. Include a list of acronyms in the FEIS:

   We have added a list of acronyms in the FEIS.

2. Address issue of land ownership:

   We have followed your recommendations relative to the land ownership and delete reference to ownership in this section

3. LEDD certification for the upper portion:

   The sustainable design approach and the LEED strategy described therein delineates that the LEED certification for the lower portion of the site is focused on mitigating the impacts that are most important for the adjacent wetland areas. The lower portion of the site is within the Special Management Area (SMA) district and the SMA determination emphasizes the need for low impact development particularly in this area that is closest to environmentally sensitive areas.

   The proposed development will be developed and built in accordance to LEED Silver certification requirements and LEED certification will only awarded after an independent third-party audit certifies the successful realization of the sustainable design goals in the completed construction. This ensures to the public that the development is indeed built "green". The applicant is not opposed to implement sustainable building and site development strategies for the upper portion of the site. But even without actually applying for LEED certification, all development will support those impacts that are most important to the proposed site, such as resource

conservation (e.g. efficient water and electricity infrastructure), onsite renewable energy, comprehensive stormwater discharge, light pollution and supporting alternative modes of transportation.

4. Elaborate on the soil load bearing capacity of the lower portion:

   We have added a comprehensive discussion about soil load bearing capacity of the lower portion in the FEIS. Furthermore, an updated project Masterplan will be developed in conjunction of the zone change request. This updated Masterplan will contain further analysis of the soil capacity of the landfill area.

5. Attention to BMPs

   While the DEIS has already addressed BMP, we have added further details of BMPs in the FEIS.

6. Final drainage design:

   The updated design of the drainage system will be addressed in the updated project Masterplan for the zone change request. He FEIS delineates updating of technical details of the design, such as the layout of the park and the drainage system, in new Section Six under of unresolved issues. The updated layout of the proposed light industrial park is being developed and this layout will have slight changes relative to the design of the warehouses and roadway systems delineated in the concept design that was presented with the EIS. For example, the applicant is considering whether to develop a part of the property that will be rezoned as a base yard. This would alter the drainage and roadway systems. The nature of the development, e.g. the commitment to use low impact development strategies would, however, not be affected.

   As we had discussed, the EIS is only the first step in the permitting process that is required to rezone the property and start development of the proposed light industrial park. Thus after the EIS is accepted, the applicant will need to apply for a zone change and a SMA permit before proceeding with the project. The applicant will closely cooperate with the accepting agency, the City and County of Honolulu, Department of Planning and Permitting, to ensure all prerequisites are in place for a successful zone change application. The creation of a more complete and updated project Masterplan of the development, which includes a final drainage plan, is be required for the zone change request.

7. Evaluate traffic level before 2026:

The DEIS proposes to carry out a new, follow-up traffic impact analysis report (TIAR) at about midpoint of the project, which is represented by the completion of about 50% of the planned new industrial space or after the upper portion of the site is fully developed and the development of the lower portion of the site would commence. The main objective of the new, follow-up TIAR is to verify that the trip generation rates that were correctly assumed in the original TIAR. A new, follow-up TIAR will identify if the actual traffic volume generated by the project and the background traffic has indeed grown at the estimated rates delineated in the DEIS.

In the new, follow-up TIAR mitigation measures will be selected and designed on the basis of actual traffic volume identified at the mid-point of the project. This approach will make any traffic impact analysis more accurate and will provide more appropriate and effective traffic impact mitigation measures for the time after project midpoint and up to full build-out of the project, when traffic impacts will require some form of mitigation

The State Department of Transportation (DoT) has requested revisions to the current TIAR, which is submitted with the FEIS. The DoT has accepted the request of the applicant to submit a revised TIAR in conjunction with the zone change request. The updated project Masterplan for the zone change request will provide more detailed design information of the proposed project, which will then be used for the new traffic analysis. In addition to the LOS based traffic analysis, and as part of the updated project Masterplan, an analysis will be carried out of the current traffic problems on the Kapa'a quarry road which affect traffic safety on that road. The process of revising the current TIAR is delineated in the new section Six of the FEIS under "unresolved issues".

8. Private Shuttle:

The applicant is prepared to implement a private shuttle service if public transportation service will not serve the proposed project site, e.g. the Kapa'a valley. The scope of such shuttle service will depend on the demand for such alternative transportation services developed by the companies within the proposed light industrial park.

We have been forthcoming in keeping a continuous dialogue with agencies and other stakeholders. We have conducted several meetings and engaged in other communications with County and State agencies as well as stakeholders from the community.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

TAKE PRIDE IN AMERICA

MAR 25 2011

In Reply Refer To:
2011-TA-0126

Letter No.17

Dr. Manfred Zapka
Sustainable Design and Consulting, LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Subject: Technical Assistance for the Kapaa Light Industrial Park Draft Environmental Impact Statement, Oahu

Dear Mr. Zapka:

The U.S. Fish and Wildlife Service (Service) is in receipt of your letter dated January 24, 2011, requesting comments on the Draft Environmental Impact Statement (DEIS) for the development of the Kapaa Light Industrial Park in Kailua, Oahu. These comments are provided in accordance with the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.: 87 Stat. 884); and other authorities mandating Federal oversight of environmental resources including the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.). We previously provided comments on the Draft Environmental Assessment in February 2009 (Service File 2009-TA-0094) and on the Preparation Notice in August 2010 (Service File 2010-TA-0407).

The proposed project is to expand the existing commercial and light industrial warehouse park on three, contiguous land parcels, located in the Kapaa Valley, windward Oahu. The Kapaa III property borders the Kawainui Marsh and Kapaa Stream, a critically important wetland complex and the largest remaining wetland in the State of Hawaii. These wetlands are occupied by the federally endangered Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*) and Hawaiian duck (*Anas wyvilliana*), as well as populations of migratory waterfowl and shorebirds protected under the MBTA. The developers had previously planned a 15-acre wildlife habitat and wetland restoration project, with funds supplied the U.S. Department of Agriculture, National Resources Conservation Service (NRCS). However, the DEIS states that the wetland creation portion of the project has been removed (potentially indefinitely) due to concerns regarding water quality, function of the wetland and endangered species issues.

In past letters, we provided comments regarding the potential for the detention ponds to attract breeding waterbirds to the site, creating an "attractive nuisance." The preferred alternative includes detention ponds and the DEIS states: "Therefore the detention ponds will be typically completely empty and will only be filled or partly filled on rare occasions. There will be no permanent large residual water surface in the detention ponds that could attract a permanent habitat for the endangered water birds that were mentioned in the letter." It is not clear how it

has been determined that the detention ponds will not retain water particularly during prolonged or intense rain events. Ponded water does not have to be permanent to attract Hawaiian stilts especially during the breeding season. Hawaiian stilts are readily attracted to ephemeral water sources and there have been many instances of stilts nesting at unsuitable sites where food and cover is absent. We recommend if the detention ponds hold standing water for more than a week during the breeding season (mid-February through August) or more than two weeks during the rest of the year, deterrents, such as "bird balls," netting, or some type of permanent cover, should be used to reduce the attractiveness of the site. If these measures are not used, then the Final EIS needs to explain the rationale as to why run-off or major rain events will not pool water in the detention ponds and how the applicant will ensure listed waterbirds will not be attracted to the site. This discussion should also further describe the proposed predator management program, outlining in detail the invasive species removal program. In addition, the DEIS indicates that the use of underground cisterns will reduce the amount of water held in detention ponds. We recommend increasing either the number of cisterns or the size of the cisterns to further reduce or eliminate the need for water to be collected in detention ponds.

The Service acknowledges and appreciates that the DEIS incorporates several measures to promote native wildlife and habitats, including shielding of exterior lights, use of native vegetation in landscaping projects, and implementation of a predator control program for invasive species. We also recommend the use of sturdy, animal-proof, garbage containers that reduce the attraction of the area to non-native and feral species, such as feral cats, rats, mongoose, and house mice. The proposed project has also incorporated the use of construction and management Best Management Practices (BMPs) to minimize impacts to Kawainui Marsh and surrounding watershed. To assist you, we have attached a copy of our recommended BMPs to reduce the potential for sedimentation and erosion. We suggest you incorporate the applicable practices into your project plans.

If, during the construction or operation of this project, it is found that listed Hawaiian waterbird species are being attracted to the site, the project manager should contact our office immediately. Additional conservation measures may be necessary to avoid the take of listed species. If take of listed species cannot be avoided, it may be necessary to consult with us pursuant to section 7(a)(2) of the ESA or apply for an incidental take permit under section 10(a)(1)(b) of the ESA. If, in the future, the applicant proposes to develop the 15-acre wetland site to improve water quality, we recommend contacting our office early in the planning process so we can help minimize potential impacts to listed waterbirds.

We appreciate your efforts to conserve listed species. If you have questions, please contact Aaron Nadig or Michelle Bogardus, Consultation and Habitat Conservation Planning Program (phone: 808-792-9400, fax: 808-792-9581).

Sincerely,

for Loyal Mehrhoff
Field Supervisor

Enclosure

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service recommends that the measures below be incorporated into projects to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources.

1. Turbidity and siltation from project-related work shall be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.

2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.

3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss special aquatic site habitat (beaches, coral reefs, wetlands, etc.) and the function of such habitat shall be replaced.

4. All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.

5. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.

6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.

7. No contamination (trash or debris disposal, non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests, etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP – see http://www.haccp-nrm.org/Wizard/default.asp) to prevent attraction and introduction of non-native species.

8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.

9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.

10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding, etc.).

Sustainable Design & Consulting LLC
Engineering / Technology • Strategy • Change Management
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September 14, 2011

Response to letter No.17

Ms. Loyal Mehrhoff, Field Supervisor
U.S. Fish and Wildlife Services, Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 25, 2011
Your reference: 2011-TA-0126

Dear Ms. Mehrhoff,

Thank you for your comments and recommendations in your subject letter.

We offer the following responses to your comments and recommendations, grouped according to the issues discussed in your letter.

Previously planned 15-acre wildlife habitat and wetland restoration project:

We confirm your statement that the applicant no longer pursues plans to establish a wildlife habitat and engage in wetland restoration within the Kapa'a Stream corridor as was described in the Environmental Assessment of the proposed project that preceded the DEIS. As you stated, the decision of the applicant to discontinue the project was due to concerns regarding effect on water quality when removing a significant amount of vegetation in the designated wetland, endangered species issues and well as other functions of the wetland. The decision of the applicant should not, however, be interpreted as a lessening of his concern and enthusiasm to implement measures that will conserve precious natural resources and wildlife. The applicant has committed to develop the proposed light industrial park with a host of low impact development strategies and technologies.

Possible attraction of water birds to detention ponds:

The DEIS has followed the guidance given in your earlier letters on attraction avoidance measures. The applicant favors underground cisterns not only for collecting of rainwater but also for stormwater detention. Using underground water catchment would obviously prevent impacts of attracting water birds. If above-ground water detention is needed in addition to the below ground units the applicant confirms that deterrents, such as delineated in your letter, will be used, since the function of the detention ponds is obviously to retain some volume of water and the detention ponds will have a free surface at some time during and after significant storm events.

Infrequent storm events could produce an accumulation of stormwater through overflow the underground detention basins and cisterns and could produce free water surfaces in the catchment areas (supplemental detention ponds). This occurrence would, however, be infrequent enough to be negligible and would not be a persistent attraction to endangered water birds.

Predator management and invasive species removal programs and BMPs:

Since attraction from free water surfaces in the development will no longer be present, predator management programs are no longer needed to protect endangered wildlife. The applicant might decide to implement management programs for control of non-native and feral species, such as feral cats, rats, house mice, etc. to protect his property. The final design will incorporate your guidelines on invasive species removal, where applicable. Your list of recommended BMPs, which was attached to your letter, has been included in the FEIS.

Measures promoting native wildlife and habitats:

We appreciate your support for our proposed approaches to ensure wildlife and restore habitat. Your recommendations in regard to use of animal-proof garbage containers will be added to the FEIS.

Recommendations if water birds are found at the site:

The applicant will implement your recommendations if water birds are found at the site during construction and operation. The proposed site is currently not a habitat for listed Hawaiian water birds and it is very unlikely that unintended take of listed species would occur at the newly developed industrial site. Therefore it is not anticipated that an incidental take permit under section 10 of the ESA is required.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

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DIRECTOR

KAI NANI KRAUT, P.E.
DEPUTY DIRECTOR

KENNETH TORU HAMAYASU, P.E.
DEPUTY DIRECTOR

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TP1/11-400696R

March 24, 2011

Letter No.18

MEMORANDUM

TO: DAVID K. TANOUE, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: WAYNE Y. YOSHIOKA, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
KAPA`A LIGHT INDUSTRIAL PARK IN KAILUA, OAHU, HAWAII

This responds to your January 24, 2011, memorandum requesting our review and comments for the subject project.

Our Traffic Engineering Division (TED) has the following comments:

- Page 220, Please verify the dates of the footnotes for Figure 4-9
- Page 224, Figure 4-13, the heading should be replaced with "PM peak distribution of generated trip for in and out bound project traffic"
- Page 225. the LOS footnote should be replaced with "LOS level requires mitigation as unsatisfactory traffic conditions occur"
- Section 4.9.6 – The mitigation measures which affect the traffic operations along Kapa`a Quarry Road should be implemented as part of the first increment of the project.

- Appendix 6, Page 3 if the Sight Distance Analysis, Figures SDA-5 and SDA-6; For driveway number one located off of Kapa`a Quarry Access Road, the proposal to relocate the crosswalk away from the access road would not only detract from a continuous path for pedestrians but would decrease visibility between pedestrians and motorists turning off the access road.

Our Public Transit Division (PTD) has the following comments:

- TheBus service at the two key intersections listed below will be impacted by the subject project; therefore the potential impacts of the project on transit (i.e. bus operations, bus stops, etc.) during construction, and after the project is completed should be studied.
    - Kapa`a Quarry Road with Mokapu Boulevard and Kalanianaole Highway
    - Kapa`a Quarry Road and Kapa`a Quarry Access Road
- Construction notes shall include the following transit note: "This project will affect bus routes, bus stops, and paratransit operations, therefore, the Contractor shall notify the Department of Transportation Services, Public Transit Division at 768-8396 and Oahu Transit Services, Inc. (bus operations: 848-4578 or 848-6016 and paratransit operations: 454-5041 or 454-5020) of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop and duration of project at least two weeks prior to construction."

Prior to the start of the project, all affected Neighborhood Boards, residents, and businesses should be informed about the scope and duration of the project.

Thank you for the opportunity to review this matter. Should you have any further questions on the matter, you may contact Virginia Bisho of my staff at Local 85461.

WAYNE Y. YOSHIOKA
Director

Sustainable Design & Consulting LLC
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September 14, 2011

Response to letter No.18

Mr. Wayne Y. Yoshioka, Director
City and County of Honolulu, Department of Transportation Services
650 South King Street 3rd Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letter dated March 24, 2011
Your reference: TP1/11-400696R

Dear Mr. Yoshioka,

Thank you for your comments and recommendations in your subject letter. We offer the following responses to your comments and recommendations, grouped according to the issues discussed in your letter.

Our responses to comments of the Traffic Engineering Division (TED):

- Footnote of Table 4-9; has been corrected from 2016 to 2026.
- Caption of Figure 4-13; has been changed to "PM-peak".
- Caption of Table 4-12 has been corrected in accordance with your letter
- We propose to assess, design and implement traffic mitigation measures for the quarry road after a new, follow-up traffic impact assessment report (TIAR) is concluded. The analysis of the current TIAR suggests that no mitigation measures would be required prior to midpoint of development of proposed project. Consequently the new, follow-up TIAR is presently scheduled for the year 2016, which represent midpoint of development schedule. The new, follow-up TIAR will determine if the actually occurring traffic conditions at the time of new TIAR deviates from the expected trip generation volumes of the proposed project and the growth of the background traffic. The State Department of Transportation (DoT) has requested revisions to the current TIAR. DoT has accepted that the revision of the current TIAR will be carried out in conjunction with the zone change request.
- We have changed the location of the crosswalk in accordance to your suggestions.

Our responses to comments of the Public Transit Division (PTD):

- As stated above based on the current TIAR no significant impacts are expected until the midpoint of the development schedule, e.g. when approximately 50% of the planned floor space has been added or sometime in 2016 to 2017. Therefore, no

concrete traffic impact mitigation measures are planned at this point. Rather, it is proposed that a new TIAR will be carried out at midpoint of development schedule, and at this point in time impacts of the project on the transit will be analyzed and mitigation measures, if found necessary, will be selected and designed.

- As per your recommendation the following notes will be included in construction notes: "This project will affect bus routes, bus stops, and paratransit operations, therefore, the Contractor shall notify the Department of Transportation Services, Public Transit Division at 768-8396 and Oahu Transit Services, Inc. (bus operations: 848-4578 or 848-6016 and paratransit operations: 454-5041 or 454-5020) of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop and duration of project at least two weeks prior to construction."

As you recommend the applicant is in contact with stakeholders, including the Kailua Neighborhood Board, and has been informing the public about the proposed project for the past three years. More public involvement is planned as part of the zone change and Special Management Area (SMA) permit application. Both permits are required before the project can be implemented.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

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DIRECTOR

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Jan S. Gouveia
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Jadine Urasaki

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
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HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
DIR 0109
STP 8.0388

March 30, 2011

Letter No.19

Mr. Mike Watkins
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Watkins:

Subject: Kapaa Light Industrial Park
Draft Environmental Impact Statement (DEIS)

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project.

DOT understands the applicant, Kapaa I, LLC is proposing to expand its existing 22-acre light industrial park by 55-acres. The proposed expansion would be developed incrementally over 18 years. Access to the project will be from Kapaa Quarry Access Road.

The DOT Highways Division has not completed its review of the project and will provide comments as necessary.

DOT appreciates the opportunity to provide comments. If there are any questions or the need to meet with the Highways staff please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Very truly yours,

GLENN M. OKIMOTO, Ph.D.
Director of Transportation

ET:km

c: Dr. Manfred Zapka, Sustainable Design & Consulting, LLC

bc: HWY-P, STP(ET)

NEIL ABERCROMBIE
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STATE OF HAWAII
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IN REPLY REFER TO:

STP 8.0397

RECEIVED
'11 APR 14 A11:33
DEPT OF PLANNING AND PERMITTING CITY & COUNTY OF HONOLULU

April 6, 2011

Letter No.20

Mr. Mike Watkins
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Watkins:

Subject: Kapaa Light Industrial Park
Draft Environmental Impact Statement (DEIS)

The State Department of Transportation (DOT) previously commented on the DEIS for the subject project in its letter STP 8.0388 dated March 30, 2011 (attached). DOT now offers the following supplemental comments provided by the DOT Highways Division staff.

DOT's comments regarding the TIAR are as follows:

1. The Traffic Impact Analysis Report (TIAR) is unacceptable and needs to be revised, as discussed below and submitted for DOT's review and approval.

2. While the TIAR states that it will evaluate level of service (LOS), based on delay, volume to capacity (V/C) results shown in various tables would indicate a one or two level difference in LOS from delay-based LOS. This discrepancy should be addressed.

3. The calculations for the Kapaa Quarry Road intersections at Mokapu Boulevard and Kailua Road need to be provided. More discussion should also be provided for the Kapaa Quarry Road and Mokapu Boulevard intersection.

4. While the TIAR recommended some mitigation measures, we recommended that it be supported by the appropriate calculations along with some discussions of the effects. The TIAR should also address LOS F conditions even though it may not be the result of the subject project.

5. DOT agrees with the TIAR recommendation that the TIAR be updated in or around the buildout of Phase C (2016) and before the start of Phase D to evaluate and validate the project conditions and see whether adjustments are necessary.

DOT appreciates the opportunity to provide comments. If there are any questions, including the need to meet with Highways Division staff, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Very truly yours,

GLENN M. OKIMOTO, Ph.D.
Director of Transportation

Attachment: Ltr STP 8.0388 dtd 3/30/11

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GLENN M. OKIMOTO
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JADINE URASAKI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
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IN REPLY REFER TO:
HWY-PS 9ta
2.9422

August 31, 2011

09-01-11 A11:16 IN

Letter No.21

Mr. David K. Tanoue
Director
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Tanoue:

Subject: Kapaa Light Industrial Park
Draft Environmental Impact Statement (DEIS)
Kailua, Oahu, Hawaii
TMK: (1) 4-2-015:001 (por), 6 and 8

With reference to comment 1 in our letter to you dated April 6, 2011 regarding the subject DEIS, at the request of Mr. Manfred Zapka, the consultant for the Kapaa Light Industrial Park, we have agreed that the Revised Traffic Impact Analysis Report (TIAR) can be submitted with the project's zone change request. This will allow the applicant to expedite the permitting process and better address the inadequacies and shortfalls of the TIAR, subject to our review and approval.

If there are questions, please contact Ken Tatsuguchi, Engineering Program Manager, Highways Division, Planning Branch, at 587-1830. Please reference file review 2011-053.

Very truly yours,

for GLENN M. OKIMOTO, Ph.D.
Director of Transportation

c: Manfred Zapka, Sustainable Design & Consulting, LLC

bc: STP, HWY-PS (2011-053A)

RI:ac

Sustainable Design & Consulting LLC
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September 14, 2011

Response to letters No.19, No.20 and No.21

Dr. Glenn M. Okimoto, Director of Transportation
State of Hawaii, Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Subject: Draft Environmental Impact Statement – Kapa'a Light Industrial Park
Response to your letters dated March 30, 2011 and April 6, 2011
Reference DIR 0109 – STP 8.0388 and STP 8.0397, respectively
Project meeting with DoT staff on June 7, 2011
Response to your letter dated August 31, 2011, reference HWY-PS 2.9422

Dear Dr. Okimoto,

Thank you for your comments and recommendations in your two letters dated March 30, 2011 and April 6, 2011. In addition we thank your agency very much that you have agreed, in your letter dated August 31, 2011, to our request that the revised TIAR can be submitted with the project's zone change application.

Your March 30, 2011 letter suggested that the Department of Transportation (DoT) had not completed the review of the DEIS at the time of the communication.

Your April 6, 2011 follow-up letter submitted supplemental comments and offered a number of comments and recommendations. On June 7, 2011 we had the opportunity to meet with staff members of your department to discuss the two communications.

The applicant agrees and looks forward to working with the DoT on revising the Traffic Impact Analysis Report (TIAR) so that all areas of the traffic analysis are carried out DoT approval. The applicant had requested that the revision to the TIAR be part of the zone change application rather than preparing a revised TIAR for the Final EIS (FEIS). Your agency has agreed that the revised TIAR can be submitted with the project's zone change request.

In the following we present our detailed responses to your comments and recommendations, as delineated in your letter dated April 6, 2011.

A. The applicant will work with the traffic consultant during the zone change request to amend the present TIAR and address the areas that DoT considers need further elaboration and analysis. The recommended amendments of the TIAR will include providing more details of source data and calculation methods and results, discussion of LOS results if found different between the two calculation methodologies used in the TIAR (e.g. time of delay versus V/P ratio) and providing complete description of assumptions including references used. The applicant will contact DoT prior to completing the revised analysis to discuss how issues raised by DoT will be addressed in detail.

B. The current TIAR, which was completed and submitted for the DEIS, recommends that in the course of the proposed project a new traffic count be conducted to ascertain whether the initially used assumptions on growth traffic volumes and trip generations should be revised as the first part of the project is being completed. In keeping with this recommendation the applicant and DoT agree that a new TIAR should be conducted around the year 2016 or 2017, which is the projected time when the development in the lower portion of the proposed site would commence (in accordance to the predicted rate of adding industrial space). Since the actual rate of absorption of the new industrial space in the region, and therefore the pace of adding warehouses and/or industrial space in the proposed development, might differ from the projected project schedule, it was agreed that a new, updated TIAR should be conducted when approximately 50% of the planned industrial space is developed and leased. With a planned total new industrial space of about 600,000 square feet, the new TIAR would then be conducted after 300,000 square feet of industrial space have been added to the available space at the time of acceptance of the FEIS.

C. The concept design presented in the DEIS assumed that the proposed light industrial park will be composed only of warehouses, although other land uses would be permitted under the intended zone change to Limited Industrial (I-1) land use for the proposed site. Therefore, the trip generation rates in the current TIAR calculate the traffic volume generated by the proposed industrial development on the basis of “1,000 sqft per warehouse”. However, the applicant considers developing a portion of the land as a base yard, which could result in an overall trip generation that differs from the traffic volume generated by having only

warehouses in the development. The revised TIAR will use design information of the updated project Masterplan for the zone change request.

We thank you for your interest in reviewing our DEIS. If you have further questions please contact Dr. Manfred Zapka at 808 265-6321 or e-mail at **sustainableDC@gmail.com.** Your subject letter and our response letter will be presented with the Final EIS.

Aloha

Manfred Zapka, Ph.D., P.E., LEED-AP, CEM
Principal and Senior Consultant

CC: Department of Planning and Permitting, Mr. Mike Watkins

Mailing List for the EISPN

Mailing list for recipients of EISPN

Governmental Agencies and Community / Advocacy Groups: EISPN document containing the FEA report and appendices was sent as data-CD

Public Library: EISPN document containing the FEA report and appendices was sent as hard copy (to Kaneohe Public Library) and as data-CD (to Kailua Public Library)

No.	Mailing List for the EISPN to Governmental Agencies or Community / Advocacy Group
1	Ahahui Malama I Ka Lokahi P.O. Box 751 Honolulu, Hawaii 96808
2	Mr. John Harrison, President Hawaii Audubon Society 850 Richards Street, Suite 505 Honolulu, Hawaii 96813
3	Kawai Nui Heritage Foundation C/o Ms. Susan Miller 1030 Aoloa Place, Apt. 102 B Kailua, Hawaii 96734
4	Ms. Joan Fleming, President Lani-Kailua Outdoor Circle 653 Milokai Street Kailua, HI 96734
5	Ms. Donna Wong, Executive Director Hawaii's Thousand Friends 25 Maluniu Avenue, Suite 102 #282 Kailua, Hawaii 96734
6	Kailua Bay Advisory Council

No.	Mailing List for the EISPN to Governmental Agencies or Community / Advocacy Group
	629-A Kailua Road, Suite #3 Kailua, Hawaii 96734
7	Mr. Puna Nam, President Kailua Chamber of Commerce Post Office Box 1496 Kailua, Hawaii 96734
8	Mr. Bill Lane, Account Manager Hawaiian Electric Company, Inc. P.O. Box 2750 Honolulu, Hawaii 96840
9	Mr. Henry Curtis, Executive Director Life of the Land 76 North King Street, Suite 203 Honolulu, Hawaii 96817
10	Mr. Robert D. Harris, Director Sierra Club of Hawaii Chapter P.O. Box 2577 Honolulu, Hawaii 96803
11	Mr. Randy Ching, County President The League of Women Voters of Honolulu 49 South Hotel Street, Room 314 Honolulu, Hawaii 96813
12	Mr. Chuck Prentiss, Chair Kailua Neighborhood Board No. 31 Neighborhood Commission Office 530 South King Street, Room 406 Honolulu, Hawaii 96813
13	Kailua Satellite City Hall 1090 Keolu Drive, # 110

No.	Mailing List for the EISPN to Governmental Agencies or Community / Advocacy Group
	Kailua, Hawaii 96734
14	Dr. Pua Aiu, Administrator State Historic Preservation Div., DLNR Kakuhihewa Building 601 Kamokila Blvd., Suite 555 Kapolei, Hawaii 9670
15	Dr. Chiyome Fukino, Director Department of Health State of Hawaii Kinau Hale 1250 Punchbowl Street Honolulu, Hawaii 96813
16	Mr. Orlando Dan Davidson, Executive Officer Land Use Commission, State of Hawaii DBEDT P.O. Box 2359 Honolulu, Hawaii 96804-2359
17	Theodore E. Liu, Director Department of Business, Economic Development & Tourism (DBEDT) No. 1 Capitol District Building 250 South Hotel Street, 5th Floor Honolulu, Hawaii 96813
18	Mr. Brian Gibson, Executive Director Oahu Metropolitan Planning Organization Ocean View Center 707 Richards Street, Suite 200 Honolulu, Hawaii 96813
19	Dr. Brennon T. Morioka, Director Department of Transportation, State of Hawaii Aliiaimoku Building

No.	Mailing List for the EISPN to Governmental Agencies or Community / Advocacy Group
	869 Punchbowl Street Honolulu, Hawaii 96813
20	Mr. Clyde Namu'o, Chief Executive Officer Office of Hawaiian Affairs 711 Kapiolani Boulevard, Suite 500 Honolulu, Hawaii 96813
21	Mr. Abbey Seth Mayer Office of Planning, State of Hawaii, DBEDT P.O. Box 2359 Honolulu, Hawaii 96804-2359
22	Ms. Laura H. Thielen, Chairperson Department of Land and Natural Resources, State of Hawaii 1151 Punchbowl Street, Room 130 Honolulu, Hawaii 96813
23	Mr. Lawrence T. Yamamoto, State Conservationist USDA NRCS, Pacific Islands Area State Office P.O. Box 50004 Honolulu, Hawaii 96850
24	Lt. Col. Douglas Guttormsen, District Commander US Army Corps of Engineers Honolulu District, Bldg. 230, CEPOH-EC-R Fort Shafter, Hawaii 96858-5440
25	Dr. Loyal Mehrhoff, Field Supervisor Pacific Islands Fish and Wildlife Office 300 Ala Moana Boulevard Room 3-122, Box 50088 Honolulu, Hawaii 96850

No.	Mailing List for the EISPN to Governmental Agencies or Community / Advocacy Group
26	Mr. Guilherme R. Costa, Conservation Specialist Oahu Soil & Water Conservation District 99-193 Aiea Heights Drive, Suite 109 Aiea, Hawaii 96701
27	Kailua Public Library 239 Kuulei Road Kailua, HI 96734 Attn.: Branch Manager
28	Kaneohe Public Library 45-829 Kamehameha Highway Kaneohe, HI 96744 Attn.: Branch Manager

Copies of letters with comments and recommendations sent by EISPN stakeholders

There were eight comments received from the published EISP by the following agencies:

1. Department of the Army, Corp of Engineers, District Honolulu, dated July 28, 2010
2. Oahu Metropolitan Planning Organization (Oahu MPO), dated August 2, 2010
3. State of Hawaii, Department of Health, Clean Water Branch, dated August 5, 2010
4. State of Hawaii, Department of Health, Safe Drinking Water Branch, Environmental Management Division, dated August 11, 2010
5. State of Hawaii, Department of Health, Indoor and Radiological Health Branch, dated August 11, 2010
6. United States Department of the Interior, Fish and Wildlife Services, Pacific Islands Fish and Wildlife Office, dated August 20, 2010
7. State of Hawaii, Department of Land and Natural Resources (DLNR), Land Division, dated August 24, 2010
8. State of Hawaii, Department of Transportation, dated September 1, 2010
9. Hawaiian Electric Company, Inc, dated October 12, 2010

The copies of the letters by stakeholders with comments to the EISPN are presented in the following

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

July 28, 2010

Regulatory Branch

File Number POH-2010-0186

Sustainable Design & Consulting, LLC
Attention: Dr. Manfred Zapka
Post Office Box 283267
Honolulu, Hawaii 96828

Dear Dr. Zapka:

We have received your request for the Department of the Army to review and comment on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Kapaa Light Industrial Park at TMKs (1)4-2-015:008, 001 (portion) and 006 (por.) in Kailua, Island of Oahu, Hawaii. We have assigned the project the reference number **POH-2010-0186**. Please cite the reference number in any future correspondence concerning this project. We completed our review of the submitted document pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404).

Section 10 requires that a Department of the Army (DA) permit be obtained from the U.S. Army Corps of Engineers (Corps) prior to undertaking any construction, dredging and other activities occurring in, over, or under navigable waters of the U.S., including the upper limit of adjacent wetlands. The line of jurisdiction extends to the Mean High Water Mark for tidal waters. Section 404 requires that a DA permit be obtained for the discharge (placement) of dredge and/or fill material into waters of the U.S., including wetlands. The line of jurisdiction extends to the Mean Higher High Water Mark for tidally influenced waters, the Ordinary High Water Mark for non-tidal waters and the approved delineated boundary for wetlands.

Based on the information provided in the EISPN, the project site appears to be absent of navigable waters subject to Corps jurisdiction, therefore Section 10 authorization may not be required for the proposed activity. We understand from the EISPN and resources available to the Corps, the Kapaa Stream traversing the subject property discharges into the Kawainui Marsh, terminating in Kailua Bay, a traditionally navigable water. As such, the Kapaa Stream is a water of the U.S., subject to Corps jurisdiction. Also be advised that any adjacent wetlands and tributaries or drainage canals discharging into the Kapaa Stream may also be subject to Corps jurisdiction. Should the scope of the proposed work involve the discharge of fill or dredged material below the Ordinary High Water mark of the Kapaa Stream or below the approved delineated boundary of the Kawainui Marsh, a **DA permit will be required**.

The EISPN does not provide sufficient information to allow the Corps to determine if the project site encompasses additional unidentified waters of the U.S. or whether such waters are proposed for impact, which may require authorization under Section 10 and/or Section 404. When developing the Environmental Impact Statement (EIS), we recommend you conduct a thorough aquatic resource survey, describing any wetlands, drainage ditches, gulches, gullies, streams, etc., on-site, especially those that may be impacted by any of the proposed project components. In addition, include sufficient information concerning the scope of work, including the use of Best Management Practices, i.e. silt fences and sandbag berms within the vicinity and in close proximity to the Kapaa Stream, the Kawainui Marsh and all other potentially regulated bodies of water.

Only the Corps of Engineers has the authority to determine if any of these aquatic features are or are not waters of the U.S., potentially subject to regulation under Section 10 and/or Section 404. As such, we encourage the applicant to submit a request for an approved jurisdictional determination (JD) for these water bodies. Your request to the Corps should include descriptions of aquatic features proposed for impact, including whether or not they are tidally influenced, flow duration of each feature and the flow path of each feature into navigable waters. For instance: "the unnamed ditch contains flow for two consecutive weeks annually and, from the project impact site, flows for 700 linear feet prior to discharge into X Stream. X Stream flows year-round and flows 1,200 feet prior to discharge into the Pacific Ocean. The lower 200 linear feet of X Stream is influence by the tide." For wetlands, you should submit a wetland delineation conducted in accordance with the Corps of Engineers 1987 Wetland Delineation Manual and the Hawai'i and Pacific Islands Regional Supplement. We recommend the applicant also provide a vicinity map, map of the water bodies and flow paths and on-site photographs so the Corps may prepare an approved JD, if necessary.

If any water bodies are determined to be waters of the U.S., the applicant must obtain authorization from the Corps prior to discharge of dredged or fill material into these water bodies. Fill material, permanent or temporary, may include, but is not limited to: rock, dirt, sand, sandbags, concrete, piping a water of the U.S. or diverting a water of the U.S. into a pipe. Dewatering effluent from dredging, including filtered and treated effluent, is also considered fill, requiring authorization under Section 404 prior to discharge in waters of the U.S. The applicant should contact the Corps to determine if any of the proposed work constitutes a "discharge of fill" and submit an application and associated drawings that meet our drawing recommendations found at *http://poh.usace.army.mil/EC-R/EC-R.htm*. The Corps will then review the application to ensure it complies with all necessary federal laws and regulations. Note that if the fill results in the loss of waters of the U.S. and/or associated functions, the applicant may be required to provide compensatory mitigation for any unavoidable impacts. A request for an approved JD can be submitted prior to, or concurrently with, an application for the proposed work.

Thank you for contacting us regarding this project and providing us with the opportunity to comment. Should you have any questions, please contact Ms. Jessie Pa'ahana at *808.438.0391* or via email at *Jessie.K.Paahana@usace.army.mil*. Please be advised you can provide comments

on your experience with the Honolulu District Regulatory Branch by accessing our web-based customer survey form at *http://per2.nwp.usace.army.mil/survey.html*.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

OahuMPO

Memorandum

To: Manfred Zapka, PhD, PE, LEED-AP
Sustainable Design & Consulting LLC

From: Executive Director

Date: August 2, 2010

Subject: Comments on EISPN for Kapa'a Light Industrial Park in Kailua, Oahu, Hawaii

The OahuMPO is a transportation planning and programming agency that coordinates with both the State and the City and County of Honolulu. Our Oahu Regional Transportation Plan (ORTP) 2030 identifies long-range transportation issues, needs, goals, and objectives. The Transportation Improvement Program (TIP) FFYs 2011-2014 schedules projects from the ORTP 2030 for construction or implementation.

Staff has reviewed the EISPN for Kapa'a Light Industrial Park in Kailua, and has identified the TIP projects on the enclosed list as being in the same general vicinity of the proposed light industrial park. More details about these projects and our full TIP can be reviewed on our website at: http://www.oahumpo.org/programs/tipcurrent.html.

I hope this information is helpful to you. If you have any questions, please contact Senior Transportation Planner Lori Arakaki at (808) 587-2015.

BRIAN GIBSON

Enclosure

Oahu Metropolitan Planning Organization
Ocean View Center / 707 Richards Street, Suite 200 / Honolulu, Hawaii 96813-4623
Telephone (808) 587-2015 • (808) 523-4178 / Fax (808) 587-2018 / email: pmpo001@hawaii.rr.com
OahuMPO@OahuMPO.org

OahuMPO COMMENTS
KAPAA LIGHT INDUSTRIAL PARK IN KAILUA, OAHU
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

FFYs 2011-2014 TRANSPORTATION IMPROVEMENT PROGRAM PROJECTS IN THE VICINITY		
PROJECT NUMBER	**PROJECT NAME**	**PROJECT DESCRIPTION**
OS14	Guardrail and Shoulder Improvements, Various Locations	Install and upgrade guardrails to bridge end post connections, bridge railing, guardrail end terminals, crash attenuators, miscellaneous drainage, and other appurtenant improvements. Guardrail projects in the area include: • H-3 Freeway • Kalanianaole Highway, Vineyard Boulevard to Kailua Road • Kamehameha Highway, Pali Highway to Kahekili Highway
OS28	Interstate Route H-3, Safety Improvements, Vicinity of Kamehameha Highway Off-Ramp to Kaneohe Marine Corps Base Hawaii	Project involves improvements such as the installation of milled rumble strips on shoulders, pavement markings, and signage.
OS29	Interstate Route H-3, Seismic Retrofit, Halekou Interchange	Retrofit the interchange structure to meet current seismic standards.
OS30	Interstate Route H-3, Seismic Retrofit, Kapaa Quarry, Structure Nos. 1 & 2 (Inbound & Outbound)	Retrofit the interchange structure to meet current seismic standards.
OC4	Bridge Inspection and Appraisal	Inventory, inspect, and appraise City bridges, including underwater inspection, surveys, scour survey/evaluation, and preparation of plans for bridge repairs. Bridges in the area include: • Auloa Road Bridge at Kahanaiki Stream • Auloa Road Bridge at Maunawili Stream

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

08012PMT.10

August 5, 2010

Dr. Manfred Zapka, PhD, PE, LEED-AP
Principal and Senior Consultant
Sustainable Design & Consulting LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Mr. Zapka:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
Kapa`a Light Industrial Park
Kailua, Island of Oahu, Hawaii

The Department of Health, Clean Water Branch (CWB), has reviewed the subject documents of the EISPN and offers these comments on your project. Please note that our review is based solely on the information provided in the subject document and its compliance with Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

   a. Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale.

   b. Hydrotesting water.

   c. Construction dewatering effluent.

   d. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Section 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).

   You must submit a separate NOI form for each type of discharge at least 30 calendar days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 calendar days before to the start of construction activities. The NOI forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

3. For types of wastewater not listed in Item 2 above or wastewater discharging into Class 1 or Class AA waters, you may need an NPDES individual permit. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

4. Please call the Army Corps of Engineers at (808) 438-9258 to see if this subject project requires a Department of the Army (DA) permit. Permits may be required for work performed in, over, and under navigable waters of the United States. Projects requiring a DA permit also require a Section 401 Water Quality Certification (WQC) from our office.

5. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at http://www.hawaii.gov/health/environmental/water/cleanwater/index.html, or contact the Engineering Section, CWB, at 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

MT:ml

c: DOH - EPO # I-3278 [via email only]

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O.BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD/SDWB

August 11, 2010

Dr. Manfred Zapka
Sustainable Design & Consulting, LLC
P.O. Box 283267
Honolulu, HI 96828

Dear Dr. Zapka:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
KAPAA LIGHT INDUSTRIAL PARK
KAILUA, OAHU, HAWAII
TMK: 4-2-15: PORTION OF 001, 006, AND 008

Thank you for the opportunity to review the subject project's Final Environmental Assessment (FEA), serving as the content for the EISPN. The Safe Drinking Water Branch has reviewed the FEA and has the following comments to offer:

1. Section 3, Assessement of Impacts on Infrastructure, subsection 3.4.2, Water Supply, (page 3-37), states that:

> " As discussed in the Section Two, the proposed site is served by a 36-inch water main along the Kapa`a Quarry Road. Communications with the Board of Water Supply indicate that the existing infrastructure can accommodate the projected daily water demands with adequate pressures for firefighting emergencies. ..."

We have no objections if the project obtains its drinking water from the Honolulu Board of Water Supply who operates the regulated public water system in this area.

2. The FEA indicates that the project will have a dual water system. The drinking water and nonpotable, irrigation water systems must be carefully designed and operated to prevent cross-connections and backflow conditions. We believe that the Honolulu Board of Water Supply will require reduced pressure principle backflow prevention

devices to be installed immediately after each water meter to protect their drinking water distribution system.

The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow preventers to avoid contaminating the potable water supply. In addition, all nonpotable spigots and irrigated areas should be clearly labeled with warning signs to prevent the inadvertent consumption of nonpotable water.

We would strongly encourage the project owners to develop a water system management plan detailing the quality of the nonpotable water, who will be responsible for and how the drinking water and nonpotable water systems will be operated and actively monitored to maintain the separation and prevent cross connections between the two systems.

If you have any questions, please call me at 586-4258.

Sincerely,

STUART YAMADA, P.E., CHIEF
Safe Drinking Water Branch
Environmental Management Division

SY:cb

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File:

August 16, 2010

TO: Dr. Manfred Zapka, PhD, PE, LEED-AP
Sustainable Design & Consulting, LLC

FROM: Russell S. Takata, Program Manager
Indoor and Radiological Health Branch

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
Kapa'a Light Industrial Park in Kailua, Oahu, Hawaii
Request for comments on the content of the EISPN

Our comments should be printed as follows:

"Project activities shall comply with the Administrative Rules of the Department of Health:

- Chapter 11-46 Community Noise Control.

Should there be any questions, please contact me at 586-4701.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2010-TA-0407

AUG 2 0 2010

Dr. Manfred Zapka
Marc M. Siah and Associates, Incorporated
820 South Beretania Street, Suite 201
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement Preparation Notice for Kapaa Light Industrial Park Kailua, Oahu

Dear Dr. Zapka:

We are in receipt of your July 20, 2010, letter in which you requested comments on your Environmental Impact Statement Preparation Notice for Kapaa Light Industrial Park development located in Kailua, Oahu. These comments are provided in accordance with the Endangered Species Act of 1973 (16 U.S.C 1531 *et seq.*: 87 Stat. 884), as amended (ESA); and other authorities mandating Federal oversight of environmental resources including the Migratory Bird Treaty Act (16 U.S.C. 703 *et seq.*) as amended (MBTA). We provided comments on the draft Environmental Assessment in February 2009 (Service File 2009-TA-0094). You incorporated the Final Environmental Assessment into your Environmental Impact Statement Preparation Notice.

The proposed project entails expansion of the existing commercial and light industrial warehouse park on three contiguous land parcels that are located in the Kapaa valley, on the windward side of Oahu. The three parcels are owned by Kapaa III, LLC; are within the following Tax Map Keys: (1) 4-2-015:001, portion of TMK (1) 4-2-015:008, and TMK (1) 4-2-015:006; and total 78 acres. The Kapaa III, LLC property borders Kawainui Marsh and the Kapaa stream which is habitat for the federally endangered Hawaiian stilt *(Himantopus mexicanus knudseni)*, Hawaiian moorhen *(Gallinula chloropus sandvicensis)*, Hawaiian coot *(Fulica alai)* and Hawaiian duck *(Anas wyvilliana)* as well as populations of migratory waterfowl and shorebirds protected under the MBTA.

The developers have entered into a contract with the U.S. Department of Agriculture, National Resources Conservation Service (NRCS) to develop a 15-acre wildlife habitat and wetland restoration project located within the project site. The wildlife habitat restoration project will be developed in accordance with the design standards and recommendations of the NRCS. We recommend you also incorporate the following measures into the Environmental Impact Statement to minimize potential adverse project impacts to waterbirds:

TAKE PRIDE IN AMERICA

- *Ensure Waterbirds Attracted to the Restored Wetland are Not Exposed to Predators:* In the design of the 15-acre wildlife habitat and wetland restoration site, you have incorporated a 6,000-linear-foot (ft) fence surrounding the area. The fence, when installed, is designed to prevent non-native predators, such as feral cats, from entering the site. Your plans should also include measures to remove predators from the site once the fence is built (i.e., non-native predators may still remain once the fence is constructed). Measures to suppress rats and mongoose, which are know predators of the eggs of federally listed waterbird species, should also be incorporated into project plans.

- *Minimize Waterbird Attraction to Detention Ponds:* As previously addressed in our comments to the draft Environmental Assessment, we continue to be concerned that the proposed detention ponds, although designed to be "dry" during dry weather periods, still have the potential to attract breeding waterbirds. We suggest further coordination with us to develop methods to make these detention ponds less desirable habitat for waterbirds.

- *Long-Term Management to Ensure Wetland does not become an Attractive Nuisance:* Appendix G of the final Environmental Assessment states that the minimum duration of the conservation effort under the conservation plan is nine years (Wetland & Wildlife Habitat Management, NCRS Core 644). Without continued management, the wetland area may become an attractive nuisance to waterbirds (i.e., it may attract waterbirds to an area where they will be exposed to mortality or reduced reproductive success). The Environmental Impact Statement should include a long-term plan to manage wildlife habitat and wetland restoration site, which should include additional details on field procedures, personnel responsible for implementation, predator control activities, and long-term monitoring actions.

- *Address Project Impacts to Hydrology:* This project may also impact the hydrology of the area. In order to gain a better understanding of the current hydrological system at the wetlands restoration site, we recommend that a complete hydrology study be incorporated into the Environmental Impact Statement.

We recommend you coordinate further with our office as you work to develop the avoidance and minimization measures summarized above. As the lead Federal agency for the development of the 15-acre wildlife habitat and wetland restoration project, NRCS should consult with us pursuant to section 7(a)(2) of the ESA.

If aspects of the project outside of the 15-acre site, such as the detention pools, may adversely impact listed species, the developers should apply for an incidental take permit pursuant to section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats, and defines measures to minimize and mitigate adverse effects.

We appreciate your efforts to conserve listed species. If you have questions about our comments, please contact Michelle Bogardus or Aaron Nadig, Consultation and Habitat Conservation Planning Program (phone: 808-792-9400, fax: 808-792-9400).

Sincerely,

for Loyal Mehrhoff
Field Supervisor

LINDA LINGLE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 24, 2010

Sustainable Design & Consulting LLC
Box 283267
Honolulu, Hawaii 96828

Attention: Mr. Manfred Zapka, PhD, PE, LEED-AP

Ladies and Gentlemen:

Subject: Environmental Impact Statement Preparation Notice for Kapa'a Light Industrial Park

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Commission on Water Resource Management, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

for Morris M. Atta
Acting Administrator

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION

2010 AUG 16 P 2:28

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

LAURA H. THIELEN
CHAIRPERSON

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LENORE N. OHYE
ACTING DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

August 16, 2010

REF: Kapaa Light Industrial Park EISPN

TO: Morris Atta, Administrator
Land Division

FROM: Lenore N. Ohye, Acting Deputy Director Lenore N. Ohye
Commission on Water Resource Management

SUBJECT: Environmental Impact Statement Preparation Notice for Kapaa Light Industrial Park, Oahu

FILE NO.: NA
TMK NO.: (1) 4-2-015:001(por.), 4-2-015:006(por.), 4-2-015:008(por.)

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://www.hawaii.gov/dlnr/cwrm.

Our comments related to water resources are checked off below.

☒ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☒ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EPA as having high water efficiency can be found at http://www.epa.gov/watersense/pp/index.htm.

☒ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://hawaii.gov/dbedt/czm/initiative/lid.php.

☐ 6. We recommend the use of alternative water sources, wherever practicable.

☒ 7. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:
Additional information and forms are available at http://hawaii.gov/dlnr/cwrm/resources_permits.htm.

☐ 8. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water.

☐ 9. A Well Construction Permit(s) is (are) required any well construction work begins.

☐ 10. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☒ 11. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 12. Ground water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☒ 13. A Stream Channel Alteration Permit(s) is (are) required before any alteration(s) can be made to the bed and/or banks of a stream channel.

☐ 14. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is (are) constructed or altered.

☐ 15. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 16. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☒ OTHER:
The project site is in the vicinity of Kapaa Stream (also known as Kawainui Stream). Any proposed alteration of the stream channel may require a stream channel alteration permit from the Commission and should be discussed in this document.

According to our records, there are two wells located within the project parcels. Well No. 2446-01 is located at TMK 4-2-015:001, and Well No. 2446-03 is located at TMK 4-2-015:008. These are very old wells, constructed in 1892 and 1944, respectively. Our records indicate that no pumps are installed in either well and that both are unused. These wells should be properly abandoned and sealed in accordance with the State Water Code and Hawaii Well Construction and Pump Installation Standards to prevent potential contamination or wastage of the underlying aquifer, identified as the Waimanalo Aquifer System Area. The document should discuss these wells and any future plans for use or abandonment. A pump installation permit and a water use permit would be required prior to any installation of pumps and use of the wells, and a well abandonment permit would be required prior to any sealing work.

If there are any questions, please contact Commission staff at 587-0216.

LINDA LINGLE
GOVERNOR

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
JIRO A. SUMADA

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

STP 8.0213

September 1, 2010

Mr. Manfred Zapka, PhD, PE, LEED-AP
Principal and Senior Consultant
Sustainable Design & Consulting LLC
P.O. Box 283267
Honolulu, Hawaii 96828

Dear Mr. Zapka:

Subject: Kapaa Light Industrial Park
Environmental Impact Statement Preparation Notice (EISPN)

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project that includes constructing 35 new steel framed warehouse structures and associated improvements that will increase the square footage of the existing project from 250,000 square foot to 910,000 square foot with parking for 570 vehicles.

Given the project location, the State's highway facilities, Mokapu Saddle Road and Kalanianaole Highway, will be impacted. The Draft Environmental Impact Statement (DEIS) will need to address traffic and roadway impacts and identify mitigation measures.

The DOT Highways Division is concluding its review of the subject project. Upon completion of this review, DOT will provide additional comments as necessary.

DOT appreciates the opportunity to provide these interim comments. If there are any questions, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 587-2356.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

EIS

October 12, 2010

Manfred Zapka, PhD, PE, LEED-AP
Sustainable Design & Consulting LLC
P.O. Box 283267
Honolulu, HI 96828

Dear Dr. Zapka:

Re: Kapa'a Light Industrial Park EISPN
Kailua, Oahu

Thank you for the opportunity to comment on the above-referenced project. We sincerely apologize for the delay in responding to your request for comments. Hawaiian Electric Company, Inc. (HECO) has no objections at this time.

Should HECO have existing facilities/easements on the subject properties, continued access for maintenance purposes will be needed. In addition, HECO reserves the opportunity to further comment on the protection of existing power lines and electric power facilities that may be affected by the project.

As the project develops and construction plans are finalized, please continue to keep us informed so that we may be better able to evaluate any effects on HECO's system facilities.

To ensure HECO's continuing input in this project, we suggest that you work directly with Mr. Rouen Liu of our Engineering Department (543-7245). Thank you again for the opportunity to comment on this project.

Sincerely,

Kirk S. Tomita
Senior Environmental Scientist

cc: Ms. Catherine P. Kealoha (OEQC)
R. Liu

Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 2:

Market Study

<u>Appendix 2 is identical to Appendix 2 of DEIS</u>

January 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
www.sustain-hi.com

Market Study of the

PROPOSED KAPAA LIGHT INDUSTRIAL PARK

Kailua, Oahu, Hawaii

THE HALLSTROM GROUP INC.
REAL ESTATE
CONSULTANTS
& APPRAISERS

August 31, 2009

Dr. Marc M. Siah, President
Marc M. Siah & Associates, Inc.
820 S. Beretania Street, Suite 201
Honolulu, Hawaii 96813

Market Study of the Proposed
Kapaa Light Industrial Park Expansion
Kailua, Oahu, Hawaii

Dear Dr. Siah:

At your request, we have completed a defined-scope analysis assessing the market demand and estimated absorption levels for the proposed Kapaa Light Industrial Park expansion to be located on 78 gross acres in Kapaa Valley on the windward side of Oahu, mauka of Kailua Town. Identified on State of Hawaii tax maps as First Division, Tax Map Key 4-2-15, Parcels 1, 6 and 8, the project could comprise up to a circa 660,000 square feet of additional gross floor space within some 35 metal-clad buildings on 50 net subdivided site acres adjacent to the existing initial phases of the park if built to maximum envisioned densities.

The results of our investigation, analyses and modeling efforts are presented in the attached summary report which includes current market data, economic and demographic projections, an overview of the evolution of the Koolauloa District (or Greater Kailua/Kaneohe) industrial real estate sector, and estimates of finished space demand for the proposed subject inventory during its build-out period. The report focuses on tabular presentation of market-based data, modeling and indicators with brief narrative describing the study and correlating our findings.

In completing this assignment, we have viewed the subject property, its environs, and competitive projects in the study area; interviewed knowledgeable brokers and other parties regarding current sales and market conditions; utilized published and on-line databases; reviewed governmental land use designations, entitlements and policies in the region; identified existing and proposed competitive developments and their attributes; and worked with team members to create realistic econometric models of the undertaking and its secondary impacts.

ARBITRATION
VALUATION AND
MARKET STUDIES

SUITE 1350
1003 BISHOP STREET
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This summary report document, prepared for Marc M. Siah & Associates and Kapaa III LLC, is specifically intended to address market demand and absorption issues raised by the City & County of Honolulu Department of Planning and Permitting, and for inclusion into associated, timely land use entitlement petitions. Our findings do not constitute an appraisal of the property or any associated interests.

The assignment was performed in conformance with and subject to the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute, and the Uniform Standards of Professional Appraisal Practice. The function of our report is to provide real property information, real estate market data and informed professional opinions to be used for securing further entitlements needed to actualize the Kapaa Light Industrial Park, and to assist internal planning and decision-making by the development venture.

Based on our investigation and analysis, we have estimated the 660,000 square feet of gross industrial floor space of the proposed Kapaa Light Industrial Park should achieve full absorption within 16 to 18 years of offering.

Demand for the inventory will be via a combination of the evolution of the Windward industrial sector into an adequately supplied, sustainable trade area; continuing new business creation in a favorable economic region; relocation/expansion of existing companies into an under-serviced market; and the shortage of I-2 zoned land in the region. The need for additional development is evidenced by the rapid on-going absorption of floor space in Kapaa Valley over the past two decades.

Available vacant and proposed competitive supply is exceptionally limited, and will become increasingly scarce as existing light industrial spaces in Kailua and Kaneohe are being marketed more towards commercial-oriented businesses, I-2 parcels in Kailua Town are rezoned to other uses, and issues regarding non-conforming sites in Koolauloa are addressed.

We appreciate the opportunity to be of service in regards to this unique holding. Please contact us if further detail or explanation is required.

Sincerely,

THE HALLSTROM GROUP, INC.

Tom W. Holliday

Tom W. Holliday
Supervisor/Senior Analyst

/as

THE HALLSTROM GROUP INC.

REAL ESTATE
CONSULTANTS
& APPRAISERS

MARKET STUDY OF THE
PROPOSED KAPAA LIGHT INDUSTRIAL PARK

Located at

Kailua, Oahu, Hawaii

Prepared for

Marc M. Siah & Associates, Inc.

ARBITRATION
VALUATION AND
MARKET STUDIES

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August 2009

ASSIGNMENT

The Kapaa Light Industrial Park will be sited on 78 gross acres in Kapaa Valley[1], which is located on the lower easterly flanks of the Koolau Mountains, on the windward side of Oahu, mauka of Kailua Town, approximately 9 miles east of Honolulu. The valley has long-been used for quarrying, land fill and industrial uses, and the proposed project will abut and be an expansion of the in-place development comprised of some 30 industrial/warehouse buildings containing 273,476 square feet of gross leasable floor space.

The proposed additions to the existing inventory, at maximum densities, would include up to 35 new "metal frame/siding on slab" industrial warehouse-type buildings housing up to 660,000 square feet of gross floor area. Approximately 247,000 square feet of the new product would be located on lands now zoned I-2 Intensive Industrial, which are partially improved with the existing warehouses; with the remaining space on two abutting parcels seeking entitlements.

The proposed development, its environs and characteristics are described in detail within the ***Draft Environmental Assessment for the Kapaa Light Industrial Park, Kailua, Hawaii*** prepared by Marc M. Siah and Associates, dated November 2008, which served as a basis for our study.

As part of the review process of the Draft EA undertaken by the City and County of Honolulu Department of Planning and Permitting they are requiring further analysis of market support for the development. These requests form the structure and function of our assignment, as stated in the DPP letter of March 3, 2009 regarding their review of the project:

> "Please prepare an industrial market study. We would be interested in whether or not this

[1] The net subdivided area will be circa 50 acres after allowances for open space, setbacks and buffer area.

> windward area can absorb three (3) times more industrial floor spaces than currently exists in the area. Please discuss the anticipated increased demand for warehouse space and other types of industrial space in this region and also the location from which industries are likely to come."

"Sustainability" as it relates to the industrial sector of the Windward real estate market was also a focal point of our assessment. From a market-based planning perspective, an efficient sustainable market must provide sufficient competitive product to meet neighborhood needs. This serves to limit traffic impacts from commuting workers and business vehicles, and provide on-going opportunity to small businesses and startups in the region.

At present, the Koolauloa industrial sector does not demonstrate characteristics of long-term market sustainability.

PRESENTATION

In order to address the DPP issues, we have completed an eight-part study and reporting process:

1. Overview of the Oahu and Kailua/Windward industrial market sectors.

2. Development and absorption of the existing Kapaa Quarry industrial area.

3. Macro-economic quantification of demand for additional light industrial space in the Koolaupoko trade area.

4. Other industrial demand creation issues impacting the study trade area.

5. Identification of available existing and proposed light industrial supply in the competitive market sector.

6. Identification of most probable users for the proposed park inventory.

7. Assessment of the subject property and proposed project characteristics from a market perspective and its probable competitive standing therein.

8. Estimate of absorption of the proposed subject inventory.

Additionally, we have included a summary of Economic Impacts (employment, wages, business operations, etc.) and Public Benefits (primary taxes collected) for the project during build-out and upon operational stabilization.

The body of the report, focusing on tabular presentation with brief supporting and concluding narrative follows a summary of out salient indicators.

PRIMARY STUDY CONCLUSIONS

Based on our investigation and analysis, we have reached the following primary conclusions regarding the proposed Kapaa Light Industrial Park as of August 1, 2009:

1. Koolaupoko, which comprises the primary study region (or "Greater Kailua/Kaneohe" from a trade area perspective), is the poorest supplied industrial sector of any urban area on Oahu or in the state, despite it being one of the most populous and above-average income markets in the islands. The area currently contains only about 21 percent of the industrial space demand created by the resident population, or less than one-fourth the level of trade area supply found in Ewa, Central Oahu and Honolulu.

   Historically, the majority of demand created by Windward consumers and businesses was oriented towards other areas of the island; notably Honolulu. As a result, the effective trade area has been stunted in

regards to proximate availability of "neighborhood/ local" and "subregional" industrial-type services. This is an unsustainable condition which increasingly adds expenses to area households and businesses, and is exacerbated due to the limited industrial-zoned land base.

In recent years, several factors have combined to stimulate business growth in the Greater Kailua/Kaneohe community:

- Recognition of the economic potentials associated with a stable 119,000 person moderate to upper-income primary trade area.

- On-going dislocation of industrial businesses serving Koolaupoko from their existing Windward and Central Honolulu locations.

- Dramatically increasing time and costs associated with servicing the Windward side from elsewhere on the island due to escalating traffic, gas, idle labor and operating expenses.

- The commute into Honolulu has worsened to the point small business owners living in Kailua/Kaneohe are looking to relocate operations closer to their residence and/or employees.

- It is a desirable, natural trade area for Honolulu or Central Oahu/Ewa businesses looking to expand.

- There has been a major increase in home/small business and self-employed persons in Koolaupoko, many of which have/will require industrial spaces.

While it is widely accepted the Windward Coast should not be the location for many intensive industrial uses, particularly those serving islandwide markets, it is under-supplied from a local and subregional perspective.

Neighborhood-oriented contractors, suppliers, repair shops, maintenance/landscaping, craftsmen/wood-working, and warehousing are all uses for which Koolaupoko has a demonstrable shortfall in available space.

2. As the economy recovers and into the long-term, more local/neighborhood-oriented businesses will seek a Windward location, generating increasing demand for additional industrial space in the Greater Kailua/Kaneohe trade area, even though the resident population will remain generally stable. Assuming sufficient lands are made available, the trade area will evolve into a standard suburban market which would capture up to 40-plus percent of the demand for industrial space users created by the local residents and businesses if competitive space were made available. Should Koolaupoko achieve growth to such a minimally sustainable level it would still capture only about half the per capita space demand of Oahu's other urban and suburban areas.

   In addition to the demands created within a trade area expanding towards a viable market balance, other factors are contributing to the need for additional industrial space in the study area including:

   - The rezoning of industrial lands in Kailua Town to more profitable mixed-uses.

   - The dislocation of trade area service providers from the most proximate Central Honolulu industrial subdivisions.

   - The relocation of current non-conforming industrial users within Koolaupoko.

   - The conversion of spaces in existing industrial parks/subdivisions into commercial and other uses.

- The secondary demand created by the 14,000 residents and businesses in Koolauloa.

Our macro-economic demand models indicate the Koolaupoko region will readily support an additional 555,000 to 1.1 million gross square feet of industrial-type floor space over the coming 21-plus years (through 2030), or from 66 to 119 acres of vacant gross land area. The model mid-points are at 832,000 square feet of floor space and 92 acres of land.

An additional 166,000 square feet of demand will be created via dislocation and conversion, resulting in a total mid-point need for some 998,000 gross square feet of floor area by 2030, and about 96 acres of land.

Although this represents a doubling of the currently available industrial inventory in the region, it results in Koolaupoko still supporting only 34 to 42 percent of the industrial demand created by its residents and businesses; a level nominally sufficient to house most local and subregional industrial uses on a sustainable basis.

3. Koolaupoko contains some 82 total acres of industrial zoned lands containing a total of 991,618 square feet of finished floor space. The sector has remained relatively stable during the recent downturn, with a vacancy rate at the end of the first quarter of only 3.5 percent; favorably comparing with the overall rate for Oahu of 4.9 percent.

   The amount of available industrial space/land supply is extremely limited in Koolaupoko (excluding the subject property). As of the end of the first quarter, there was 35,115 square feet of vacant floor space, and the tax office shows only 3.09 acre of zoned vacant industrial lands. This represents one to two years of potential supply relative to demand. To provide for long-term trade area sustainability, additional industrial lands must be provided in Kailua/Kaneohe.

Further, the available supply of regional industrial lands in the district is being diminished by the on-going/planned transformation of existing industrial sites into higher return commercial and residential development. And, over time many established Windward industrial businesses located on non-conforming sites are being moved to alternative sites.

Further, there are environmental issues associated with historic industrial development types (particularly those in non-conforming locations), which will be addressed via the master plan's focus on energy efficiencies and environmental concerns.

It is anticipated that benefits arising from the adoption of LEED planning will become an increasing market factor in the industrial sector over the mid to long-term. The subject LEED-compliant master plan will well-position the project within this emerging market attribute.

4. Despite a recession meaningfully impacting virtually every sector of the state's real estate market, the demand for space at the existing Kapaa development has remained quite strong. A soon to be completed 20,000 square foot building is fully pre-leased, meaningful interest is emerging in the 19,600 square foot building to follow, and the project has an overall vacancy rate of only 4.2 percent.

   Since 2001, a total of 116,116 square feet has been added to the Kapaa Valley inventory, 110,000 square feet of which (or 95 percent) has been absorbed to date. The average absorption rate of new space in the project has been at circa 13,000 square feet per year. Adding in turnover replacement, the development has recently been leasing-up some 33,000 square feet annually.

   Ownership contends there is continuing strong interest by businesses seeking to locate in the valley due to its favorable location and limited alternatives. Six of the seven buildings constructed in this decade achieved full

lease-up within six months of completion (or less). And, it is the speed of construction which is the limiting factor on absorption, not a lack of demand.

In addition to the strong support for finished space, offers to buy/lease acreage for base yard facilities are regularly submitted, with ownership stating that upwards of 15 acres of subject I-2 land could readily be absorbed by the market.

5. The subject site is well-located for the proposed light industrial use. Among the contributing factors are:

- It is adjacent to similar existing development and has been "prepared" for such uses by years of intensive quarrying and landfill in the valley.

- It is nearby the five major routes providing access into and through the Windward area; H-3, and Pali, Likelike, Kalanianaole and Kahekili Highways.

- It is centrally-located within its effective trade area.

- The master plan will embody "sustainable" building technologies, and be in full LEED compliance. This will result in increased energy efficiency and a far lesser environmental impact then historic industrial development. We envision this becoming a more focal market issue in coming decades.

- The characteristics of the site and master plan mitigate potential conflicts with other uses.

- The location has a well-established demand as evidenced by the successful leasing of more than 270,000 square feet of space over the last two decades (or nearly 30 percent of all Windward industrial space).

6. We have assessed the proposed development based on the forecast trends for the Greater Kailua/Kaneohe industrial sector and the probable standing of the Kapaa Light Industrial Park therein. Our absorption forecasts are based on the application of three methods, all of which show support for the project:

   - Gross Analysis -- Even with the proposed subject inventory, the demand for space in Koolaupoko will exceed the supply during the projection period (through 2030).

   - Residual Demand Analysis -- Even if all other available industrial lands are absorbed first, the residual demand will be sufficient to absorb the subject inventory in 14 to 19 years.

   - Market Shares Analysis -- Based on its competitive characteristics relative to the scarce available alternatives, we estimate the subject product will capture a sufficient share of demand to achieve full absorption of the proposed warehouse floor space in circa 16 years.

   We forecast it will require from 16 to 18 years for the proposed 660,000 square feet of floor space in the expansion area of the Kapaa Light Industrial park to reach full absorption. Faster absorption would be achieved if subject acreage were made available for base yard use.

7. The estimated market-level construction costs for the buildings in the subject development are expected to total some $52.8 million (excluding any infrastructure), with local contractors and suppliers garnering profits of some $7.4 million. Circa 176 worker-years in the trades will be created via construction, with wages totaling $12.5 million.

   At build-out and stabilization, the tenant businesses are forecast to generate a minimum of $165 million annually

in operating income, and employ from 660 to as many as 825 persons (in accordance with tenant business types) with potential wages totaling $29.7 million.

The project would produce an estimated $1.85 million annually in taxes to the City and County of Honolulu, and $8.8 million per year in primary taxes to the State of Hawaii. The project is anticipated to require nominal expenses in the form of public services.

OVERVIEW OF THE OAHU AND KAILUA/WINDWARD INDUSTRIAL MARKET SECTORS

There are some 35,588,597 square feet of industrial floor space on Oahu, developed on circa 3,017 acres of land. This constitutes approximately 61.6 percent of the total industrial floor space in the State of Hawaii.

There have been significant additions to the inventory over the past decade, totaling some 5.12 million square feet of floor space--virtually all in the Central Oahu and Ewa areas of the island. The expansion corresponded to significant economic growth and an increasing diversification of business activity in the islands.

As shown on Table 1, the "Per Capita Spatial Allowance for Each Resident" on Oahu of 39.32 square feet of industrial floor area per person. A similar ratio is found on Kauai (36.45 feet per resident), but those on the Big Island and Maui are much higher, specifically due to the large scale inclusion of commercial-type uses often found within zoned "light industrial" subdivisions.

Ratios between 28 and 50 square feet of industrial space per resident are the general range within major metropolitan areas in the United States in accordance with the level of trade activity, manufacturing and other economic and locational factors. Being an isolated market which serves as the economic

hub of the entire state, it would be expected that Oahu's ratio would tend towards the upper end of the spectrum.

Although the island experienced a net absorption loss of some 245,274 square feet in the first quarter of 2009 (nearly a quarter of million more square feet were vacated versus being leased up), the overall vacancy rate of 4.9 percent remains generally low relative to similar-size mainland markets.

Initial figures from mid-year indicate there has been some additional vacancies as a result of the on-going recession, but movement towards stabilization has been emerging during the preparation of this report. A return to a positive economic environment is anticipated in 2010-11 by the State Department of Business Economic Development & Tourism (DBEDT) and by 2011 according to the UHERO Economic Information Service.

On an overall basis, Oahu's industrial inventory is reasonably adequate, and has typically maintained a favorable balance of supply and demand over the long term.

As with commercial uses, industrial floor space can also be delineated between a variety of neighborhood/local, (sub)regional, destination and location/functional specific types. For a given "trade area" to be considered sustainably-balanced it must provide sufficient inventory to service demands created by the residents and businesses of the economic community. Otherwise, a shortage condition emerges resulting in added costs to consumers.

Despite the apparent island-wide balance, the vast majority of industrial development is located along the heavily urbanized southerly coastline of the island from Kalaeloa (Barber's Point) to Kakaako, and in Central Oahu.

As displayed on Table 2, these trade areas have a per capita industrial space allowance at or near the island-wide average of 39 feet per person. However, the Koolaupoko District (or "Greater Kailua/Kaneohe") is significantly under-supplied at only 8.3 square feet of floor space per resident; just 21 percent of the island-wide average

While locating many industrial use types in Koolaupoko would not be practical, such as those airport or harbor-related, major manufacturers and island-wide distributors, or desirable from a community perspective, the substantive suburban trade area is statistically underserviced from a comparative perspective.

Greater Kailua/Kaneohe is distinctly defined by a major geographic barrier (the Koolau Range), is relatively removed (10 or more miles) from the nearest alternative industrial inventory, and is one of the largest trade areas in the state with a primary resident population greater than 100,000, and above-average household incomes and property values. Further, it serves as the operative base for some industrial demands created in the abutting rural Koolauloa District.

Analysis of the statewide industrial sectors and indicators taken from studies by the Urban Land Institute and other sources demonstrate that from about one-third to nearly half of industrial demand is oriented towards "neighborhood/local" or subregional general uses within a defined trade area.

These business types, essential in meeting the daily needs of consumers and companies in the trade area, include: storage and warehousing; showrooms; offices and staging areas for contractors, maintenance/landscaping operations, and other tradesmen and businesses; product suppliers to other local companies and agricultural uses; auto-related services and products; and, spaces for local residents to conduct their small business activities (such as craftsmen and custom production/manufacturing).

The remaining one-half to two-thirds of industrial demand created by the population and businesses of a suburban trade area is oriented towards major, destination, regional (or "super-regional") facilities servicing numerous trade areas or within more intensive urban environments.

A summary of the Koolaupoko or Greater Kailua/Kaneohe industrial space sector comprising the primary study area is shown on Table 3. As with the island-wide data the statistics are through the first quarter of 2009.

Indicative of the strength of demand for light industrial floor space in the region is the 3.5 percent vacancy rate at the time of the survey. This is meaningfully lower (by 29 percent) than the island-wide vacancy rate of 4.9 percent for the same period. Additionally, Koolaupoko's net loss of space absorption of 5,314 square feet represents only 0.54 percent of the total floor space inventory, notably below the 0.69 percent net loss for the entire island.

Similar to the overall Oahu market, initial second quarter statistics indicate an increase in the vacancy rate for Greater Kailua/Kaneohe industrial properties; but at a much lesser rate than for the island as a whole. We note the differing treatment of commercial spaces in some industrial-zoned buildings, which are experiencing higher vacancy levels than standard industrial structures, creates a disparity between the two primary surveys companies (CB Richard Ellis and Colliers Hawaii).

DEVELOPMENT AND ABSORPTION OF THE EXISTING KAPAA QUARRY INDUSTRIAL AREA

Intensive industrial uses in Kapaa Valley began with quarrying operations in the 1940s that continued into the 1990s. During the same period, portions of the valley have also been used for landfill. A result of these activities was to create a relatively level plateau of several hundred acres; vacant with the exception of several structures remaining from quarry plant operations.

Commencing in the late 1980s, a series of "Quonset-hut" type buildings were added on the property, providing competitively priced storage, work and staging space for Windward industrial businesses which did not require the characteristics or amenities associated with the higher-priced industrial subdivisions located in the center of Kailua and Kaneohe.

When the current ownership purchased the fee interest in the land in 2000, they significantly upgraded the types of structures

built, moving towards standard "metal frame/siding/roof on concrete slab" industrial warehouse construction.

A summary of the existing development and use of the Kapaa Quarry industrial area is contained on Table 4.

By 2000, there was an estimated 157,360 square feet of gross floor space within 23 of the older-type buildings. During the 12-plus year emplacement and lease-up period for these structures an average of some 13,113 gross square feet of floor space per year was absorbed.

From 2001 to the present seven of the newer warehouse buildings were added, totaling 116,116 gross square feet of floor area. This total includes Building 30, containing 20,000 square feet which is nearing completion and lease-up as of the report date.

Table 5 displays the construction of Kapaa Quarry floor space and its absorption on an annualized basis.

During this decade, the average absorption rate for new space in the industrial area was 12,902 square feet per year. The under-construction building is fully pre-leased; a notable occurrence given the recessionary status of the economy and widespread vacation of space elsewhere on Oahu and statewide.

Preparations are underway to construct another 19,600 square foot building on the existing I-2 zoned acreage in 2010. Management reports strong interest and expects to have the space fully leased-up by or shortly after completion.

Including the recent turnover rate in the development of about 20,000 square feet per year, the subject industrial area is effectively absorbing about 33,000 square feet of floor space annually.

At present, the overall vacancy rate in the development is about 4.2 percent, marginally higher than the regional average, with

the lower cost older buildings (many with long-time tenants) showing slightly lower vacancies than the newer structures.

Typically, the space in the project is about 98 percent occupied; or effectively full for a development having so many structures and individual tenants from a market perspective.

Approximately 60 to 70 percent of the tenants at Kapaa are relocations of newer and existing small businesses; from their home/garage or other non-conforming locations, from more expensive industrial Kailua/Kaneohe developments, or by windward resident businesspersons who want their operations to be closer to their homes.

Most of the other tenants are expanding Oahu businesses seeking a windward location to exploit the opportunities within Koolaupoko, and to avoid the difficulties and costs of servicing area customers from offices in Honolulu, Central Oahu or Ewa.

New business creation also contributes to tenancy levels.

Most space leases run for five year terms.

In addition to the 273,476 square feet of existing and under-construction floor space, the existing development also houses 8 land tenants utilizing about 36 gross site acres.

Ownership reports interest in floor space and (particularly) base yard area from prospective tenants "almost every day", with base yard acreage being exceptionally scarce throughout Windward Oahu. Among these, a major utility has recently approached ownership in an effort to obtain up to 10 acres for a base yard facility including 40,000 square feet of office/warehouse space.

The primary factors cited by tenants in electing to locate in the Kapaa industrial area are:

- Scarcity of alternative Windward industrial-zoned locations.

- Competitive pricing for space relative to other Kailua/Kaneohe developments.
- Ease of access to all the major thoroughfares of Windward Oahu.
- Relatively high quality of the newer warehouses.

MACRO-ECONOMIC QUANTIFICATION OF DEMAND FOR ADDITIONAL LIGHT INDUSTRIAL SPACE IN KOOLAUPOKO

As discussed foregoing, the industrial sector of Greater Kailua/Kaneohe is not fueled by major manufacturers, transportation hubs or companies with an island-wide customer base, but by "neighborhood/local" and subregional businesses serving the daily needs of the Windward community and in providing space for small businesses owned/operated by area residents.

Within this context, the demand for industrial space in the study trade area is therefore (as with retail space) primarily a function of the population being serviced by the constituent businesses and the adequacy of the available inventory of space to meet the expressed needs.

This macro-economic quantification of demand for a given trade area is fundamentally a three step process:

1. Estimate the trade area resident population base during the projection period.
2. Identify the per capita spatial demands required to provide adequate levels of floor area for "neighborhood"-type industrial businesses (the capture rate of overall industrial demand).
3. Construct an econometric model combining the factors to forecast gross floor and land area needed to adequately service the trade area over the projection time-frame.

For modeling purposes, we have utilized a 21-plus year time frame stretching from mid-2009 through the year 2030.

Estimate of Trade Area Population

Owing to the scarcity of zoned, available residential sites, and the expressed desire to limit urban sprawl in Windward Oahu, the estimated resident population of the Koolaupoko (primary trade area) and Koolauloa (secondary trade area) Districts is not anticipated to meaningfully increase over the coming two decades.

Conversely, growth projections made by the City & County of Honolulu Department of Planning and Permitting (DPP) forecast a slight decrease in the Koolaupoko resident population by 2030 due to declining household sizes coupled with relatively few housing additions. And, only minor gains in the Koolauloa population.

The DPP forecasts are shown at the top of Table 6 as 'Scenario One: Development Plan Forecasts, Unadjusted". They have forecast the current population of circa 119,000 will drop to 116,666 by 2030.

Given the type of residential inventory in Greater Kailua/Kaneohe (relatively larger homes in comparison to most newer product on the island) which we forecast will continue to attract similar types of purchasing families into the future, and the number of multi-generational households in the region, we believe the DPP figures depicting a decline of two percent in the District population over the next twenty years are somewhat conservative.

As an alternative to this "minimum" DPP perspective we have made some nominal revisions to their estimates, shown across the bottom of the table as "Scenario Two: Development Plan Forecasts, Adjusted".

Under this "maximum" perspective it is assumed household sizes remain generally stable for the district instead of declining, and that uncertified ("illegal") Transient Vacation Units are converted to resident population use (calculated on Table 7). The impact is not notably substantive, resulting in a total

resident population for Koolaupoko of 125,000 in 2030; less than 9,000 persons and about seven percent more than the DPP projections.

Also shown on the Table are the similar scenario forecasts for the Koolauloa District, which will provide secondary industrial space demand and business opportunities for companies located in Greater Kailua/Kaneohe which service the larger Windward Coast trade area.

Identify Per Capita Spatial Demands

The average industrial floor area spatial allowance on Oahu is presently at about 39 gross square feet per person. This level is commensurate with the size and characteristics of the island's economy relative to other locales, and has resulted in a generally sustainable balance between inventory supply and market demand.

The total industrial floor space available in Koolaupoko is at just over eight square feet per resident, or only 21.2 percent of the island-wide average. This is the lowest level, by far, for any similar-sized trade area in the state; and with 119,000 persons in the District it is one of the most populous defined trade areas in the state.

Even much smaller, but comparably "isolated" trade areas such as Waimea on the Big Island (14.1 square foot of industrial space per resident) and Lahaina (23.4 square feet), have substantially larger levels of industrial inventory on a per capita basis.

Acknowledging that most major industrial facilities should be oriented towards the Ewa-Honolulu corridor, still results in Koolaupoko being meaningfully under-supplied for meeting the broad-spectrum of demand created by neighborhood/local and subregional industrial users. These are economically required to adequately service such a significant trade area that is more than ten miles and often upwards of thirty minutes driving time from other industrial areas (and worsening).

Generally neighborhood/local and subregional type industrial uses comprise between a third and half of the total demand for industrial inventory. Thus, Koolaupoko is under-served, and

could support from 50 to more than 100 percent more floor space beyond present levels from a macro-economic perspective.

We estimate that a conservative to moderately appropriate range for the community-based needs of the Greater Kailua/Kaneohe trade area would be at 34 to 42 percent of the total demand created by the area residents. This would result in a per capita floor space allowance of 13.3 to 16.4 square feet per person; still at the bottom end of the range among urban trade areas statewide.

Our projections call for a long-term evolutionary period (extending to 2030) for Koolaupoko to reach even these comparatively low levels of sustainable industrial inventory for a suburban trade area.

Application of the Model

The population, per capita spatial demand figures, and effective regional capture rate were combined to estimate Koolaupoko demand for industrial space through 2030 as shown on Table 8.

The Scenario One "minimum" projections, which utilize the DPP Koolaupoko population forecasts, assume there is no further growth in the Oahu per capita industrial space figure and that the regional capture rate will move from its current level of about 21.5 percent of total regionally created demand to 34 percent of the island-wide average by the end of the projection time frame.

Under this alternative, the total demand for industrial floor space in the primary trade area will be at 1,546,991 square feet by 2030, an increase of 555,373 gross square feet and 56 percent from current levels. This includes an estimated latent (unmet) demand for nearly 6,200 square feet of floor space.

The Scenario Two "maximum" projections utilize the adjusted DPP Koolaupoko population estimates, assume nominal growth in the Oahu per capita industrial space demand figure (to 40 square feet per person) and a regional capture rate of 42 percent. This alternative indicates the total floor space demand in the primary trade area will be at 2,100,000 square feet in 21 years,

an increase of 1,108,382 square feet and 112 percent above the presently available inventory.

A combined mid-point between the two scenarios is shown at the bottom of the table. Mid-point figures generally serve as the basis of analysis throughout the remainder of the report.

The estimated demand is further delineated on Table 9, broken into periodic additions required from gross floor area (in square feet) and gross site area (in acres) perspectives.

The model indicates there is a latent undersupply at present of some 6,197 square feet, even with the currently low regional capture rate. This figure is conservative and reflects the near-term business creation and operational disruptions associated with the on-going recession.

Apart from secondary factors which will additionally will contribute to industrial demand in the Greater Kailua/Kaneohe trade area, discussed following, our macro-economic analysis indicates the mid-point demand for additional industrial space will be at 831,878 square feet of floor space and 92 acres of gross site area between now and 2030.

OTHER INDUSTRIAL DEMAND CREATION ISSUES IMPACTING THE STUDY TRADE AREA

Beyond the demand for new industrial space in the study trade area generated by its evolution into a reasonably-serviced and sustainable suburban sector, there are several secondary sources of demand which also must be met by the market.

Cumulatively, we estimate they will contribute about another 20 percent to the demand quantified via the macro-economic model.

Dislocation of Existing Users

As part of its Kailua Village master plan, Kaneohe Ranch has rezoned 21 "I-2 (Intensive Industrial District)" classified parcels near the town core (Hekili Street and Hamakua Drive) to other designations. The planning goal was to bring some of the in-place commercial-oriented tenants into conformance with the underlying zoning and to otherwise put these properties to higher, better and more profitable uses than available via their existing industrial uses/zoning.

Six of the properties were re-zoned to "IMX-1 (Industrial and Commercial Mixed-Use)" with a major change of focus away from industrial towards the commercial alternative. The other 15 were re-zoned to "B-2 (Community Business District)", which preclude a wide-spectrum of standard neighborhood/local industrial use types.

Only a single I-2 parcel remains in the subdivision.

While most of this land is not improved with true industrial uses, it is estimated the long-term impact of this undertaking will be to remove some 15,000 square feet of industrial space from the trade area inventory during the study period.

A major source of dislocation of industrial users is taking place in central Honolulu, where extensive proposed redevelopments are being pursued to transform intensive industrial areas into residential, commercial, business and mixed-use project.

Particularly impacted will be the Kakaako industrial area, one of the closest sources of industrial lands to the Koolaupoko trade area (although still more than 10 miles removed), and a location from which many industrial businesses used as a base to service their Windward customers and accounts.

Significant industrial floor space and acreage, at a similar distance from the study trade area, will also be lost through redevelopment in the Kapalama Military Reserve and as short-term tenants are dislocated from the Airport and Mapunapuna industrial subdivisions.

A study completed by Colliers Monroe Friedlander in December 2005[2] estimated a total of nearly 480,000 square feet of industrial floor space will be "lost" due to these areas of transitioning use by 2019, with the potential for additional amounts in the following decades.

This estimate was made prior to the recent announcement of Kamehameha School's intention to redevelop 29 acres in Kakaako away from industrial uses. A minimum of 300,000 square feet of industrial floor space will be lost due to the Kaiaulu o Kakaako project, resulting in a total of at least 780,000 square feet lost in Honolulu.

While much of this dislocation is anticipated to be re-directed as demand towards Ewa and Central Oahu industrial subdivisions, such locations are not appropriate for businesses with a strong Greater Kailua/Kaneohe patronage component. Further, dislocated company owners who reside in Koolaupoko will be hesitant to move operations to these relatively far-removed (and traffic-plagued) sites.

A minor portion of this demand would inevitably be focused towards the study trade area if sufficient, competitive industrial floor space and zoned lands were made available. We conservatively estimate this secondary market component could contribute some 95,000 square feet of additional floor space demand to base Greater Kailua/Kaneohe levels (or about 12 percent of the total near to mid-term dislocation) during the study period. And substantially moreso if the pace of dislocation escalates.

The final aspect of potential dislocation demand will be internal to Koolaupoko. At present, there are numerous non-conforming industrial-type uses spread throughout the District, often in residential-zoned subdivisions (businesses being operated out of the owner's home) with some major non-conformance areas in Waimanalo.

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2 "Campbell/Kapolei Industrial Market Transient Demand Study", Hamasu and Macapanpan, December 20, 2005.

Over time many of these businesses will have to relocate to conforming industrial lands, with Kapaa providing an excellent alternative.

It is difficult to quantify a precise amount of floor space this secondary demand component will require over the coming two decades. However, a meaningful portion of the 270,000 square feet of space built in the Kapaa over the past two decades has been absorbed by this type of business; an operation moving from a home/garage or non-conforming location due to the need to expand, have more/higher quality space, or due to community and governmental pressures.

We have made a conservative allowance of 25,000 square feet of demand in the study trade area will come from the re-location of non-conforming users elsewhere in the District.

The total estimated secondary industrial floor space demand in Greater Kailua/Kaneohe created by dislocation/relocation impacts during the projection period (to 2030) is 125,000 square feet; but could readily be twice this amount.

Conversion of Industrial Space to Commercial Uses

Beyond the broad-scale conversion of Kaneohe Ranch industrial lands in Kailua Town to other uses, incremental conversion of existing industrial spaces to commercial tenancy is on-going in the built-out industrial subdivisions of Kailua and Kaneohe.

This trend, common throughout the state, is accelerated when available commercial space/lands within a trade area are fully absorbed and/or commercial rents and prices reach high levels. Both of these conditions exist in the Koolaupoko industrial sector.

Based on our review of the industrial subdivisions in Kaneohe and Kailua (such that remain), and surveys completed by major Oahu realty groups, we estimate that some 20 percent, or nearly 200,000 square feet of existing floor space built on industrial-zoned lands is being used for somewhat to full commercial-oriented business operations; a figure which has grown by nearly 25 percent during this decade.

Given the long-established status of most of the remaining "true" industrial users in these subdivisions, this trend is expected to slow, but not cease, during our projection period.

We have made an allowance that 20,000 square feet industrial floor space will be further lost due to conversion of existing space from industrial to commercial tenant businesses.

The current Koolaupoko Sustainable Communities Plan specifically calls for this conversion of industrial lands in the centers of Kailua and Kaneohe stating "Light industrial zones should be converted to commercial-industrial mixed use to reflect actual use patterns and promote storefront uses along the sidewalks." (page 3-37).

Thus, the actual impact of continuing conversion from industrial to commercial and quasi-commercial uses would be allowed to be much greater, increasing the pressure for additional industrial lands in the area (such as the proposed subject).

Secondary Demand from Koolauloa District

The industrial businesses in the study trade area are the closest source of most industrial services and supplies to the adjoining, rural and more isolated windward portions of the Koolauloa District. There are a few (often non-conforming) industrial users in the area, and many consumers may elect to use providers located in Central Oahu or elsewhere on the island, but there is no doubt that a portion of demand created by Koolauloa residents and businesses is directed into the study trade area.

While there are plans to meaningfully increase industrial supply in Koolauloa as part of the proposed HRI Laie master planning process, some additional future demands will still leak into Koolaupoko as a result of the evolving trade area and the minor projected increases in the upper-Windward resident population base.

We have made an allowance for this secondary demand component of 21,000 total gross square feet of industrial uses within the study trade area over the next 21 years.

This equates to about 1.25 square feet of space per person in Koolauloa (or three percent of total per capita demand).

Correlation of Secondary Demand Components

The secondary demand components are summarized in regards to both finished floor space and acreage requirements during the projection period and incorporated along with our macro-economic demand mid-point indicators on Table 10.

The estimated total primary and secondary industrial space demand components within the Greater Kailua/Kaneohe trade area for the period 2009 through 2030 is 997,878 square feet of floor space or 93.4 gross acres of zoned lands.

We note our projections do not include demand for open base yard areas, which could readily contribute another 20 to 40 acres to the total.

AVAILABLE EXISTING AND PROPOSED INDUSTRIAL SPACE SUPPLY

According to City and County Real Property Tax records (as accessed via hawaiiinformationservice.com), there are only 3.09 acres of vacant, available industrial-classified sites in the Koolaupoko District apart from the zoned portions of the subject property.

This represents less than four percent of the total amount of zoned lands needed to service the Greater Kailua/Kaneohe trade area through 2030.

There are some vacant industrial-designated lands within the Kaneohe Marine Air Station, but these are not available for general market use.

We are not aware of any significant new additions to the Koolaupoko industrial land inventory proposed at this time.

Further, the current Koolaupoko Sustainable Communities Plan discourages the development of any further industrial

subdivisions in the District and speaks only to expansion of industrial uses in the Kapaa Quarry area (the subject property) "if sufficient demand can be demonstrated".

MOST PROBABLE USERS OF PROPOSED KAPAA LIGHT INDUSTRIAL PARK

New tenants of the proposed subject project are anticipated to be, for the most part, of the same general type and mix as currently exists in the buildings developed to date, including:

- Storage and small to moderate-sized warehousing.
- Offices, storage and staging areas for a wide variety of contractors, maintenance and landscaping companies, and similar businesses.
- Small to moderate-sized product suppliers to other companies, agricultural operations, and the general public within the trade area (often specialty products such as exotic woods, masonry/stone, and animal/grange supply).
- Craftsmen and custom design, production and assembly operations such as cabinet makers, solar water/power units, woodworkers, and interior design products.
- Equipment rental and repair.
- Automotive supply, servicing and customizing (although any engine repair or other type work which could potentially have unfavorable environmental consequences would be discouraged/not allowed).
- Land tenants.

In general, these are businesses which do not require a large on-site public patronage.

Additionally, the impacts of dislocation and increasing traffic congestion and traveling costs will attract selected moderate to larger businesses currently servicing the Windward side from Honolulu which will seek to open branch locations within the study trade area.

ASSESSMENT OF PROBABLE MARKET STANDING OF THE PROPOSED SUBJECT DEVELOPMENT

The proposed Kapaa Light Industrial Park will achieve a favorable market standing in the Greater Kailua/Kaneohe trade area for numerous reasons, focal among them:

- It already enjoys a reputation as a primary industrial location in Koolaupoko, with the existing and under-construction buildings comprising nearly 30 percent of the regional in-place industrial inventory, and a position as one of the largest concentrations of space in the District. The demonstrated ability to absorb some 273,000 square feet of floor space over the past two decades and the satisfaction of the tenant base all speak to a high level of proven, existing market acceptance. Unlike a fully new development, it will not have to endure through a ramp-up period of market exposure.

- Alternative locations in the trade area are exceptionally scarce and expensive. There are not many choices for Windward industrial businesses to locate outside of Kapaa. This inherently results in a near-total "capture" of the demand for additional space in the competitive market sector. Even apart from its many positive attributes, almost by default, the proposed development becomes the premiere industrial location in Greater Kailua/Kaneohe from a market perspective.

- The general access characteristics of the property relative to the trade area being serviced are good; superior to most other industrial developments on Oahu. It is at the

near-loci of the central trade area it services (Kahaluu to Waimanalo), minimizing drive times for out-going service providers and in-coming patrons. The five major thoroughfares of the Windward side basically coalesce nearby Kapaa Valley, and all within a few minutes drive from the subject site. H-3, Pali Highway and Likelike Highway lead across the Koolau Range into the urban core of Greater Honolulu; Kalanianaole Highway leads southerly along the Windward Coast; and, Kahekili Highway to the northerly Windward communities.

- Owing to its somewhat isolated nature relative to other urban types and long-established industrial uses, the potential for conflicts with nearby developments (a market concern for any industrial project) is mitigated. Additionally, this characteristic will keep intense/storefront commercial tenants from locating in the Park, displacing industrial users as seen elsewhere throughout the trade area (and State) and driving up prices via their ability to pay more in rents and for property.

- In many ways, the subject property is somewhat of a "blank slate." It is well-suited for industrial uses as a result of the decades of quarrying and landfill which have created the in-filled, virtually featureless, artificial plateau upon which the existing and proposed industrial buildings site. The environmentally-sensitive and LEED-compliant master plan will insure that the proposed Park operations will have minimum impact on the lower elevation features in the Valley.

- The space lease and ground rents at Kapaa have an established standing as being very competitive, and expanded industrial development of the site has the potential to provide favorable economic returns within the context of its physical attributes and historic use.

ESTIMATE OF ABSORPTION OF THE PROPOSED SUBJECT INVENTORY

Based on our foregoing analysis, we have estimated the probable absorption velocity for the proposed subject inventory using the three methodologies described following.

We note our focus has been strongly-oriented on the demand for the subject "warehouse" floor space and underlying land area as a function of the site being built-out as envisioned in the master plan. While ownership's primary goal is to pursue this total build-out option, if it elects to use portions of the site for base yards (for which there is a significant market demand), the speed of absorption would increase meaningfully from the indicated conclusions.

Gross Demand/Supply Analysis -- This straight-forward technique assumes that if there is insufficient supply to meet projected market demand levels during the projection period (2009 to 2030), the proposed subject inventory will be absorbed in a reasonable manner, regardless of competitive qualities, as there are no other alternatives available.

Over the next two decades, if the Kapaa Light Industrial Park is not built as proposed, there will be a shortfall of from 500,000 to 1,000,000-plus gross square feet of industrial floor space in the study trade area and from 63 to 115 gross site acres of land.

This undersupply condition will ensure there is sufficient unmet demand to absorb the project within the projection timeframe.

The Residual Method -- In this technique, the available non-subject existing and proposed industrial floor space/acreage supply is placed on a time-line depicting the absorption of all competing product. To the extent this supply falls short of the forecast mid-point demand for product in the trade area, or exceeds the projected total, a respective undersupply or oversupply situation will exist.

Having thus accounted for the market absorption of all potentially competitive regional industrial inventory, and acknowledging the unlikelihood of additional major subdivisions being proposed and approved during the projection period, it can be asserted the subject development will capture virtually all of any remaining residual demand. This approach is conservative as it assumes the subject will capture only what is left over after all other inventory fully actualizes their share of demand.

Given the attributes of the Kapaa holding and master plan, and successful absorption experience to date, we believe it will be a regional leader, not a follower, as is implicit in this method.

Table 11 displays the application of this technique to the study trade area and the subject.

The top half of the table depicts the approach in regards to floor space absorption, with the existing vacant floor space and potential space on vacant industrial-zoned sites shown as being absorbed in the near to mid-term as the economy recovers.

After allowance for this (notably limited) competitive supply to be fully absorbed, there remains sufficient unmet residual demand for the entire proposed subject floor area to be fully absorbed within a 14 to 19 year period during the expected construction period.

The analysis from a land area (acreage) perspective is shown at the bottom of the table and provides similar results.

<u>The Market Shares Method</u> -- This approach accounts for the probable competitiveness of the subject inventory regardless of the total level of product otherwise offered on the market. It is an estimate of how much of the total forecast demand for industrial floor space/acreage in the Greater Kailua/Kaneohe trade area the subject could expect to capture on an annual basis in light of its locational, pricing and "amenity" characteristics.

Moderate in application, this technique tests "pure" competitiveness and is considered the classic absorption projection methodology, but does require judgment in the selection of capture rate factors.

Table 12 displays the application of this technique from a gross floor space (in square feet) perspective.

As the subject enjoys a favorable location and well-established market standing, it would be expected to achieve a high capture rate even were there meaningful competitive industrial spaces/lands available. As there is exceptionally limited competing supply, the subject project will achieve a near total capture rate of expressed demand.

During the first several years of offering, the capture rate is nominally lower in consideration of the scarce competing product. Thereafter, we have assumed a 90 percent capture rate, which is very high but may be somewhat conservative in light of market conditions.

This approach, using mid-point demand estimates, indicates the proposed subject floor space inventory will require about 16 years to achieve full absorption.

SUMMARY ECONOMIC IMPACTS ANALYSIS

The primary economic impacts and governmental tax receipts associated with the Kapaa Light Industrial Park are summarized on Table 13. All values are expressed in constant, uninflated 2009 dollars and assuming currently prevailing costs, wages and other factors.

- The project will generate some $52.8 million in new capital investment during its nearly two decades of construction, exclusive of infrastructure costs, based on vertical "all-in" construction expenses of $80 per square foot for the warehouse buildings.

- The anticipated contractor and supplier profits flowing to local business who provide the materials and labor for the undertaking are estimated at $5,280,000 and $2,112,000, respectively, during the build-out.

- A total of 176 worker-years will be required to build the Park, based on an average of one worker-year for every $300,000 of construction costs. The total wages paid to these workers will be some $12.5 million assuming prevailing wages are paid.

- On a stabilized basis, after build-out and full lease-up, the businesses populating the proposed new areas of the Park will employ an estimated 660 to 825 full-time equivalent workers (assuming one FTE worker for every 800 to 1,000 square feet of gross floor area. The annual wages earned by these workers will total up to $29.7 million.[3]

- After stabilization is reached, the operating business are forecast to generate $165 million in gross annual receipts, based on average sales of $250 per year per gross square foot of floor area.

- The City and County of Honolulu will receive an estimated $1.85 million in primary annual receipts from the proposed Park areas. This includes $1,023,000 in real property taxes (assuming an average assessed value of $125 square feet of finished floor space and a tax rate of $12.04 per $1,000), and $825,000 for its "transportation fund" portion of the State General Excise Tax (GET) collections.

- The State of Hawaii will receive some $8.8 million per year on a stabilized basis, consisting of $6,864,000 in GET on the Park's gross operating revenues and nearly $2

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[3] Actual worker count will be dependent upon the final mix of tenant businesses and amount of land area dedicated to base yard use (if any).

million in annual income tax revenues on operating business profits and employee wages.

Beyond these standard economic impacts and public benefits considerations, there is another significant but atypical issue which could have a major negative impact on the economic standing and sustainability of the Windward communities over the long-term. There are significant direct costs associated with a planning decision to not provide sufficient lands for neighborhood/local and subregional industrial land users in Koolaupoko.

If Greater Kailua/Kaneohe is not provided with enough industrial land inventory to support the on-going (and necessary) evolution of the Koolaupoko trade area, businesses will be forced to service the region from staging locations in the Ewa-Honolulu corridor, with more and more companies being further ewa over time via dislocation.

The costs of such long-distance servicing are high, have escalated rapidly in recent years, and will continue to inflate meaningfully into the future. Increasing fuel prices, vehicle ownership and operating expenses, and time/labor costs associated with a degrading traffic environment will result in Windward customers having to pay artificially higher costs for industrial-related services and products which must be "shipped" to a comparatively isolated location relative to the urbanized corridor of Oahu.

The economic impact resulting from a "no more industrial lands" perspective is effectively a tax/tariff on products and services for Windward residents and businesses.

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ADDENDA

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ADDENDA

Qualifications of The Hallstrom Group, Inc.

Qualifications of the Analyst

TABLE 1

SUMMARY OF EXISTING INDUSTRIAL SPACE DEVELOPMENT IN HAWAII AND AMOUNT PER CAPITA
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii
As of End of First Quarter 2009, Major Islands Only

County	C& C of Honolulu	Maui		Kauai	Hawaii		State Totals
Total Estimated Industrial GLA (Square Feet)	**35,588,597**	**10,520,066**	(1)	**2,321,229**	**9,350,499**	(1)	**57,780,391**
Estimated Resident Population (Year-End 2008)	905,034	143,691		63,689	175,784		1,288,198
Per Capita Spatial Allowance for Each Resident (Square Feet per Person)	**39.32**	**73.21**		**36.45**	**53.19**		**44.85**
General Market Operating Overview							State Averages
Vacancy Rate	4.9%	0.6%		0.3%	0.4%		3.3%
Weighted Avg. Monthly Base per Square Foot Rents							
Net	$1.21	$0.98		$1.00	$0.95		$1.20
Gross	$1.55	$1.24		$1.59	$1.20		$1.49
Average Monthly per Square Foot Operating Expenses	$0.33	$0.26		$0.29	$0.25		$0.31
Space Absorbed in 2009 (through 1st Qtr)	(245,274)	37,224		2,162	13,280		(192,608)

(1) Maui and Big Island ratios artificially inflated due to large-scale inclusion of commercial and quasi-commercial uses within light industrial parks. In most modern parks on Maui and in West Hawaii commercial uses account for between 45% and 55% of total developed space.

Source: CB Richard Ellis, State DBEDT and The Hallstrom Group, Inc.

TABLE 2

COMPARISON OF EXISTING INDUSTRIAL SPACE DEVELOPMENT PER CAPITA ON OAHU BY TRADE AREA
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii
As of End of First Quarter 2009

Trade Area	Honolulu	Ewa/Waianae	Central Oahu	Koolaupoko
Total Estimated Industrial GLA (Square Feet)	**18,458,004**	**5,741,041**	**5,971,148**	991,618
Estimated Resident Population (Year-End 2008)	488,000	141,000	162,500	119,000
Per Capita Spatial Allowance for Each Resident (Square Feet per Person)	**37.82**	**40.72**	**36.75**	**8.33**
Per Capita Allowance Islandwide	39.32	39.32	39.32	39.32
Ratio of Region Per Capita Development to Island Average	**96.19%**	**103.54%**	**93.45%**	**21.19%**

Source: CB Richard Ellis, State DBEDT and The Hallstrom Group, Inc.

TABLE 3

SUMMARY OF EXISTING INDUSTRIAL SPACE DEVELOPMENT IN THE KOOLAUPOKO/GREATER KAILUA-KANEOHE STUDY AREA
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii
As of First Quarter 2009

	Koolaupoko District/ Greater Kailua-Kaneohe
Total Estimated Industrial GLA (Square Feet)	991,618
Estimated Resident Population (Year-End 2008)	119,000
Per Capita Spatial Allowance for Each Resident (Square Feet per Person)	8.33
Per Capita Allowance Islandwide	39.32
Ratio of Koolaupoko Per Capita Allowance to Island Average	21.19%
General Market Operating Overview	
Vacancy Rate	3.54%
Weighted Avg. Monthly Base per Square Foot Rents	
Net	$0.97
Gross	$1.17
Average Monthly per Square Foot Operating Expenses	$0.20
Space Absorbed in 2009 (through 1st Qtr)	(5,314)

Source: CB Richard Ellis, Colliers Hawaii, State DBEDT and The Hallstrom Group, Inc.

TABLE 4

CURRENT KAPAA QUARRY INDUSTRIAL AREA SUMMARY
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii

1. Gross Floor Area	
Pre-2000 Constructions (Quonset Huts and Mesh Bldg).	157,360
2001 to Current Constructions (Metal Warehouse on Slab)	116,116
Total Leasable Floor Space	**273,476**
2. Estimated Historic Annual Absorption	
Original Leases Circa 1988 through 2000 Square Feet Per Year	13,113
Original Leases 2001 to 2009 Square Feet Per Year	12,902
Tenant Turnover Space per Year (Recent Average)	20,000
Annual Average Total Original and Turnover Space Leased	**33,023**
3. Vacancy Rate	
In Pre-2000 Buildings (Square Feet Vacant)	5,554
Percent of Total Available	3.5%
In 2001 to Current Buildings (Square Feet Vacant)	6,000
Percent of Total Available	5.2%
Overall Vacancy Rate (Weighted Average)	**4.2%**
4. Base Yard/Land Tenants	
Number of Base Yard/Land Tenants	8
Land Area in Acres	36+/-
5. Next Scheduled Addition (Leasable Area in Sq. Ft.)	
Building #45 (Completion in 2010)	19,600

Source: Kapaa III LLC, and The Hallstrom Group, Inc.

TABLE 5

SUMMARY OF HISTORIC KAPAA QUARRY FLOOR SPACE ABSORPTION
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii

Year	In Gross Leasable Square Feet			Absorption Period Required
	In-Place Floor Area at Beginning of Year	Floor Area Added During Year	In-Place Floor Area at End of Year	
Pre-2000			157,360	Older Leases
2001	157,360	6,000	163,360	Within 6 Mos.
2002	163,360	6,000	169,360	Within 6 Mos.
2003	169,360	0	169,360	
2004	169,360	15,600	184,960	Within 6 Mos.
2005	184,960	16,000	200,960	Within 6 Mos.
2006	200,960	33,316	234,276	Within 6 Mos.
2007	234,276	19,200	253,476	Within 6 Mos.
2008	253,476	0	253,476	
2009 (1)	253,476	20,000	273,476	Fully Pre-Leased

(1) Building to be completed in Fall 2009.

Source: Kapaa III, LLC and The Hallstrom Group, Inc.

TABLE 6

HISTORIC AND PROJECTED RESIDENT POPULATION
FOR PRIMARY AND SECONDARY STUDY AREAS 1990 TO 2030
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii

	Historic Figures			Projected Figures				
Year	1990	2000	2008 Year-End Est.	2010	2015	2020	2025	2030
Scenario One: Development Plan Forecasts, Unadjusted (1)								
Koolaupoko District (Primary)	117,694	117,994	119,000	119,852		119,569		116,666
% Annual Average Change		0.03%	0.11%	0.36%		-0.02%		-0.24%
Koolauloa District (Secondary)	14,263	14,546	14,800	15,013		15,824		16,515
% Annual Average Change		0.20%	0.22%	0.72%		0.54%		0.44%
Total Windward Population	131,957	132,540	133,800	134,865		135,393		133,181
% Annual Average Change		0.04%	0.12%	0.40%		0.04%		-0.16%
% of Oahu Total	15.8%	15.1%	14.8%	14.2%		13.1%		11.9%
Scenario Two: Development Plan Forecasts, Adjusted (2)								
Koolaupoko District (Primary)	117,694	117,994	119,000	119,300	121,000	122,500	124,000	125,000
% Annual Average Change		0.03%	0.11%	0.05%	0.28%	0.25%	0.24%	0.16%
Koolauloa District (Secondary)	14,263	14,546	14,800	15,000	15,500	16,000	16,500	17,000
% Annual Average Change		0.20%	0.22%	0.27%	0.67%	0.65%	0.63%	0.61%
Total Windward Population	131,957	132,540	133,800	134,300	136,500	138,500	140,500	142,000
% Annual Average Change		0.04%	0.12%	0.07%	0.33%	0.29%	0.29%	0.21%
% of Projected Oahu Total	15.8%	15.1%	14.8%	14.1%	13.7%	13.4%	13.1%	12.7%

(1) As taken from "Growth Projections by DP Area (2000 -2030)", Department of Planning and Permitting.
(2) Adjusted to stabilized household size and for return of uncertified TVU units into residential use.

Source: C&C of Honolulu DPP, and The Hallstrom Group, Inc.

TABLE 7

ESTIMATED RESIDENT POPULATION IMPACT OF TRANSIENT VACATION UNITS IN WINDWARD OAHU
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii

Primary Study Area	
Koolaupoko District	
Estimated Transient Vacation Units (1)	561
Percent of Regional Housing Inventory	1.52%
Less Those Having Non-Conforming Use Certificates (2)	78
Total Estimated "Illegal" TVUs	483
Average Number of Bedrooms in TVUs (3)	2.6
Average Household Size	3.5
Total Resident Population Displaced by TVUs	**1,691**
Secondary Study Area	
Koolauloa District	
Estimated Transient Vacation Units (1)	106
Percent of Regional Housing Inventory	2.36%
Less Those Having Non-Conforming Use Certificates (2)	13
Total Estimated "Illegal" TVUs	93
Average Number of Bedrooms in TVUs (3)	2.6
Average Household Size	3.5
Total Resident Population Displaced by TVUs	**326**
ESTIMATED TOTAL DISPLACED WINDWARD POPULATION	**2,016**

(1) From "Vacation Rentals in Hawaii", The Kauaian Institute, October 2005.
Others have estimated there are/were more than 1,000 TVUs in Windward Oahu.
(2) From "Nonconforming Use Certificates by TMK", City & County of Honolulu, Department of Planning and Permitting-Code Compliance Branch, November 2008.
(3) Extrapolated from data presented in "Vacation Rentals in Hawaii".

Sources: As Cited and The Hallstrom Group, Inc.

TABLE 8

QUANTIFICATION OF INDUSTRIAL FLOOR SPACE DEMAND
IN THE GREATER KAILUA STUDY AREA FROM 2009 TO 2030 (1)
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii

Scenario One: Minimum Population Estimates and Growth Rate

Year	Patronage Population: Annual Growth Rate	Patronage Population: Forecast Total	X	Per Capita Demand in Square Feet	=	Total Resident Demand in Square Feet	X	Regional Capture Rate (2)	=	Net Regional Demand in Square Feet
2009		119,000		39.00		4,641,000		21.5%		997,815
2010	0.71%	119,852		39.00		4,674,228		22.0%		1,028,330
2015	-0.03%	119,700		39.00		4,668,300		25.0%		1,167,075
2020	-0.02%	119,569		39.00		4,663,191		28.0%		1,305,693
2025	-0.27%	118,000		39.00		4,602,000		31.0%		1,426,620
2030	-0.23%	116,666		39.00		4,549,974		34.0%		1,546,991

Scenario Two: Adjusted Population Estimates & Maximum Growth Rates

Year	Patronage Population: Annual Growth Rate	Patronage Population: Forecast Total	X	Per Capita Demand in Square Feet	=	Total Resident Demand in Square Feet	X	Regional Capture Rate (2)	=	Net Regional Demand in Square Feet
2009		119,000		39.00		4,641,000		21.5%		997,815
2010	0.25%	119,300		39.00		4,652,700		22.0%		1,023,594
2015	0.28%	121,000		39.25		4,749,250		27.0%		1,282,298
2020	0.24%	122,500		39.50		4,838,750		32.0%		1,548,400
2025	0.24%	124,000		39.75		4,929,000		37.0%		1,823,730
2030	0.16%	125,000		40.00		5,000,000		42.0%		2,100,000

Indicated Projection Mid-Point

Year	Patronage Population: Annual Growth Rate	Patronage Population: Forecast Population	X	Per Capita Demand in Square Feet	=	Total Resident Demand in Square Feet	X	Regional Capture Rate	=	Net Regional Demand in Square Feet
2009		119,000		39.00		4,641,000		21.5%		997,815
2010	0.48%	119,576		39.00		4,663,464		22.0%		1,025,962
2015	0.13%	120,350		39.13		4,708,694		26.0%		1,224,260
2020	0.11%	121,035		39.25		4,750,604		30.0%		1,425,181
2025	-0.01%	121,000		39.38		4,764,375		34.0%		1,619,888
2030	-0.03%	120,833		39.50		4,772,904		38.0%		1,813,703

Figures Do not Include the Current Unmet Shortfall in Space Estimated at 6,197 Square Feet (See Table 9).

(1) Per capita demand includes space for industrial uses only.
(2) The Regional Capture Rate is the portion of the entire demand spectrum created by regional residents which will be focused towards ("captured") by industrial projects in Kailua/Kaneohe. This includes construction trade shops, suppliers for regional users, base yards, limited warehousing, repair shops, other storage, and marginal light manufacturing. Significant portions of demand are presently directed towards development in Honolulu and Ewa.

Source: The Hallstrom Group, Inc.

TABLE 9

ESTIMATED TOTAL ADDITIONAL INDUSTRIAL FLOOR SPACE AND ACREAGE DEMAND
FOR THE GREATER KAILUA STUDY AREA 2009 TO 2030
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii

Scenario One: Minimum

Year	Forecast Floor Space Demand (in Sq. Ft.)	Divided by FAR Allowance (1)	Resulting Land Area Demand (in Acres)
2009	997,815	0.24	95
2010	1,028,330	0.24	98
2015	1,167,075	0.24	112
2020	1,305,693	0.24	125
2025	1,426,620	0.24	136
2030	1,546,991	0.24	148

Scenario Two: Adjusted

Year	Forecast Floor Space Demand (in Sq. Ft.)	Divided by FAR Allowance (1)	Resulting Land Area Demand (in Acres)
2009	997,815	0.24	95
2010	1,023,594	0.24	98
2015	1,282,298	0.24	123
2020	1,548,400	0.24	148
2025	1,823,730	0.24	174
2030	2,100,000	0.24	201

FINISHED FLOOR SPACE ANALYSIS (in Square Feet)

	Scenario 1	Scenario 2
Total Existing Demand		997,815
Estimated Existing Industrial Space (Sq. Ft.):		991,618
Current Undersupply or (Oversupply):		**6,197**
Periodic Additions Required (Sq. Ft.):		
Latent/Existing Demand	6,197	6,197
2009 to 2010	30,515	25,779
2011 to 2015	138,745	258,704
2015 to 2020	138,618	266,103
2021 to 2025	120,927	275,330
2026 to 2030	120,371	276,270
Cumulative Additional Space Required:	555,373	**1,108,382**
Increase as a Percent of Existing Floor Space	55.66%	**111.08%**
Estimated Mid-Point Additional Space Required (2):		**831,878**

DEVELOPABLE LAND AREA ANALYSIS (in Acres)

	Scenario 1	Scenario 2
Total Existing Demand		95
Estimated Existing Commercial Development Sites (in Acres.):		82
Current Undersupply or (Oversupply):		**13**
Periodic Additions Required (Sq. Ft.):		
Latent/Existing Demand	13	13
2009 to 2010	3	2
2011 to 2015	13	25
2015 to 2020	13	25
2021 to 2025	12	26
2026 to 2030	12	26
Cumulative Additional Acreage Required	**66**	**119**
Increase as a Percent of Existing Acreage:	**69.12%**	**124.55%**
Estimated Mid-Point Additional Space Required (2):		**92**

(1) Assuming average finished "Floor Area Ratio" of .28 for finished industrial development sites, with a net to gross efficiency on bulk sites of 85%.
(2) Includes existing latent demand in totals.

Source: CB Richard Ellis and The Hallstrom Group, Inc.

TABLE 10

SUMMARY OF DEMAND COMPONENTS FOR FINISHED INDUSTRIAL FLOOR SPACE IN KOOLAUPOKO
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii
Excludes Demand for Base Yard Spaces

Period	2009-2010 (1)	2011-2015	2016-2020	2021-2025	2026-2030	Totals 2009-2030
1. Gross Leasable Floor Area Analysis (All Figures in Square Feet Finished Floor Space)						
Demand Component						
Natural Trade Area Evolution (Using Mid-Point Figures)	34,344	198,724	202,360	198,128	198,321	831,878
Dislocation of Existing Industrial Uses	5,000	50,000	50,000	20,000		125,000
Conversion of Industrial Spaces to Commercial Uses		5,000	5,000	5,000	5,000	20,000
Secondary Demand from Koolauloa District (Allowance)	1,000	5,000	5,000	5,000	5,000	21,000
TOTAL ESTIMATED PERIODIC KOOLAUPOKO DEMAND	**40,344**	**258,724**	**262,360**	**228,128**	**208,321**	**997,878**
2. Gross Developable Site Area Analysis (All Figures in Gross Site Acres)						
Demand Component						
Natural Trade Area Evolution (Using Mid-Point Figures)	3.3	19.0	19.4	19.0	19.0	79.6
Dislocation of Existing Industrial Uses	0.5	4.8	4.8	1.9	0.0	12.0
Conversion of Industrial Spaces to Commercial Uses	0.0	0.5	0.5	0.5	0.5	1.9
Secondary Demand from Koolauloa District	0.1	0.5	0.5	0.5	0.5	2.0
TOTAL ESTIMATED PERIODIC KOOLAUPOKO DEMAND	**3.8**	**24.3**	**24.6**	**21.3**	**19.4**	**95.5**

(1) All latent demand shown in 2009-2010, will likely require several more years to be expressed and absorbed.

Source: The Hallstrom Group, Inc.

TABLE 11

PROJECTION OF POTENTIAL SUBJECT ABSORPTION USING THE RESIDUAL METHOD BASED ON TOTAL DEMAND FOR INDUSTRIAL SPACE AND LAND IN THE KOOLAUPOKO STUDY AREA
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu Hawaii
Based on Mid-Point Demand Estimates

Product Type	TOTAL SUPPLY	Lease/Sales Period 2009-2010	2011-2015	2016-2020	2021-2025	2026-2030	Total
Gross Square Feet of Finished Floor Space							
Currently Vacant Space	35,115	15,000	15,115				30,115
Market Share Percentage of Total Demand		37%	6%				3%
Potential Space on Vacant Industrial Lands (1)	37,716		12,000	12,000	13,716		37,716
Market Share Percentage of Total Demand			5%	5%	6%		4%
Regional Floor Space Demand (mid-point)	**997,878**	**40,344**	**258,724**	**262,360**	**228,128**	**208,321**	**997,878**
Shortage or (Excess) Supply	**925,047**	**25,344**	**231,609**	**250,360**	**214,412**	**208,321**	**930,047**
Potential Residual Subject Floor Space Demand							
at 95% Capture Rate	878,794	24,077	220,029	237,842	203,692	197,905	883,544
at 85% Capture Rate	786,290	21,542	196,868	212,806	182,250	177,072	790,540
Gross Acreage of Industrial Sites							
Currently Vacant, Zoned Industrial Lands	3.1		1.0	1.0	1.1		3.1
Market Share Percentage of Total Demand			4%	4%	5%		3%
Regional Industrial Land Demand (mid-point)	**93.4**	**3.8**	**24.3**	**24.6**	**21.3**	**19.4**	**93.4**
Shortage or (Excess) Supply	**90.4**	**3.8**	**23.3**	**23.6**	**20.2**	**19.4**	**90.3**
Potential Residual Subject Land Area Demand							
at 95% Capture Rate	85.8	3.6	22.1	22.4	19.2	18.5	85.8
at 85% Capture Rate	76.8	3.2	19.8	20.1	17.2	16.5	76.8

(1) According to property tax records, there are 3.09 acres (124,701 square feet) of vacant industrial-classified sites in Koolaupoko apart from the subject. Assuming a net "Floor Area Ratio" of .28 for the available finished sites, the total finished GLA would be some 37,716 square feet.

Source: Hawaii Information Service & The Hallstrom Group, Inc.

TABLE 12

SUMMARY OF POTENTIAL SUBJECT PROJECTED DEMAND LEVELS
FOR INDUSTRIAL FLOOR SPACE USING THE MARKET SHARES METHOD
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii
Based on Gross Leasable Floor Area Required

Using Mid-Point Demand Assumptions

Sales Year	Total Koolaupoko Trade Area Industrial Demand (in Gross Acres)	Effective Subject Share	Indicated Total Subject Absorption (in Gross Acres)
1	20,172	85.00%	17,146
2	20,172	85.00%	17,146
3	51,745	90.00%	46,570
4	51,745	90.00%	46,570
5	51,745	90.00%	46,570
6	51,745	90.00%	46,570
7	51,745	90.00%	46,570
8	52,472	90.00%	47,225
9	52,472	90.00%	47,225
10	52,472	90.00%	47,225
11	52,472	90.00%	47,225
12	52,472	90.00%	47,225
13	45,626	90.00%	41,063
14	45,626	90.00%	41,063
15	45,626	90.00%	41,063
16	45,626	75.00%	34,219
Totals	**743,931**	**88.81%**	**660,677**

Source: The Hallstrom Group, Inc.

TABLE 13

SUMMARY OF MAJOR ECONOMIC IMPACTS
AND PUBLIC BENEFITS
Market Study of the Proposed Kapaa Light Industrial Park
Kailua, Oahu, Hawaii
All Amounts Expressed in Constant, Uninflated 2009 Dollars

Analysis Item	During Build-Out/Absorption Period	Stabilized Annually Thereafter
Direct Capital Investment	$52,800,000	
Local Contractor's Profits	$5,280,000	
Local Supplier's Profits	$2,112,000	
Construction Worker-Years of Jobs	176	
Construction Worker Wages	$12,496,000	
Tenant Full-Time-Equivalent Employment		600 to 825
Employee Wages		Up to $29,700,000
Total Operating Gross Receipts		$165,000,000
City & County of Honolulu Gross Tax Receipts (1)		$1,848,000
State of Hawaii Gross Primary Tax Receipts		$8,797,800

(1) Real property taxes and portion of GET for transportation fund.
(2) State income tax and Gross Excise Tax.

Source: The Hallstrom Group, Inc.

Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 3:

Survey of Existing Businesses at the Project Site

<u>Appendix 3 is identical to Appendix 3 of DEIS</u>

January 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
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Table of Contents:

Questions asked in questionnaire

Summary of findings of company survey

Figure 1 Frequency distribution of residence of total full time equivalent employees

Figure 2 Frequency distribution of size of companies within existing industrial development

Figure 3 Distribution of FTE employees from Kailua & Kaneohe as function of size of company

Questions asked in questionnaire

One short, one-page questionnaire was distributed to each company and collected within three working days. The following information was requested from companies and was used for the data analysis:

1. Name of company
2. Type of company:
3. Total number of full time employees
4. Number of full time employees from Kailua
5. Number of full employees from Kaneohe

Summary of Results from the survey

Survey carried out September 2010:

Number of companies which returned questionnaire	40	
Total number of companies in existing warehouse development	44	
Percentage of total companies that returned the questionnaire	90%	
Total number of employees in companies that returned questionnaire	251	
Normalized total number of employees in all companies	279	
Percentage of all employees from Kailua	39%	
Percentage of all employees from Kaneohe	18%	
Percentage of all employees from outside Kailua & Kaneohe	43%	
sum	100%	
Percentage of all employees from Kailua and Kaneohe	**57%**	
Total industrial space of existing warehouses	283,000	squart feet
Per employee allowance of warehouse space	1,015	sqft per employee

Figure 1 Frequency distribution of residence of total full time equivalent employees

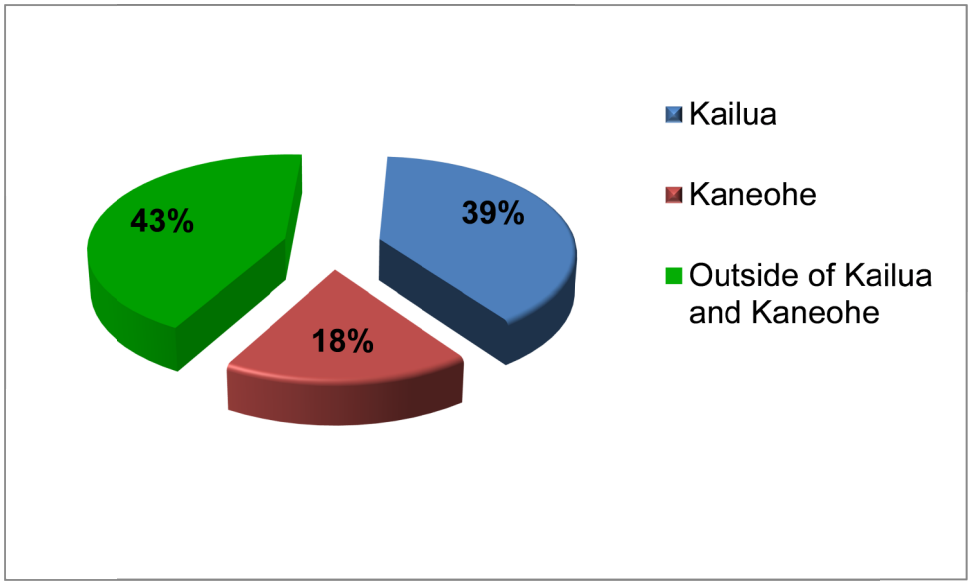

Figure 1 indicates the residence of employees of companies in the existing warehouse development at the proposed site. The figure indicates that 39 and 18 percent of all employees reside in Kailua and Kaneohe, respectively. The percentage of employees, who live in Kailua or Kaneohe represents 57 percent of the entire workforce of companies at the existing warehouse development.

Figure 2 Frequency distribution of size of companies within existing industrial development

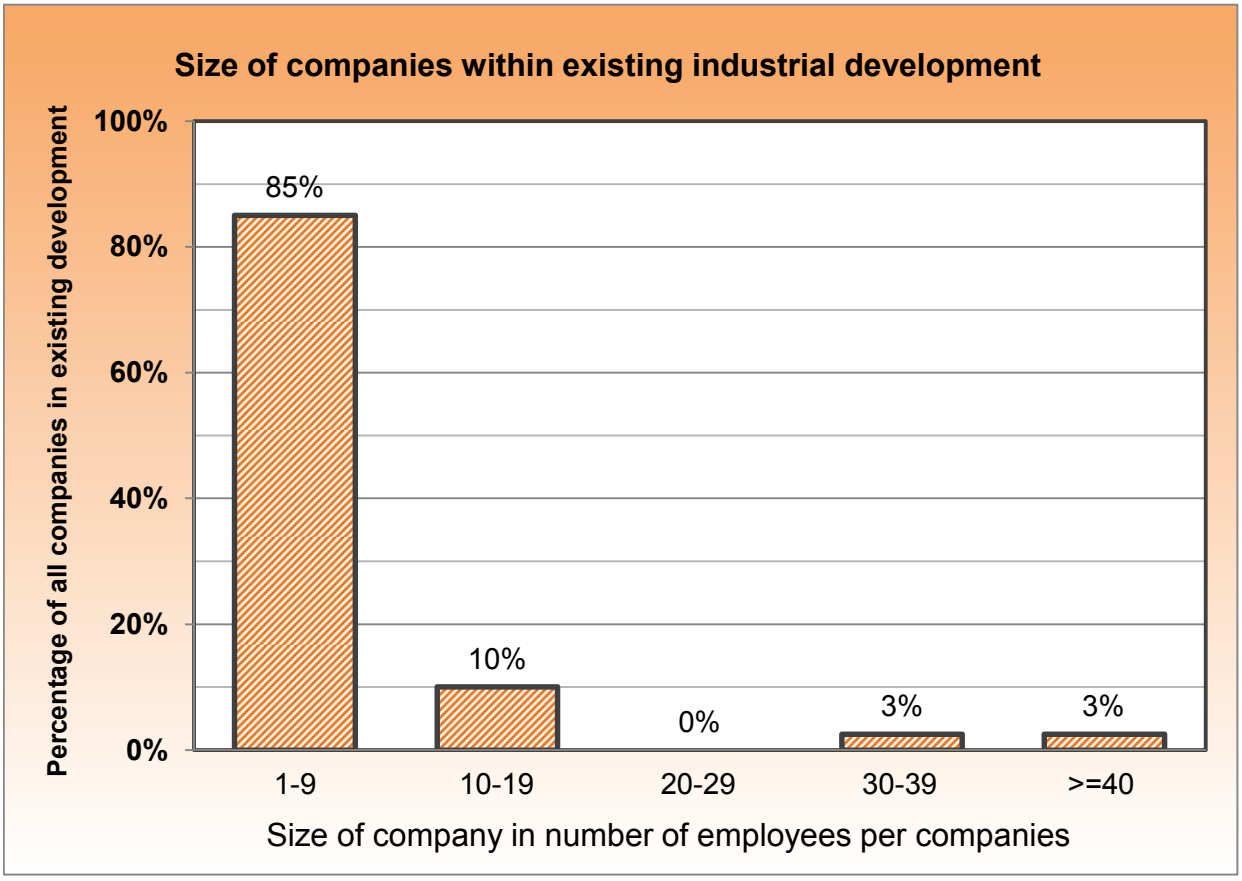

Figure 2 indicates the distribution of all employees as a function of size of company. The figure suggests that 85 percent of all companies are working in companies with 1 to 9 employees.

Figure 3 Distribution of FTE employees from Kailua & Kaneohe as function of size of company

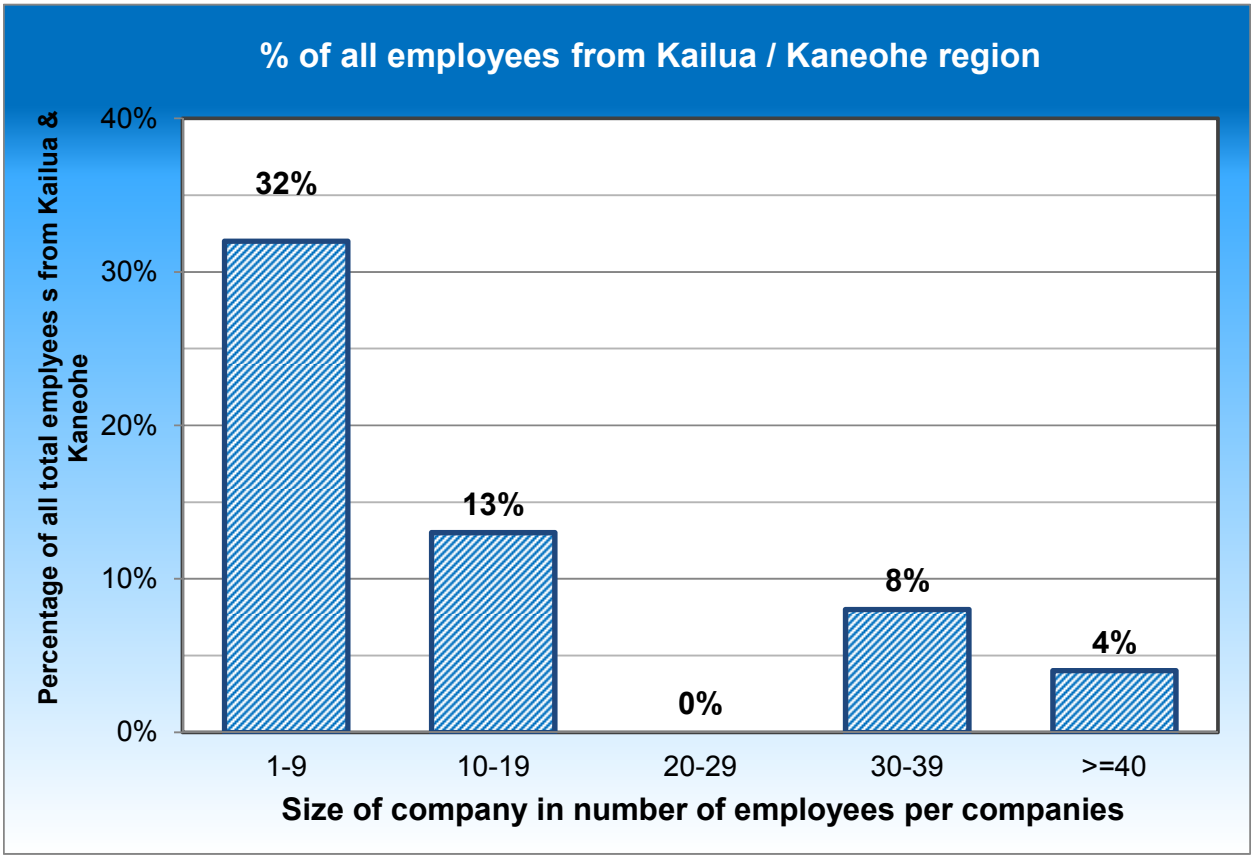

Figure 3 indicates the distribution of the 57 percent of total employees who are from Kailua & Kaneohe, as a function of size of company. The figure indicates that 32 percent of all employees come from Kailua and Kaneohe and are working in small companies with 1 to 9 employees.

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Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 4:

Sustainable Design Approach

<u>Appendix 4 is identical to Appendix 4 of DEIS</u>

January 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
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APPENDIX 4

Draft Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Sustainable Design Approach

Concept Design for the Proposed

Kapa'a Light Industrial Park

in the Lower Portion of the Development of the Project Site

within TMK 4-2-15:006 (portion of)

Definition of LEED Credits to be Attempted and Description of

Design Measures to Attain LEED Silver Certification Upon

Completion of the Development

Prepared for

Kapaa I, LLC

Prepared by

Sustainable Design & Consulting LLC
www.sustain-HI.com

November 2010

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1. Introduction

The Kapa'a Light Industrial Park will be developed on former landfill area that is within the land parcels TMK 4-2-15:001 (portion of), 006 and 008. The intended land use is industrial warehouses, which requires that the land is properly zoned for this use. While the parcel TMK 4-2-15:008 is already zoned I-2 (Intensive Industrial), the other two parcels TMK 4-2-15:001 (portion of) and 006 have to be rezoned to I-1 Light industrial from the present P-2 General preservation land in order to build warehouse or base yards.

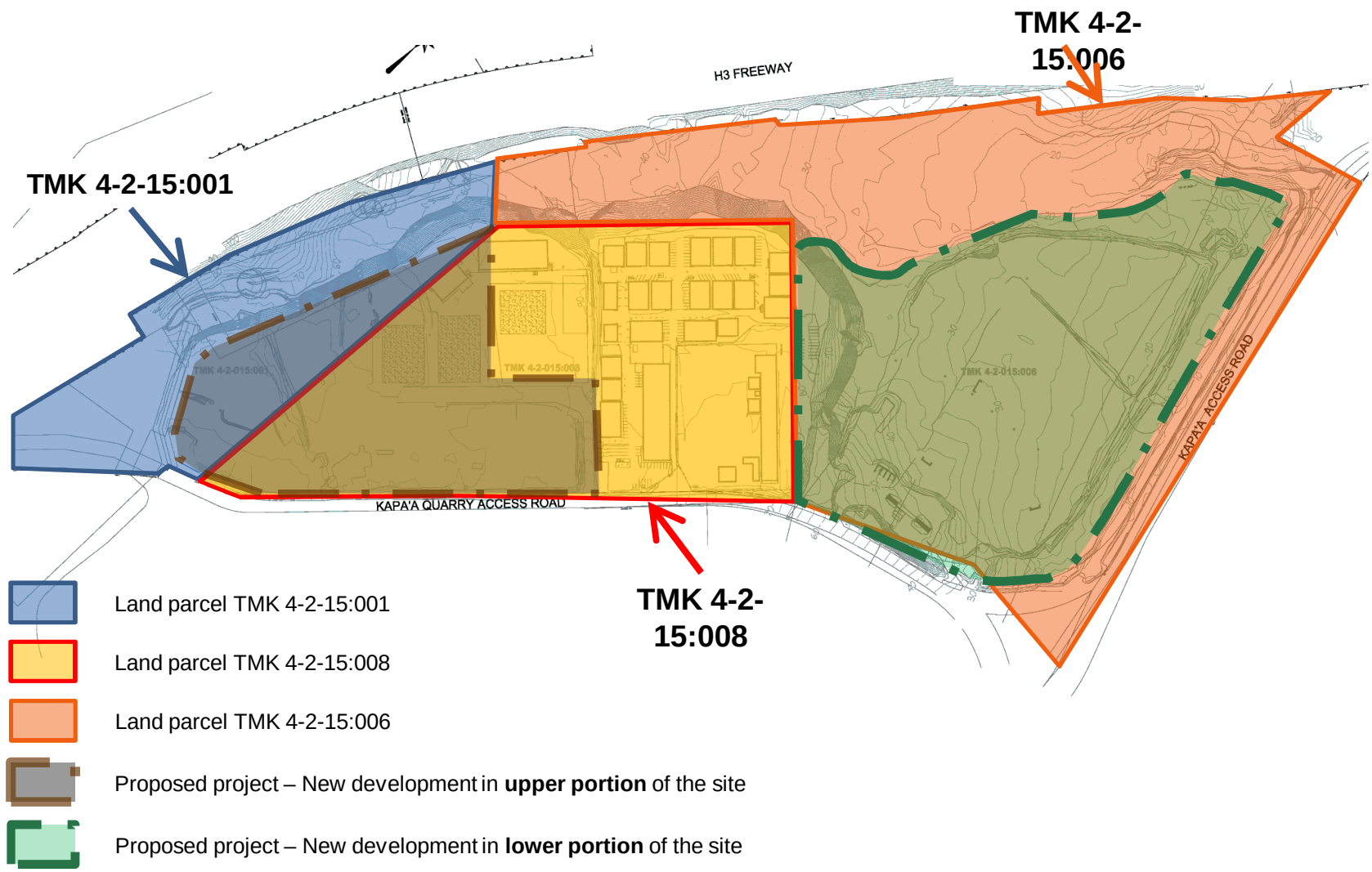
The three parcels are contiguous land parcels, whereby parcels TMK 4-2-15:001 (portion of) and 008 are adjacent and on one plateaued portion of the site and parcel TMK 4-2-15:006 is on another plateau which is at a lower elevation. Thus, the proposed site is separated into two portions, the upper portion and the lower portion.

Figure SDA 1.1 shows an aerial photography of the proposed site. The boundaries of the land parcels are indicated. The central part of the proposed site, parcel TMK 4-2-15:008 has presently a number of warehouses, while the adjoining parcel TMK 4-2-15:001 (portion of) to the west does not have any permanent buildings or structures. This parcel is graded but has no pavement; only some dirt roads.

Figure SDA 1.1 shows the parcel TMK 4-2-15:006 to the east of the existing warehouse development. The parcel 4-2-15:006 includes a larger portion of the Kapa'a Stream corridor and an area that was formed from landfill that dates back several decades. Only the land fill area will represent of lower portion of the proposed site and no open space will be used for the development footprint of the project. The land within parcel 4-2-15:006, which will be used for the warehouse development is currently used for different activities ranging from green waste processing to storage of inert building material.

In planning the light industrial park the lower portion of the site, parcel TMK 4-2-15:006 has to be considered of having a larger potential for impact on the surrounding land and especially the adjacent wetland. Figure SDA 1.2 shows that a significant portion of the parcel 006 is within the Special Management Area (SMA) district. The site is in close proximity to important wetland, especially the Kawainui Marsh. Consequently, the planned light industrial park will have to be developed in such a way to avoid significant impacts to the environment and to the community.

Green building technologies can effectively mitigate many potential impacts to the environment and the community. Electing a recognized green building certification program and subjecting the design and construction to an thorough audit by a third party to verify that the selected development approach conforms to effective and proven green building and development practices is a strong commitment to implement the environmentally friendly design for the light industrial park.



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Kapa'a Light Industrial Park
Draft Environmental Impact Statement
Sustainable Design Approach - Lower Portion of Site

Figure SDA 1.1 Land Parcels on which the Proposed KLIP will be developed

In accordance to these goals the developer of the Kapa'a Light Industrial Park has decided to develop the lower portion of the proposed site in accordance to the LEED Green Building Rating System for Core and Shell, Version 3.0. Upon completion of construction the warehouse development will apply for **LEED Silver** certification, which signifies an advanced level of commitment to green building technology implementation.

Figure SDA 1.2 shows the project boundary of the proposed site for which LEED Silver certification is sought.

The LEED Green Building Core and Shell Rating system applies to new constructions or major renovations where the owner occupies less than 50% of the space, which is the case for the proposed Kapa'a Light Industrial Park, where warehouses will be built on a graded and landscaped site. Tenants will occupy warehouse space and are will be responsible to build and maintain the commercial interior. The core and shell spaces encompass the building envelope of the warehouses and the development of all areas around the buildings and providing all utility services.

In reaching the LEED Silver certification goal the project has to qualify for at least 51 credit points out of a total of 100 credit from five credit categories plus 10 possible bonus points for innovative designs, exemplary performance and fulfillment of regional priorities.

Credits carry different weight have different numbers of possible points maximum associated with them . In addition for selected credits, the degree of credit compliance results in different number of credit points awarded. The LEED project team can adjust the project approach in such a way as to select how many points will be attempted from the different credit categories and bonus points. The ability to select which credits are attempted provides the project team with the opportunity to consider locally important factors. In the case of the proposed industrial development the project team has selected to focus on those credits, which would result in effective mitigation of impacts on the wetland area.

Section Two of this design document presents the selected design approach to fulfill the requirement of the LEED Silver certification goal.

Section Three of this design document shows a more detailed design description of several key credits that will be attempted.

Section Four of this design document summaries the proposed certification approach and discusses how and to which extent the different credit categories contribute to overall points of the project and offer effective impact mitigation for the adjacent environment and the community living in the Koolaupoko region.

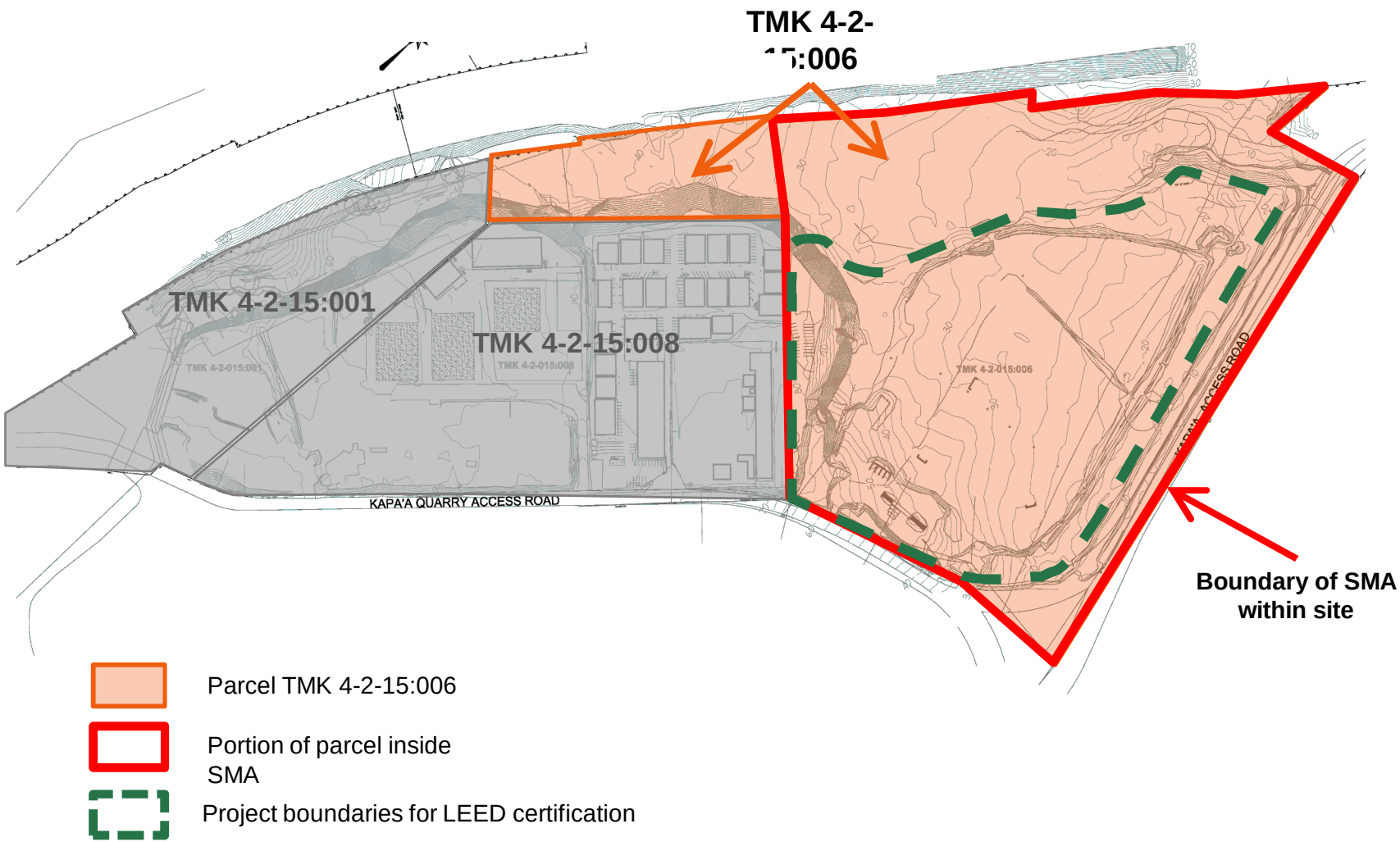

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Figure SDA 1.2 Project boundary for LEED certification

2. List of the LEED Credits for LEED Silver Certification

The list below summarizes the credits that will be attempted by the project team to achieve LEED certification upon completion of the proposed project. Credits have different point values. The sum of credit points attempted in the design and achieved upon project completion determines the level of LEED certification. The project goal is to achieve LEED Silver certification.

The list below shows only those credits that will be attempted by implementing appropriate measures and technologies. The list also shows several important credits (high credit points) and measures that would mitigate important impacts for the proposed project are important and that might be attempted if the project team decides to include these credit in the overall LEED strategy of the proposed project. .

Furthermore the list below also shows prerequisites that must be met and for which no points are awarded. By and large the credit prerequisites for this project are not only met by generally exceeded, in order to implement an effective impact mitigation for the proposed project.

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
SS Sustainable Sites:	
SS Prerequisite 1: Construction activity pollution prevention: This is a prerequisite, therefore design measures have to be implemented and no credit points are awarded.	
Intent of credit: Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation;	The project will conform to the erosion and sedimentation requirements of the 2003 EPA Construction General permit or applicable local standards and codes, whatever is more stringent. The project will specifically implement Best Management Practices (BMP) to avoid or significantly mitigate impacts from soil erosion, loss of topsoil, or impacts from airborne dust and particular matters. Section 3.1 presents a more detailed description of the type of control measures for storm water runoff from the construction site

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
SS Credit 1: Site Selection : The proposed design approach satisfies all but one requirement for this credit; with the present site layout this credit will not be attempted	
Intent of credit: Reduce the environmental impact from the location of building on a site.	The project satisfies most of the requirements of this credit. There is one building and one loading dock within the site layout which are closer than the required 100 feet setback from the wetland delineation. The portion of the proposed site that is closest to the wetland area in the Kapa'a Stream corridor is reserved for a vegetative buffer zone around the site areas which contain buildings, roads, parking areas and other hardscape areas. In case of changes to the proposed park layout this credit point might be achieved. Section 3.2 discusses the reason why the credit is not attempted at this time; but might be attempted if there is a change in the proposed layout of the industrial park
SS Credit 3: Brownfield Redevelopment: The proposed design approach satisfies the core intent of the credit but does not follow all requirements; this credit will not be attempted	
Intent of credit is to rehabilitate damaged sites where development is complicated by environmental contamination and reduce pressure on undeveloped land	The proposed site has not officially been defined as a Brownfield, and therefore the credit cannot be counted at this point in time. However, the proposed project site satisfies the intent of the credit to reduce pressure on undeveloped land. The development on this former landfill is likely more cost intensive than developing on undeveloped land.

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
SS Credit 4.1: Alternative Transportation - Public Transportation Access: This credit is important but cannot be satisfied without the creation of at least one public bus line; if a public bus line is implemented to serve the project area during the development of the project in addition to the planned private shuttle the credit will be attempted	
Intent of credit is to reduce pollution and land development impacts from automobile use.	At the present there is no public transportation that serves the Kapa'a Valley or the west side of the Kawainui Marsh. The project team understands that there are no immediate plans to implement public transportation to this area. The developer strongly support alternative transportation and plans to start a private shuttle service if there is a sufficient demand from the businesses leasing the industrial space. While private shuttle would be one out of two required bus services, this credit point cannot be achieved, but might be achieved sometime in the future. This credit point would significant help the project team to reach a higher certification level.
SS Credit 4.2: Alternative Transportation: Bicycle Storage & Changing Rooms: this credit will be attempted	
Intent of credit is to reduce pollution and land development impacts from automobile use.	Bicycle storage and changing rooms will be made available to the users (employees and visitors) of the proposed industrial park. These measures will encourage the use of bicycles as a means for commutes or visits to the industrial park. It has been pointed out that riding a bicycle on the current quarry road might be not safe, due to the absence of a paved shoulder. The project team anticipates that in the near future conditions for safer bicycle riding will improve along the quarry road, e.g. through the planned Kawainui Marsh perimeter trail (a combined walkway / bikeway). This perimeter trail would provide secure riding and walking along the quarry road from Mokapu Blvd. and Kalanianaole Highway to the proposed project site.

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
SS Credit 5.1: Site Development - Protect or Restore Habitat: this credit will be attempted	
Intent of credit is to conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.	The minimum of area (either 50% of site (excluding building footprint) or 20% of entire site) will be restored with either native or adapted plant species. A significant portion of the restored land will be contained in the vegetative buffer zones that will surround the proposed industrial park. Section 3.3 presents a more detailed description of the design approach for this project measure
SS Credit 5.2: Site Development - Maximize open space: this credit will be attempted	
Intent of credit is to promote biodiversity by providing a high ratio of open space to development footprint.	Vegetated open space will be provided that exceeds the county zoning requirement by more than 25%. The vegetated open space comprises the area that is outside the development foot print (e.g. hardscape, buildings, roads, and parking areas) thus vegetated areas adjacent and between the buildings as well as open space at the perimeter of the site.
SS Credit 6.1: Stormwater Design: Quantity Control: this credit will be attempted (the basic requirements for the stormwater design will significantly exceed the basic requirements so that exemplary performance credit will be attempted)	
Intent of credit is to limit disruption of the natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.	The project will implement a stormwater management plan that protects the receiving stream channels from excessive erosion and includes stream protection and quantity control strategies. All stormwater will be treated to remove at least 80% of all pollutants before being discharged into the receiving waters in a controlled manner. An extended detention pond will contain stormwater peak flows and will release the stormwater with a low flow rate over a time period that is between 24 and 48 hours. The rainwater will be collected from a portion of the roof areas and selected

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
	sections of the internal roadway. The collected rainwater will be harvested in underground cisterns for use in irrigation and certain graywater applications; thus parts of impervious roof surfaces and roadway sections will be transformed to pervious surfaces since the collected rainwater will ultimately either infiltrate into the ground or evaporated by the vegetation. Section 3.4. presents a more detailed description of the design approach for the stormwater system related to quantity control
SS Credit 6.2: Storm water Design - Quality Control: this credit will be attempted (the basic requirements for the stormwater design will be significantly exceeded by the selected project approach; therefore an exemplary performance credit will be attempted)	
Intent of credit is to limit disruption and pollution of natural water flows by managing stormwater runoff.	The proposed stormwater management plan will comprise several interlinked treatment steps. It is the goal to treat 100% of all stormwater that is collected from impervious surfaces and conveyed to the treatment facilities. The main treatment component of the proposed system is the extended detention pond, where stormwater will undergo natural treatment functions and stormwater catchment units. The stormwater catchment units are placed upstream of the detention ponds and remove all the floatables as well as a significant portion of the suspended solids and nutrients from the stormwater runoff. The combined efficiency of the catchment units and extended detention ponds are estimated to be around 90%, which is significantly higher than the 80% efficiency in TSS removal required under this credit. Section 3.5. presents a more detailed description of the design approach for the stormwater system related to quality control

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
SS Credit 7.1: Heat Island Effect - Non-Roof: this credit will be attempted	
Intent of credit is to reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.	The site hardscapes (including roads, sidewalks and parking lots) will be configured to achieve the following heat island mitigation: shade will be provided by trees, structures covered by polar panels and structures that have >29 SRI, hardscape material with >29 SRI will used as well as open grid pavement. Section 3.6. presents a more detailed description of the design approach of non-roof heat island avoidance
SS Credit 8: Light Pollution Reduction: this credit will be attempted	
Intent of credit is to minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve night time visibility and reduce impacts from lighting on nocturnal environments	Both interior and exterior lighting have to be considered for effective mitigation of light pollution. Interior lights should not be penetrating to the outside unabated and within the limits given under this credit. Exterior lighting should be limited to the extent required by safety and comfort. The exterior lighting for the project is regulated by requirements of the LZ1 (=Dark) light zones of IESNA RP-33. LZ1 far exceeds the requirements for urban regions; yet LZ1 is more appropriate given the close proximity to the Kawainui Marsh. Section 3.7.presents a descriptions measures for the interior and external lighting systems to reduce light pollution
SS Credit 9: Tenant Design and Construction Guidelines: this credit will be attempted	
Intent of credit is to educate tenants about implementing sustainable design and construction features in the tenant build-out.	Create and disseminate to all tenants a document that provides tenants with important design and construction guidelines. The documents will enable tenants to coordinate their design and construction efforts with the LEED certified core and shell building

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
	system. The document will address all important credit categories of the LEED for Commercial Interiors certification process. Section 3.8 discusses the tenants guidelines to incorporate sustainable building strategies
WE - Water Efficiency **WE Prerequisite 1: Water Use Reduction**: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems	The water consumption in the buildings will be reduced by at least 20% below the water use baseline defined in the prerequisite.
WE Credit 1: Water Efficient Landscaping: this credit will be attempted	
Intent of credit is to limit or eliminate the use of potable water or other natural water resources for landscape irrigation.	The proposed selection of special native or adapted plant species will reduce the need for irrigation. The project will use only captured rainwater and recycled greywater for irrigation. The rainwater from the extensive roofs will be captured, filtered and conveyed to cisterns from where it will be pumped to locations requiring irrigation or to buildings for selected greywater applications (e.g. wastewater conveyance) Section 3.9 presents a more detailed description of the design approach water efficient irrigation

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
WE Credit 2: Innovative Wastewater Technologies: this credit will be attempted (the proposed project approach will significantly exceed the basic requirements for the innovative wastewater systems design; therefore an exemplary performance credit will be attempted)	
Intent of credit is to reduce wastewater generation and potable water demand while increasing the local aquifer recharge	The requirements of this credit will be satisfied through both of the alternative credit options: (1) by reducing the amount of potable water used for sewage conveyance by at least 50%. Water conserving fixtures (water closet, urinals) and non-potable water (e.g. captured rainwater and recycled greywater) will be used. It is project goal to only use non-potable water for sewage conveyance (2) by using advanced wastewater treatment systems onsite combined with infiltration on the site. Section 3.10 provides a discussion of the proposed system design of the onsite wastewater system
WE Credit 3: Water Use Reduction 40% Reduction: this credit will be attempted	
Intent of credit is to further increase water efficiency within the buildings to reduce the burden on municipal water supply and wastewater systems	The project will only use water conserving water fixtures (e.g. water closet, urinals, shower heads) and will replace potable water for applicable water with either captured rainwater or recycled graywater for certain applications to the allowable (e.g. local codes) extent possible. This includes the use of highly efficient water fixtures (e.g. Water Sense fixtures). Section 3.11 discusses some strategies for achieving a 40% reduction in water use in the buildings

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
EA - Energy & Atmosphere	
EA Prerequisite 1: Fundamental commissioning of building energy systems: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is to verify that the project's electricity are installed and perform well according to the requirements, basis of design and construction documents.	Fundamental commissioning will be carried out by a commissioning authority according to the requirements of this prerequisite
EA Prerequisite 2: Minimum energy performance: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is to establish the minimum level of energy efficiency for the proposed building and systems to reduce impacts of avoidable energy use.	Demonstrate a 10% improvement in the proposed building energy use performance compare to a building baseline energy performance. As an alternative to the demonstrated 10% improvement in the building performance (which include a comprehensive energy modeling) the prerequisite can satisfied by the option of following prescriptive measures of the ASHRAE Advanced Energy Design Guide for warehouses.
EA Prerequisite 3: Fundamental refrigerant management: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is to reduce stratospheric ozone depletion.	Chlorofluorocarbon (CFC)- based refrigerants will not be used in the proposed industrial park

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
EA Credit 1: Optimize Energy Performance: this credit will be attempted	
Intent of credit is to achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.	The project will attempt to reduce the energy consumption of the proposed development by at least 30% below the baseline energy consumption standard. The reduction in energy consumption for the required building systems will be achieved by using only energy saving lighting and controls, using natural lighting to the extent possible, and using only energy efficient appliances and HVAC systems. Section 3.12 presents the measures that will be implemented to achieve the targeted energy savings
EA Credit 2: On-Site Renewable Energy: this credit will be attempted	
Intent of credit is to encourage increasing levels of on-site renewable energy self-supply to reduce the environment and economic impact associated with fossil fuel energy	The project will install on-site renewable energy devices to generate at least 1% of the total annual energy consumption of the project. On-site renewable energy technology will include mainly Photovoltaic (PV) systems and solar thermal systems. Wind energy systems will not be used due to the danger of bird-strikes. The PV and/or solar thermal systems will be installed on the roofs of buildings or on structures that provide shade for parking areas. Section 3.13. presents a description of the proposed design approach to integrate onsite renewable energy into the project
EA Credit 5.1: Measurement & Verification – Base-building: this credit will be attempted	
Intent of credit is to provide ongoing accountability of building energy	A measurement and verification plan will be implemented that is consistent with the credit

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
consumption over time	requirements. Appropriate meters will be installed to measure energy consumption of the base core and shell building.
EA Credit 5.2: Measurement & Verification - Tenant Sub-metering: this credit will be attempted	
Intent of credit is to provide ongoing accountability of building energy consumption over time	A measurement and verification plan will be implemented that is consistent with the credit requirements. Appropriate meters will be installed to measure energy consumption of the tenant spaces. Meters and controls include centrally monitored electronic metering systems for the individual buildings that allows for tenant sub-metering.
MR - Materials & Resources	
MR Prerequisite 1: Storage and Collection of Recyclables: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is to facilitate the reduction of waste generated by building occupants.	Convenient areas to recycle paper, metals, glass, card boards\ and plastics will be made available within the park. The objective is to encourage recycling and make the use of the recycling facilities easy and accessible. The park management will establish the locations and outfitting on the recyclable collection sites and will enter into contract with a licensed recycle operator.

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
MR Credit 2: Construction Waste Management: this credit will be attempted	
Intent of credit is to divert construction and demolition debris from disposal in landfills. Redirect recyclable resources so they can be reused.	A construction waste management plan will be developed to ensure that recyclable material can be reused on site. A significant portion of the recyclable material will be concrete pavement and other structures which will be crushed for reuse as base for the internal roads or permeable road cover.
MR Credit 4: Recycled Content: this credit will be attempted	
Intent of credit is to increase demand for building products that incorporate recycled content materials.	The project will use recycled material to the extent possible. Where possible concrete structures and pavement will use fly ash instead of cement; steel structures have an inherently high proportion of pre-consumer recycled content and the extensive use of steel in the development will therefore result in a high recycled content for the overall project.
MR Credit 5: Regional Materials: 10% Extracted, Processed & Manufactured Regionally: this credit will be attempted	
Intent of credit is to increase demand for building materials and products that are extracted and manufactured within the region; supporting the use of indigenous resources and reducing environmental impacts resulting from transportation	The project will utilize building materials and products that are extracted and manufactured within the region. The building material that is permanently installed on site (e.g. mechanical, electrical and plumbing components are NOT included in the list of allowable material for this credit). The project team believes that 10% of regional products can be achieved in the design and construction.
IEQ - Indoor Environmental Quality	

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
IEQ Prerequisite 1: Minimum indoor air quality performance: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is to establish minimum indoor air quality performance to contribute to comfort and well-being of the occupants	The project team will decide on the scope of either mechanical or natural ventilation of the core and shell portion of the project. Most of the space in the warehouses will have natural ventilation and only smaller portions will have mechanical ventilation and cooling. The project team will satisfy the requirements of this prerequisite and safeguard minimum ventilation rates and avoidance of internal pollutants
IEQ Prerequisite 2: Environmental Tobacco smoke (ETS) Control: This is a prerequisite; therefore design measures have to be implemented and are not optional: no credit points are awarded.	
Intent of prerequisite is to prevent or minimize exposure of building occupants, indoors surfaces and ventilation systems to ETS	Smoking in the building is regulated under state law and the project will incorporate these laws in the design. Smoking will be prohibited in the buildings and within the designated setback from buildings openings and ventilation intakes.
IEQ Credit 3: Construction IAQ Management Plan: During Construction : this credit will be attempted	
Intent of credit is to reduce IAQ problems resulting from construction	The project will require contractors to abide by the regulation for the core and shell as well as for the tenant spaces.
IEQ Credit 4.1: Low-Emitting Materials:-Adhesives & Sealants: this credit will be attempted	
Intent of credit is to reduce the quantities of indoor air contaminates that are irritating or harmful to the occupants	The project team will specify the type of low VOC sealants and adhesives that can be used in the project to satisfy the credit.

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
IEQ Credit 4.2: Low-Emitting Materials-Paints & Coatings: this credit will be attempted	
Intent of credit is to reduce the quantities of indoor air contaminates that are irritating or harmful to the occupants	The project team will specify the type of low VOC Paints & Coatings that can be used in the project to satisfy the credit.
IEQ Credit 8.1: Daylight & Views: Daylight: this credit will be attempted	
Intent of credit is to provide occupants with connection to the outdoors through introduction of daylight.	The project will utilize as much day lighting as possible in order to lower the electricity demand in the warehouses. The 75% threshold will be achieved. The project team will utilize a combination of windows and skylights (e.g. light domes) to achieve sufficient day lighting. As was pointed out, the installation of a significant number of skylights, e.g. (5% to 7% of the total roof area) needs to satisfy the requirements of light pollution reduction. The selected skylights would have to be equipped with a suitable measure to result in allowable lighting conditions between 11:00 pm and 5:00 am.

ID - Innovation & Design:

ID1 credit 1.1: Educational program – display about the bordering Kawainui Marsh; this ID credit will be attempted

The project team will develop an education program to educate about certain issues that affect the Kawainui Marsh. The educational program will be designed in cooperation with local environmental advocacy groups and/or local schools. The centerpiece of the education program will be a display that will be erected at an accessible location on the property of the developer and adjacent to the proposed site in such a way that it will not negatively affect the traffic. In addition, the

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
	content of the display will be made accessible through the web-site presentation of the proposed warehouse development or other web-sites that inform about the marsh. The web-site will, among other issues, inform about environmentally friendly and energy efficient industrial developments. The developer will seek the cooperation of the future tenants in the warehouse development to contribute to the educational program.
ID1 credit 1.2: Use energy saving electric vehicles for maintenance vehicles in the proposed light industrial park: this ID credit will be attempted	The project will primarily use small electric utility vehicles for all maintenance functions within the proposed park that can be carried out with smaller vehicles. A part of the electric energy for the vehicles will be obtained by onsite renewable energy or other renewable resources, for example renewable energy certificates. The electric maintenance vehicles do not discharge any harmful substances and are quite in operation.
ID1 credit 1.3: Developing contractually binding performance criteria for the tenants: this ID credit will be attempted	The developer will develop contractual agreements what basic procedures the tenants have to follow when building out their leased industrial space. Areas that will be covered will comprise such LEED credits that also serve as impact mitigation measures for the proposed industrial park. One important impact mitigation is the reduction of light pollution. The developer will use binding contractual terms to enforce strict light pollution mitigation by the selection and operation of the external and internal lighting.

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
	Other impacts mitigation that will be regulated are measure to reduce noise pollution and air pollution as well as implement preferred parking and abide by requirements to conserve water and avoid disposing of substances in the onsite wastewater system that could degrade the performance of the advanced septic system.
ID1 credit 1.4: Exemplary Performance for stormwater system design: this ID credit will be attempted	
Intent of this exemplary performance credit is to minimize to the extent possible detrimental effect of storm water to the receiving waters (refer to SS6)	The proposed storm water system will be designed and operated in accordance with the highest standards in storm water volume and quality control. One hundred percent (100%) of the runoff will be treated in two stages to remove all floatables and in excess of 90% of all soluble contaminates, sediments and particular nutrients. The storm water will be contained in an extended detention pond and released to avoid stream bed erosion. Storm water will be captured and the used for irrigation of greywater applications. Section 3.4 and 3.5 show the proposed design approach of the comprehensive storm water treatment
ID1 credit 1.5: Exemplary Performance in innovative wastewater technologies: this ID credit will be attempted	
Intent of this exemplary performance credit is to reduce the amount of wastewater generated, conserve potable water and increase efficiency of wastewater treatment.	The proposed wastewater treatment system greatly exceeds the requirements of credit WE 2. The system will use no potable water for sewage conveyance and will treat 100% of the wastewater to advanced wastewater treatment standards. Section 3.1 presents a description of the proposed design approach for the onsite wastewater treatment

List of credits / prerequisites that will be implemented to achieve LEED certification goal

Type of Credit / Prerequisite	Description of design measure to meet credit
ID1 – LEED-AP:	The project team will include at least one LEED-AP as a principle team member.
Regional Priorities:	
RP credit 1: SSc6 - Storm water Design: Quantity & Quality Control; Bonus point will be attempted	The project will qualify by achieving exemplary performance in stormwater design.
RP credit 2: WEc2 (25%) - WE Credit 2: Innovative Wastewater Technologies: Bonus point will be attempted	The project will qualify by achieving exemplary performance in innovative wastewater design.
RP credit 3: MR5 - Regional materials; Bonus point will be attempted	The project will qualify by achieving the threshold in regional materials.
RP credit 3: EAc1 (30%) - Optimize energy performance: Bonus point will be attempted	The project will qualify by achieving 30% energy savings

3. Description of Key Measures for Sustainable Design Approach

This section provides more detailed descriptions of some of the key measures for the sustainable design approach. The list of credit attempted by the project team in section 2 references the key measures.

3.1. Construction Activity Pollution Prevention (SS Prerequisite 1)

The prerequisite requires an effective approach to avoid or minimize the loss of topsoil, which is regarded as one of the most significant consequence of erosion. Runoff from developed sites result in a variety of water quality issues, since pollutants, sediments and excess nutrient contained in the runoff impact aquatic habitat in the receiving waters. During construction measures have to be planned and executed to respond to rain and other erosion-causing events to avoid or minimize impacts.

The following common measures are to be adopted which should not only be met but exceeded:

Stabilization measures:

Stabilization control measures:

Temporary seeding	-	Plant fast growing grasses for temporary soil stabilization
Permanent seeding	-	Plant grass, trees and shrubs for permanent stabilization. Use preferably native or adapted plant species.
Mulching	-	Place hay, grass, woodchips, straw or gravel on the soil
	-	

Structural control measures:

Earth dikes	-	Construct earth dikes and mounds of stabilized soil to divert surface runoff from disturbed soil areas or guide runoff towards sediment basin and traps
Silt fence	-	Install fabrics held by posts to remove sediments from the runoff
Sediment trap	-	Install a sediment trap by excavating a pond or create an earthen embankment to allow sediments to settling of sediment from the stormwater runoff
Sediment basin	-	Allow for settling of sediments from the runoff before release into receiving waters

Vehicle tracking	-	Construct an area for vehicles access where soil is removed and replaced with free draining gravel so that soil displacement is minimized

Figures SDA 3.1 through SDA 3.4 show four different phases of the site development. The following paragraphs discuss measures against soil erosion and contaminated runoff.

Figure SDA 3.1 shows the first phase of site development. As a first step of the comprehensive erosion and sedimentation control plan earthen dikes or vegetative buffer zones will be installed around the project site before grading of the interior site commences. All the runoff from the site will be treated to remove as much sediments before the runoff volumes can enter the receiving waters. A range of stabilization and stormwater BMPs (Best Management Practices) will ensure that the construction related impacts on the receiving waters will be minimized. After major grading a temporary vegetation cover will be established to avoid water and wind induced erosion.

Figures SDA 3.2 shows the second phase of the site development when major roadways are constructed and the drainage system will be installed on the site. The buffer zones at the site perimeter are surrounding the interior areas with visual impact mitigation and earth dams to avoid any uncontrolled runoff. During this phase of the construction the rainwater / stormwater catchment from the roadway surfaces are installed to provide irrigation water for the growing habitat restoration areas and buffer zones at the perimeter of the site.

Figure SDA 3.3 shows the third phase of the development of the site. The warehouse structures are first built in the southern portion of the site. As warehouse construction continues more warehouses are built and added to fill the site progressively from the south towards the north of the project site. During this phase of the project the vegetation in the buffer zones is already well developed and cab offer visual impact mitigation as well as mitigation of air quality and noise impacts. The first Type A and B onsite wastewater systems are installed to serve warehouses. The effluent of the Type B wastewater systems at the perimeter of the site are discharged in leach fields or in irrigation at the southern perimeter buffer zones.

Figure SDA 3.4 shows the final phase of the development when all warehouses are constructed. The time period during which the warehouses are constructed will range from approximately five to ten years, depending on the rate at which demand for new industrial warehouse space evolves in the Koolaupoko region.

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Figure SDA 3.1 Development of Site
- 1st Phase - Grading and bufferzones

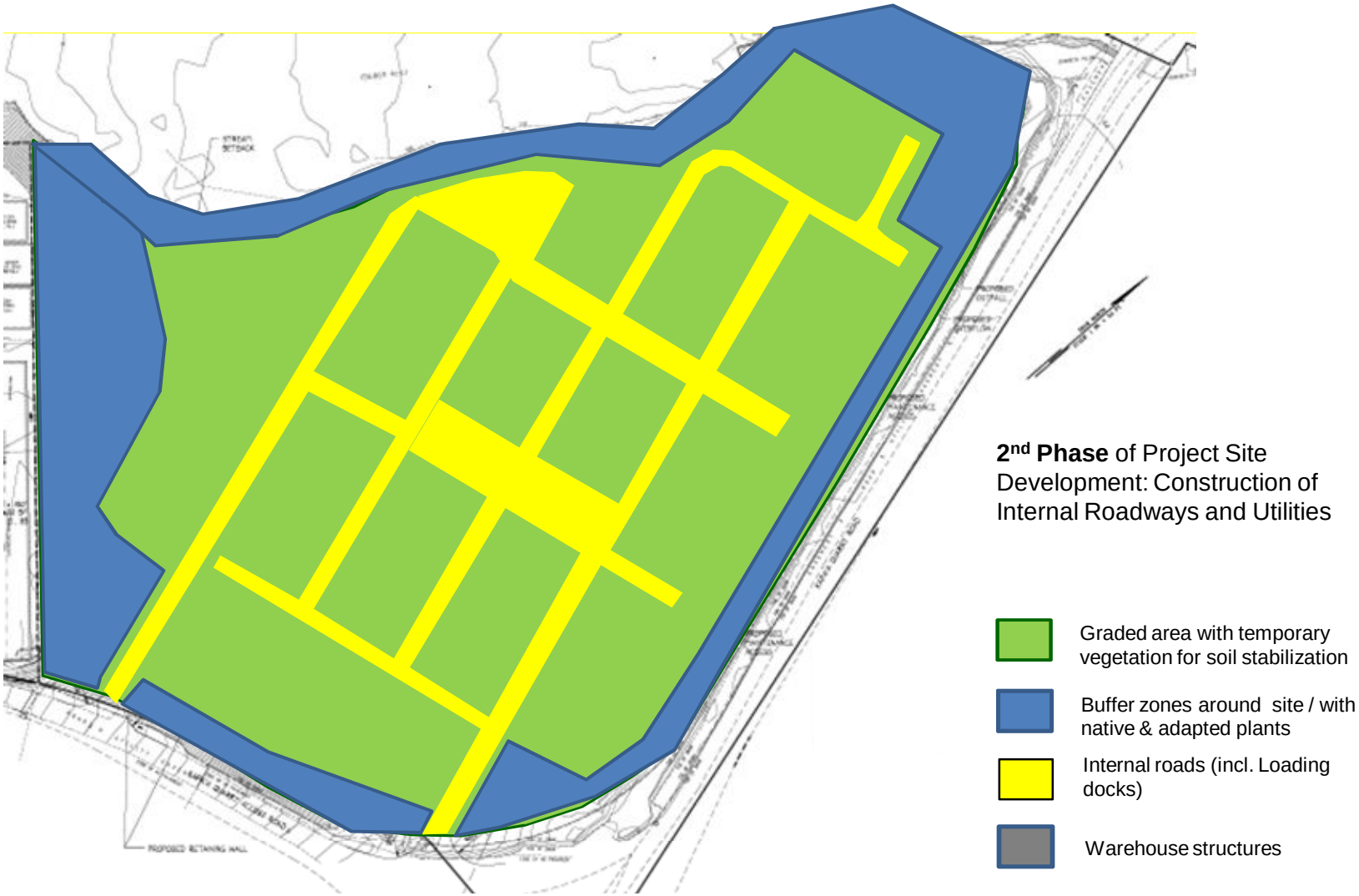

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Figure SDA 3.2 Development of site - 2nd Phase - Construction of internal roadways and utilities

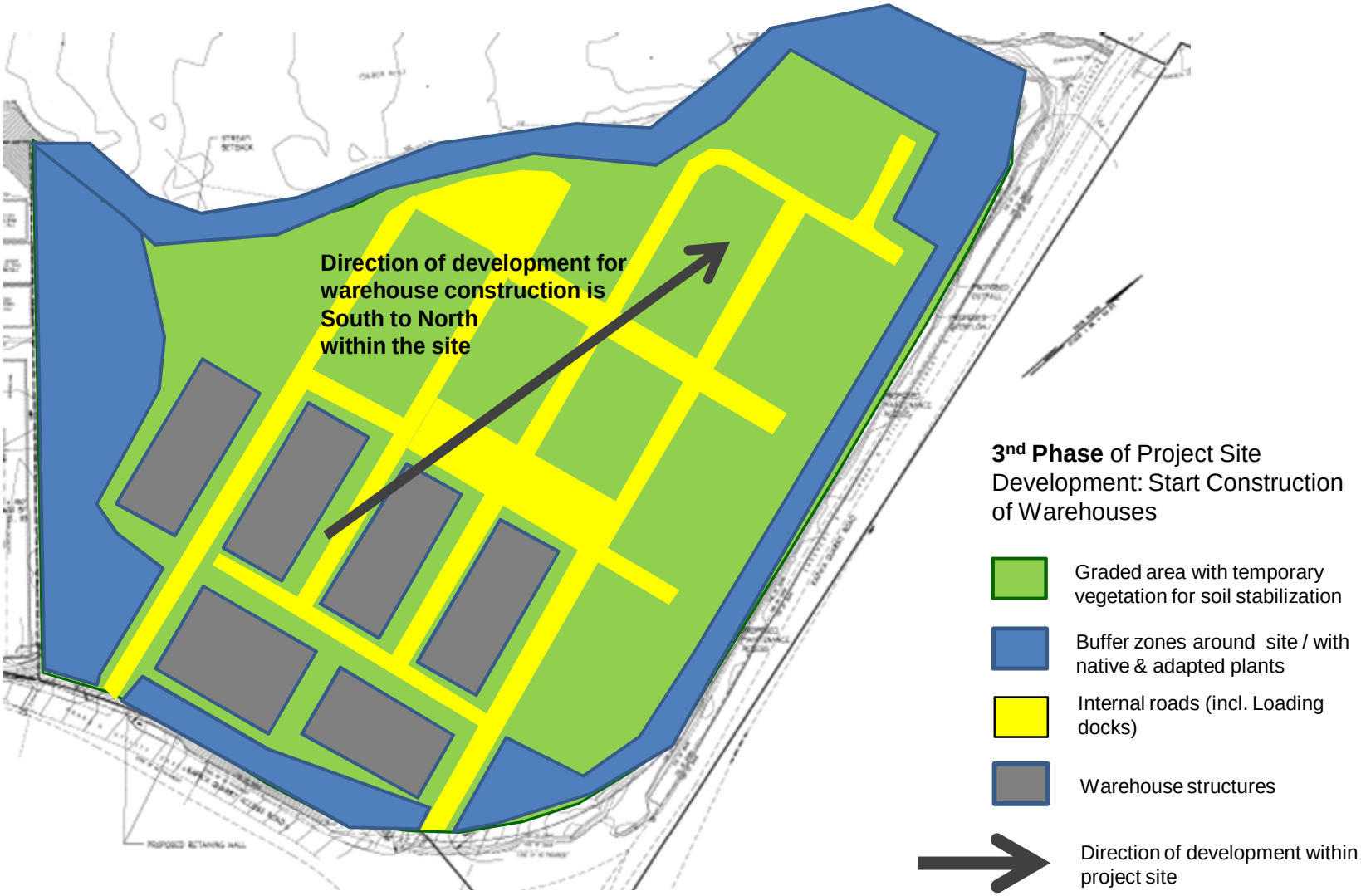

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Figure SDA 3.3 Development of site – 3rd Phase - Start construction of warehouses in southern part of site

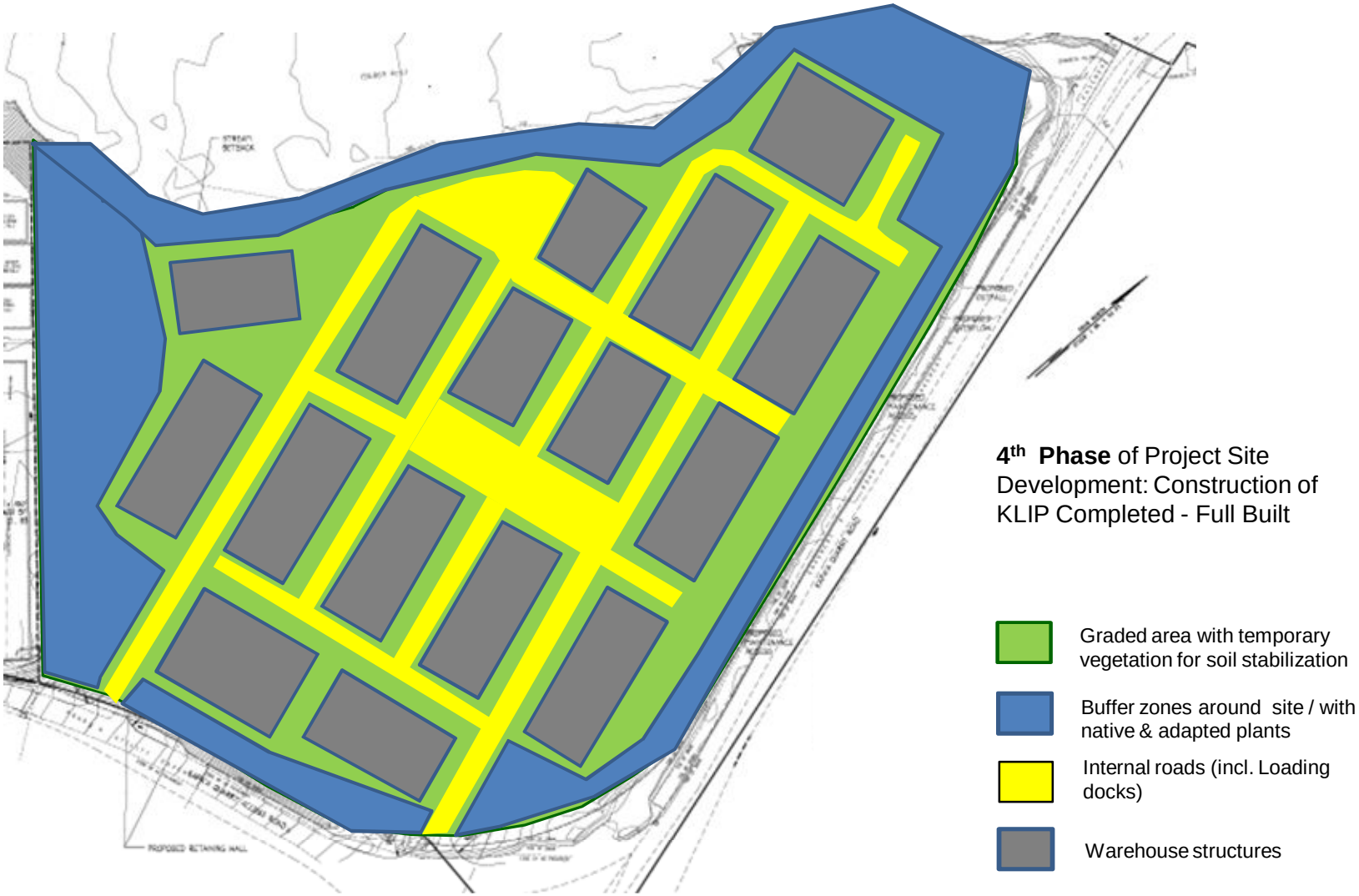

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Figure SDA 3.4 Development of site – 4th Phase - Construction of KLIP completed - full built

3.2 Site Selection (SS Credit 1)

The proposed layout of the lower portion of the proposed site, for which LEED certification is sought, is depicted on Figure SDA 3.5. The figure shows the location and extent of buildings, internal roads, hardscape and parking areas on the proposed site in relationship to wetland area that are adjacent to the site. Since the site is previously developed (e.g. was graded) the credit requires that of buildings, internal roads, hardscape and parking areas meet the following criteria:

1. The site should not be prime farmland as defined by the U.S. Department of Agriculture. - The proposed site is a land fill area and is not farmland.
2. The site should not be identified as a habitat for any species on federal or state threatened and endangered lists. – The proposed site is not identified as such a habitat.
3. The site should not be a former public parkland – The site is and was not public parkland; the site is a landfill area.
4. The site should not be within 100 feet of designated wetland – The current site layout shows some hardscape areas and buildings within the 100 feet setback requirement and therefore the credit cannot be taken.

Requirements 1 through 3 are met, while requirement 4 is NOT met; thus the credit cannot be attempted with the existing layout of the proposed site plan. However, a main objective of sustainable site development is met as the propose site is not a green field but is a former landfill area, therefore avoiding that precious greenfield and undeveloped land will be converted.

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Figure SDA 3.5 Sustainable Sites – Distance of hardscape to adjacent wetland

3.3 Site Development - Protect or Restore Habitat (SS Credit 5.1)

The project site will be surrounded by vegetative buffer zones which will provide mitigation for visual impacts, soil erosion, air quality impacts and noise impacts. The buffer zones are located at all four sides of the site perimeter as illustrated in Figure SDA-3.6. Figure SDA 3-7 illustrates the configuration of these four different buffer zones by means of four typical cross sections of the buffer zones.

Buffer Zone 1 – illustrated by Cross-Section A1: This buffer zone is located at the western perimeter of the project site and it represents a sloped area between lower and upper portion of the site which is currently vegetated. This area, has a size of 2.1 acres, a length of 600 and an average width of 150 feet. This area will be restored with native and adapted plants as well as with suitable trees that serve well as wind breaks / visual barrier. The trees and shrubs will provide an effective vegetative cover for visual and noise impact mitigation originating from the warehouses within the upper portion of the entire warehouse park development. (The typical cross section is shown on Figure SDA 3.7 – section A1 – A1).

Buffer Zone 2 – illustrated by Cross-Section A2: This buffer zone is located at the northern perimeter of the project site. The buffer zone will separate the Kapa'a Stream valley from the development. This area, which has a size of 2.5 acres, a length of 1,200 and an average width of 100 linear feet is the vegetative buffer zone between the proposed site and adjacent wetland areas in the Kapa'a Stream corridor. The vegetative buffer will have native and adaptive plants, including tall trees and shrubs. The buffer zone will contain a small earthen mound and a stabilized slope. The main function of the vegetative buffer is to separate the developed site from the adjacent wetland area and provide visual and noise mitigation. (The typical cross section is shown on Figure SDA 3.7 – section A2 – A2).

Buffer Zone 3 – illustrated by Cross-Section A3: This buffer zone is located at the eastern perimeter of the project site. This area, which has a size of 2.5 acres and a length of 1,200 linear feet, is a vegetative buffer zone between the proposed site and the adjacent quarry road as well as Kawainui Marsh. The vegetative buffer has a varying width between 80 and 120 feet, with an average width of about 100 feet and will have native and adaptive plants, including tall trees and thicker shrubs. The main function is to separate the developed site from the adjacent Kawainui Marsh and provide visual and noise mitigation. (The typical cross section is shown on Figure SDA 3.7 – section A3 – A3).

Buffer Zone 4 – illustrated by Cross-Section A4: This area is a vegetative buffer zone along the southern boundary of the site. The buffer zone is between 30 and 50 feet wide, with an average width of 40 feet. This buffer zone separates the developed site from the Kapa'a Quarry Access Road. The vegetative buffer zone has an area of about 0.4 acres and a length of 400 linear feet. (The typical cross section is shown on Figure SDA 3.7 – section A4 – A4).

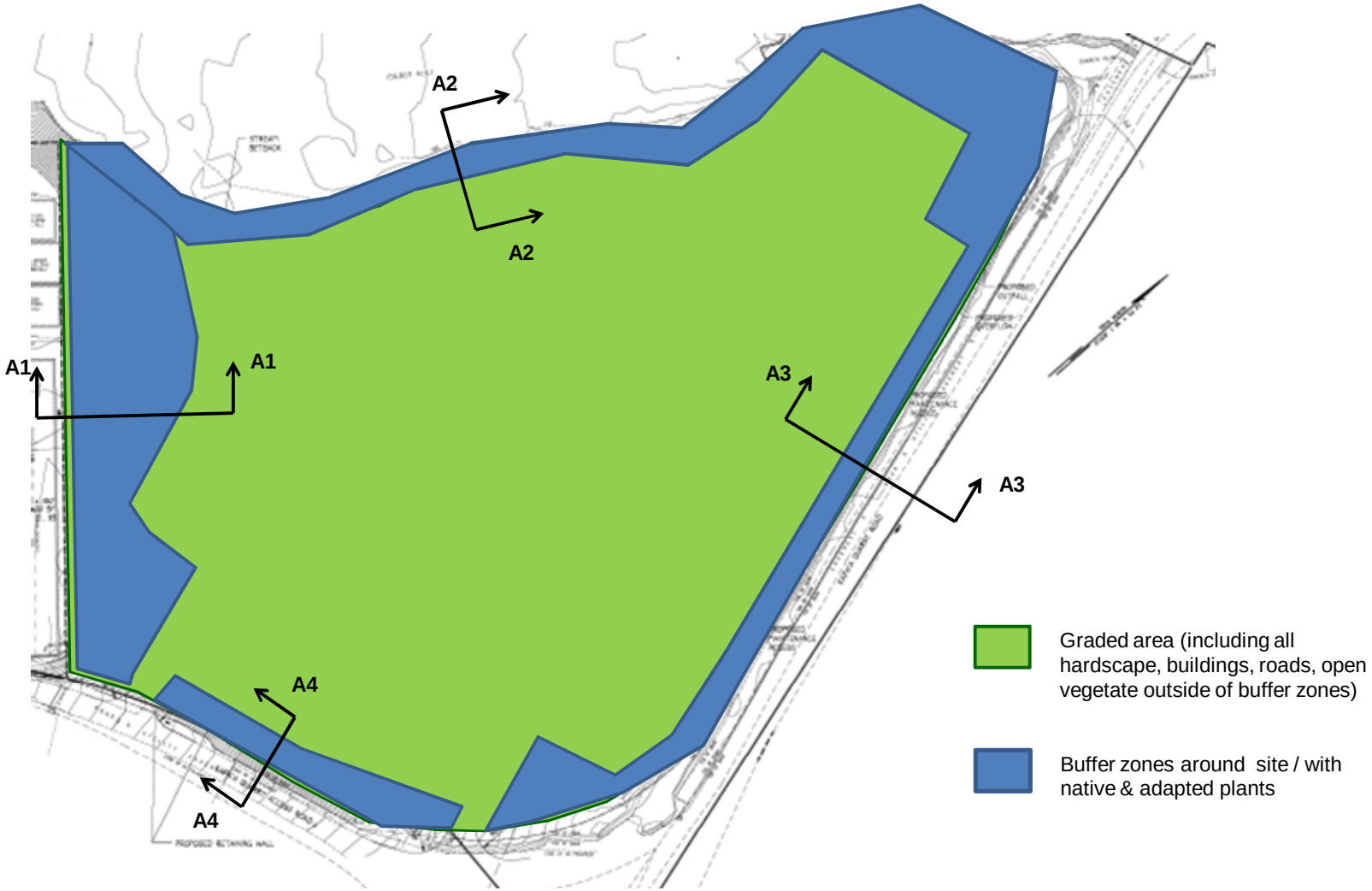

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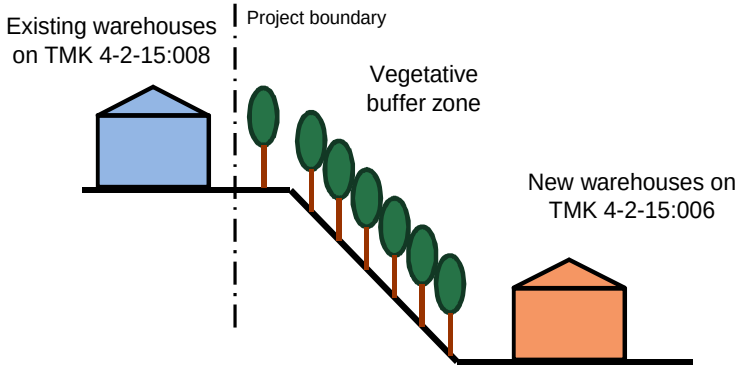
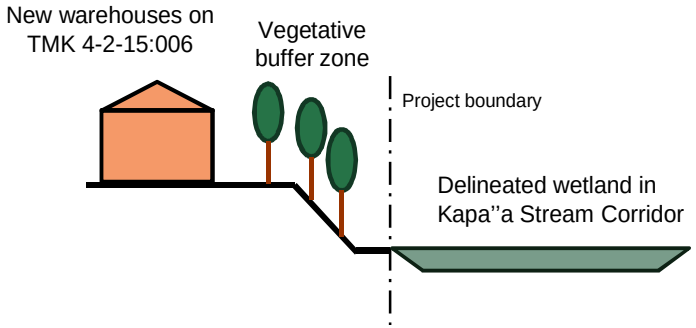
Figure SDA 3.6 Vegetative buffer zones at site perimeter - location and type of buffer zones



Section A1 – A1



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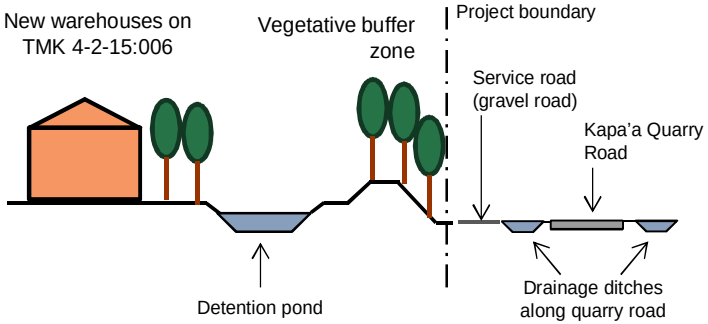

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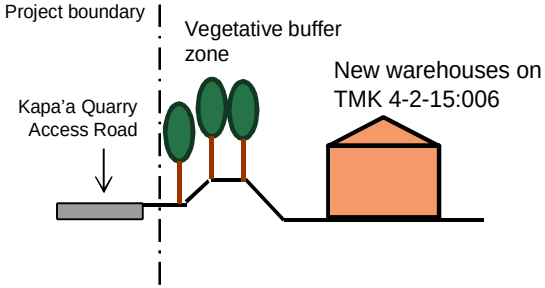

Section A4 – A4

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Figure SDA 3.7 Vegetative buffer zones at site perimeter - typical cross sections

3.4 Stormwater Design - Quantity Control (SS Credit 6.1)

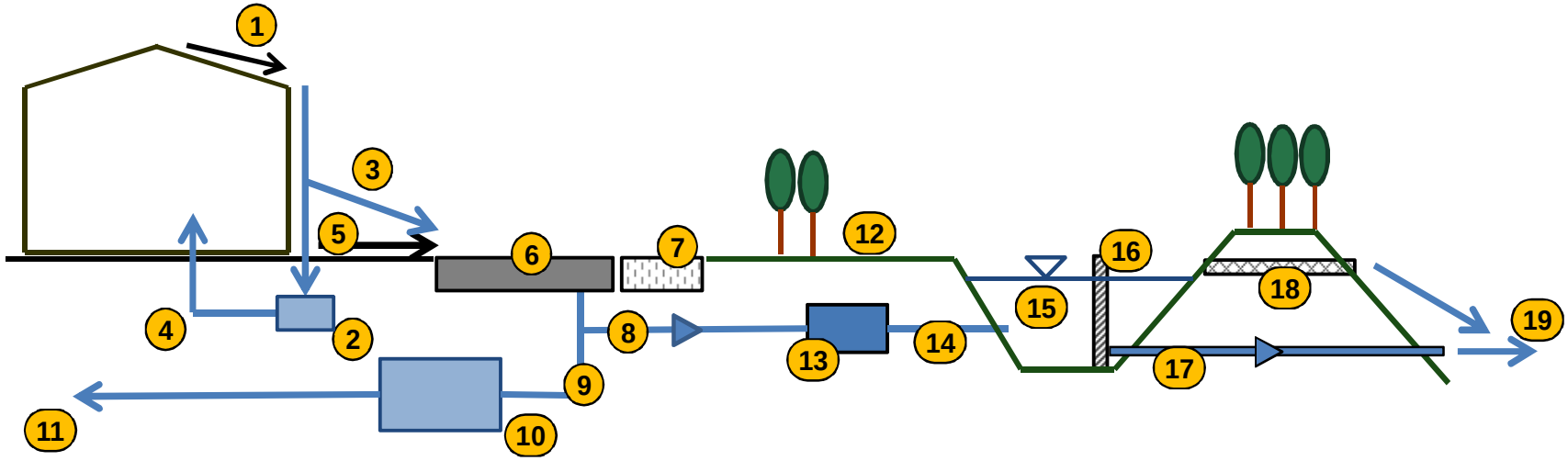
The proposed stormwater system offers a comprehensive treatment of the runoff from the proposed site. Figure SDA 3.8 shows the flow diagram of the stormwater system as it relates to the flood control function; e.g. the flow diagram illustrates stormwater management system components that control the quantity of stormwater runoff from the proposed site. The systems components are labeled from (1) through (19) and are discussed below:

Rainwater runoff from the roofs (1) is collected and conveyed to an underground tank (2). When the tank is filled to capacity the overflow (3) is directed to the stormwater conveyance system. The harvested rainwater is lifted by a pump and supplied to the buildings for use in the sewage conveyance (4). The irrigation system is a subsurface distribution system which can either use harvested rainwater of treated and recycled wastewater from the buildings.

Runoff from impervious surfaces around the warehouses (5) is conveyed to drain inlets in the roadways. Runoff from the impervious pavement of internal roadways is collected and enters the buried stromwater conveyance systems through catchment inlets (6) where all floatables, some sediments and optionally grease or oil is removed from the stormwater. Rainwater falling on open-grid parking areas (areas with perviousness > 50%) (7) and on open vegetated areas (12) percolates into the ground and no runoff is typically generated from these areas.

Runoff enters the stormwater conveyance system and is either flowing towards underground stormwater cisterns (9) and (10) or, when the stormwater cisterns are filled to capacity, flows towards the two-staged stormwater treatment (8) system downstream. On its way to the detention pond (15) the runoff flows through a nutrient / sediment trap (13) upstream where a significant quantity of sediments and suspended nutrients are removed from the runoff as well as all floatables. Stormwater runoff then flows through the outfall (14) to the detention pond, where the runoff is retained for a time between 24 and 48 hours. The runoff is then released at a low discharge rate through an appropriate discharge device (16) (e.g. perforated stand pipe or baffle system) and released to the receiving water. The discharge of outfall pipe (17) is configured to avoid scouring and erosion in the stream bed, when the water in the detention pond is released. In case of exceptionally severe storm events that surpass the design capacity of the detention pond and discharge system, an armored spillway (18) is installed that can safely convey peak discharges and avoid scouring of the embankments of the detention pond.

All stormwater runoff from the proposed site is collected and conveyed to the detention pond for comprehensive flood control. After being held in the detention pond for the prescribed 24 to 48 hours the runoff is then discharged to the receiving waters in a controlled flow. The detention ponds and time lagged release of captures stormwater shaves off detrimental peak discharges of runoff and thus avoids erosion of the streambed of the receiving water.



1. Runoff from rooftops or warehouses / structures
2. Underground rainwater storage (for use in buildings only)
3. Overflow of collected rainwater to roadway drainage system
4. Rainwater applications (irrigation, sewage conveyance, etc)
5. Runoff from impervious hardscape (other than roadways
6. Impervious roadways
7. Pervious traffic surfaces (parking, others)
8. Stormwater conveyance
9. Collected rainwater (from roofs) and stormwater runoff flow to underground rainwater cavern
10. Underground rainwater / stormwater cavern
11. Rainwater / stormwater applications for irrigation
12. Pervious vegetated open space
13. Sediment, debris catchment
14. Outfall to detention pond
15. Extended detention pond
16. Controlled stormwater release structure
17. Outfall of detention pond
18. Spillway for controlled overflow
19. Release of stormwater runoff to receiving waters

Figure SDA 3.8 Flow diagram of the stormwater System – quantity control

3.5 Storm water Design - Quality Control (SS Credit 6.2)

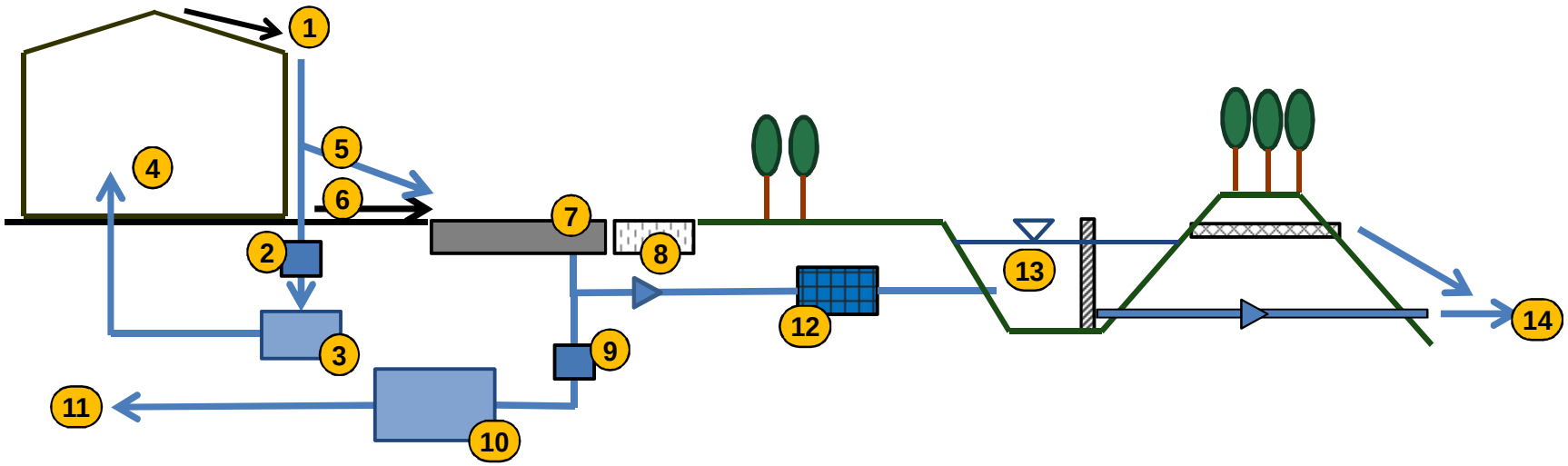
All stormwater runoff from the site are treated before it is released to the receiving waters, in order to avoid negative impacts on the water quality.

Figure SDA 3.9 shows a flow diagram for the stormwater quality control. Figure SDA 3-9 depicts the process steps of the stormwater quality control. Rainwater from the roofs (1) is collected and flows through filters (2) to underground tanks (3) where it is harvested for use in buildings (4) (e.g. toilet flushing or certain custodian uses). If the capacity of the rainwater harvesting storage tanks is surpassed, the rainwater overflows (5) and flows to the drain inlets (7) of the site stormwater drainage system. Debris catchment units (7) remove floatables, larger debris and as well as portions of sediments loads from the stormwater runoff before it enters the stormwater conveyance system . Runoff from impervious surfaces around the warehouses (6) discharges to the drainage systems inlets. Pervious traffic surfaces (8) allow infiltration of rainwater to the ground.

The stormwater runoff which enters the drainage inlets (7) flows into the underground stormwater cisterns or, when the stormwater storage cisterns (10) are filled to capacity, stormwater flows towards the stormwater treatment system, comprised of two treatment steps. The stormwater that is captured in the underground cisterns is used for irrigation (11). The treatment of the runoff is a two-step process consisting of several debris and sediment catchment units (12) (for multiple outlets into the detention pond) followed by an extended detention pond (13). First stormwater runoff passes through the debris and sediment catchment unit where all floatables and a significant portion of the sediments and other suspended solids are removed. In addition to sediments and suspended solids the catchment unit has an integrated oil-grease separator. After passing through the catchment unit the runoff enters the extended detention pond where natural treatment processes remove a portion of TSS, nutrients and sediments.

Stormwater is retained in the detention ponds for a period between 24 and 48 hours, after which it is released to the receiving waters (14).

A measure of the effectiveness of pollutant removal is the amount of total suspended solids (TSS) removed from the runoff. For the type of catchment unit that would be used for the proposed stormwater system an average TSS removal rate of 76% can be assumed. Thus 24% of the initial TSS load in the stormwater would pass to the detention pond, where the second step in the stormwater treatment occurs. An average TSS removal rate for an extended detention pond can be assumed as 60%. Thus the detention pond would remove about 15% of the initial TSS load. Adding the removal rates of the catchment unit and the extended detention pond would result in a TSS removal rate of approximately 90%, which significantly exceeds the 80% removal rate required for the credit.



1. Runoff from rooftops
2. Filter / pretreatment of collected rainwater
3. Underground rainwater storage (for use in bldgs. Sewage conveyance)
4. Rainwater applications in buildings (sewage conveyance others)
5. Overflow of collected rainwater to roadway drainage system
6. Runoff from impervious hardscape (other than roadways)
7. Inlets with debris catchment (with grease/oil trap)
8. Infiltration from pervious traffic surfaces (filter function of gravel bed and open-grid)
9. Filter for collected rainwater (from roof areas) and stormwater runoff from roads upstream of caverns (gravel filter)
10. Underground rainwater / stormwater cavern
11. To irrigation of open and vegetated areas (e.g. buffer zones)
12. Sediment / nutrient / debris catchment and grease / oil trap)
13. Extended detention pond with 24 – 48 hours residence time
14. Controlled release to receiving water with armored outfall to avoid scouring of stream bed

Figure SDA 3.9 Flow diagram of the stormwater System – quality control

3.6 Heat Island Effect - Non-Roof SS Credit 7.1

The hardscape area within the proposed development comprises of roadways, parking spaces and sidewalks. A combination of the following measures is used for at least 50% of all hardscape areas:

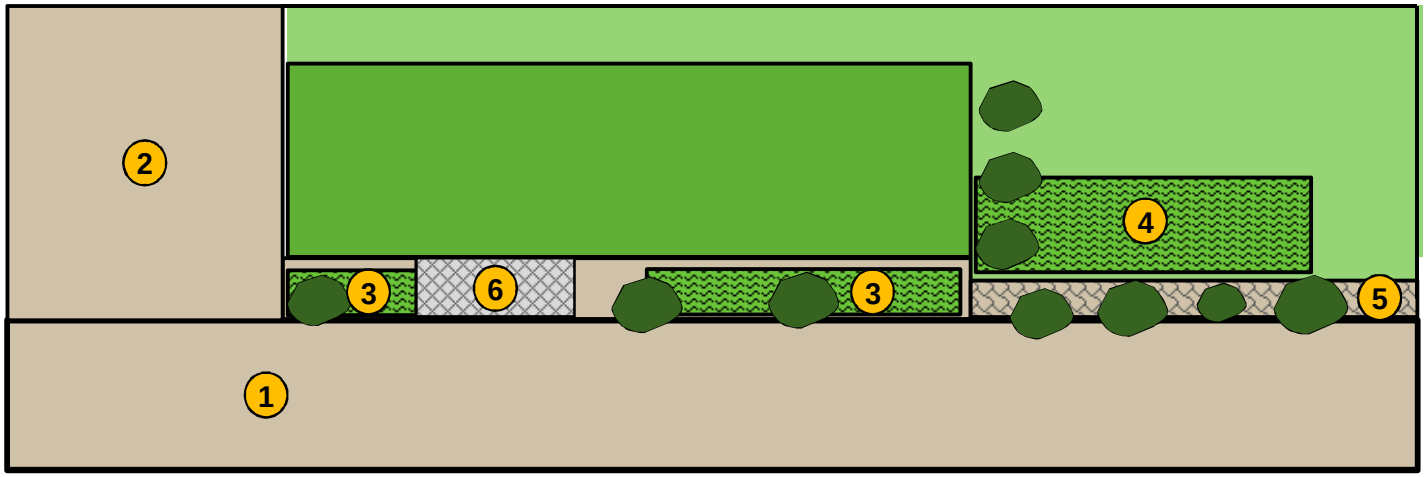
- Trees will be planted throughout the development to provide shade. In order to qualify the tree canopy has to provide the anticipated extent of shade within five years of landscape installation. The trees, which are planted throughout the park and around the buildings, also serve in the function of visual impact mitigation
- Some of the parking spaces will be covered with structures that have either a solar reflectance index at least 29 or are covered with solar panels that produce energy to offset non-renewable energy resources.
- Use of hardscape material with an SRI of at least 29. The use of light colored cement pavement can provide an SRI of at least 29 in the weathered condition.
- Use open grid pavement for off road parking spaces and emergency access roadways.

Figure SDA 3.10 illustrates the measures that will be used to achieve effective non-roof heat island mitigation.

It should be pointed out that the SS credit 7.2, Heat Island Effect – Roof, is not attempted. The requirement of SS credit 7.2 calls for an SRI of at least 78 for the planned low slope roofs. A high SRI of 78 would require light colored roofing material which would very likely result in a high visual impact of the large roof areas in the development.

3.7 Light Pollution Reduction (SS Credit 8)

Light pollution mitigation is an important measure since the proposed development will be built close to the Kawainui Marsh, which is an important habitat for endangered species, especially endangered water birds, which dwell in the extensive wetland areas of the marsh. Light pollution can negatively affect the habitat of birds in various ways, including deterioration of navigation for birds that are active at night and the destruction of important food source (e.g. insects that are attracted towards the light and are no longer available as food source).



Impervious pavement (SRI > 29) for heavy loadbearing

Open grid pavement (impervious area < 50%, vegetation in open cells) for parking or other uses of cars, light trucks, NO trucks

Open vegetated spaces around warehouses Pervious sidewalks / shoulders (gravel beds)

Structures (SRI > 29) to provide shade for parking

Tress to provide shade within 5 years of landscaping

Warehouse roof area

X Functions of areas:

1. Roadways within development
2. Truck parking or loading
3. Regular parking spaces
4. Auxiliary areas suitable for cars and light trucks
5. Sidewalks or shoulders
6. Shaded parking stalls (preferred parking)

Figure SDA 3.10 Heat island reduction – non-roof

The project measures to reduce light pollution will include controls of exterior and interior lights.

Measures to control interior lights:

The measure to reduce light pollution from interior light fixture that have a direct line of sight to building openings includes a combination of reducing the input power off all non-emergency internal luminaries or shielding all openings in building envelope. A required reduction by at least 50% of light power for internal luminaries must be by automatic control between 11:00 pm and 5:00 am. The shielding of all internal luminaries must occur by automatic controls between 11:00 pm and 5:00 am and must result in a resultant transmittance of less than 10%.

The warehouses would preferably have translucent skylights to provide daylighting and thus reduce energy demand for lighting. The skylights would cover approximate 5% - 7% of the roof area. Possible light pollution through installed skylights to provide daylight can be a challenge. The type of translucent skylights planned for the warehouses offers light-diffusion characteristics that will reduce light transmittance to less than 10% without the need for additional shielding. Lights within the warehouses will be fully shielded to avoid direct line of sight of light beams hitting the skylights, thus helping to keep light transmittance under the allowable 10% rate.

Measures to control exterior lights:

Since the proposed site is adjacent to important wetland areas the project team has selected the Illuminating Engineering Society of North America (IESNA) P-33 Light Zone L1-Dark. The Light Zone L1, which far exceeds the typical requirements for light industrial districts, since the Zone L1 is designated for developments within national parks, state parks forest land or rural areas. The proposed site is within the State of Hawaii Urban land use district.

Some of the main design and product characteristics for the external luminaries comprises as follows:

- Use minimum amount of light necessary as required by comfort and safety.
- Use automatic control to minimize or turn lights off during a certain time (e.g. between 11:00 pm and 5:00 am)
- Identify and address all light trespassing problems
- Use light sources more uniformly; e.g. use rather two luminaries with lower light output than one with high light output.
- Use only fully or semi-shielded luminaries and select those luminaries that produce the least light trespassing and glare.

The design and operational measures to reduce light pollution will be made mandatory for all tenants and users in the industrial park.

3.8 Tenant Design and Construction Guidelines (SS Credit 9)

Since the Core and Shell LEED certification only addresses the core building spaces it is important that tenants design and construct their built-out in coordination with the goals and vision of the sustainability approach of the proposed project. Tenants are encouraged to achieve LEED for commercial interior certification for their respective spaces and therefore their design and construction should fit into the sustainable design and construction approach of the overall.

The project team will produce a document for the tenants, which will address design and construction guidelines for the tenant build-out spaces. The following project specific areas are planned to be addressed in the guidelines:

Water use reduction: The goal is to conserve precious potable water resources in the buildings and to reduce the volume of wastewater produced.

Optimization of energy performance: These project goals aim to reduce energy demand by lighting and HVAC.

Energy use and metering: Communicate the goals of reducing energy use and provide means to meter energy use in the buildings.

Measurement and Verification: Implement a system to measure entire building and tenant spaces and verify that energy savings goals are met.

Ventilation: Provide guidelines to use mechanical and natural ventilation systems; communicate the need to select and manage environmentally friendly refrigerants.

Construction indoor air quality: Guidelines to protect indoor air quality during construction.

Daylighting: The warehouses will have skylights in all areas to augment lighting. Additional daylighting should conform to the sustainability goals.

Commissioning: At a minimum the electric equipment needs to be commissioned.

Elimination or control of environmental tobacco smoke (ETS): All spaces should either be ETS free or otherwise protect all tenants from ETS exposure.

While the guidelines are typically not binding specific design and constriction measures will be made contractually biding for all tenants. Certain LEED credit are linked to specific impact mitigation measures, such as:

Alternative transportation measure: Adhering to preferred parking arrangements for low emitting and fuel efficient cars and for car pools.

Water reduction: The use of harvested rainwater and graywater for certain indoor and outdoor applications and the use of water saving fixtures. , as well as utilizing separate water systems for potable and graywater.

Wastewater treatment: Using graywater and harvested rainwater for sewage conveyance. Using water saving toilets and waterless urinals.

Refrigerant management: Using only those CFC-free refrigerants

Light Reduction: Install and use interior lights in accordance to comprehensive light pollution reduction

Optimize energy performance: Using energy responsively and use only energy efficient appliances.

Low emitting materials: use only environmentally friendly paints, sealants and adhesives.

3.9 Water Efficient Landscaping (WE Credit 1)

The water efficient landscaping will use only non-potable water for irrigation.

The project will use captured rainwater and recycled graywater and wastewater for irrigation. Rainwater will be collected from certain sections of the internal roadways as well as roofs of the warehouses and stored in underground cisterns (e.g. large storage tanks). The capacity of the underground rainwater harvesting cisterns depends on the specific needs for irrigation, which dependent on a range of factors typically described in a landscaping factor. The main determinates of the landscaping factor are the rate of evapotranspiration (e.g. which is a function of the type of plant species, the density of plant cover and characteristics of shading by trees and shrubs as well as the specific micro environment) and the irrigation effectiveness. The final landscaping design will determine the needed volume of harvested rainwater. In addition recycled graywater and wastewater, which is treated to advanced standards by means of advanced septic systems incorporating recirculating sand filters and denitrification, will also be used for irrigation as needed. The type of irrigation selected will be determined by a high irrigation effectiveness and the local code requirements for irrigating with recycled wastewater.

The following lists several design principles for water efficient irrigation:

Site selection: Utilize shadows through the site and plant trees to increase shade canopy and reduce heat island effect, plan water use zones that have varying requirements for irrigation and select tank volumes of rainwater harvesting system

Do not use turf grass: Turf grass should not be used within the development since it requires significant irrigation.

Use plants according to soil: The selection of the plants will depend on the type of soil in the development. Since the proposed site is a former landfill area the top soil might have to be augmented to support the plants types that are preferred.

Selection of plants: Plants material should be selected that will easily adapt to the site. A diverse selection of native or adaptive plants is preferred over monocultures. Plants materials should use little or no fertilizers

Efficient watering practices: Drip, micromist and subsurface irrigation systems have a better efficiency than sprinkler. Watering schedules and durations need to be adjusted on a monthly basis and adjusted to actual weather conditions.

Figures SDA 3.8 and SDA 3.9 show the proposed schemes of rainwater harvesting for irrigation as well as for use in the buildings. In the final build-out of the proposed industrial park the rainwater collected from certain sections of the roads, some or all roofs of the warehouses and the reused wastewater from the buildings are main sources for irrigation water. Since the park is developed over a period of several years a combination of rainwater collection and wastewater recycling schemes are required to provide operational flexibility for supplying sufficient irrigation water quantities.

Detail (1) in Figure SDA 3.8 shows the approach of collecting rainwater for non-potable water uses inside the buildings using rainwater tanks dedicated to the particular building. The rainwater for use in the buildings is collected from the roofs and flows into a below-ground or above-ground storage tank. Before use inside the buildings the collected rainwater is filtered. The rainwater use inside the buildings is limited to sewage conveyance and certain janitorial uses. For the use of collected rainwater inside the buildings an initial estimate suggests that around 230 gpd of harvested rainwater are used for flushing the toilets and for selected janitorial use in a typical warehouse (e.g. size about 24,000 sq ft). A tank with a capacity of about 3,000 to 4,000 gallons would have sufficient reserves to supply harvested rainwater also during the dry season.

Significant volumes of harvested rainwater and stormwater for irrigation are required for irrigation and the collection of rainwater and stormwater requires larger areas and a larger storage volume. A cost-effective means to store larger volumes of rainwater and stormwater are underground cavern. Innovative designs are available to construct such cavern with modular internal support so that the top of the caverns can be used for parking or auxiliary traffic areas for cars and light trucks. The collection of the irrigation water would use sections of the internal roadways and the large roof areas of the building.

During the development of the industrial park, when warehouses are added over time the roadways can be used as a cost effective source for irrigation water. The collection system from the roadways could use gravel beds in the shoulder of the roads with smaller rock sizes to function as a coarse filter for the runoff from the streets. During lighter storm events runoff from the roads flows through an open channel with sloped bottom towards the gravel bed from where it flows towards the underground rainwater harvesting storage. During intense storm events runoff fills the gravel bed and then the open channel carries the runoff to the detention pond. Similarly, when the rainwater harvesting storage is filled stormwater flows is automatically redirected towards the detention ponds.

Figure SDA 3-11 shows a typical layout of the project site with the likely locations of rainwater / stormwater cisterns to supply irrigation water. Since practically all irrigation needs are located at the perimeter of the site the cisterns are located accordingly. Once all warehouses are built, the roofs would also be used to supply the irrigation water for the then expanded landscaped area and for irrigation needs for vegetation around the warehouses.

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Figure SDA 3.11 Possible locations of underground rainwater and stormwater caverns for irrigation water

3.10 Innovative Wastewater Technologies (WE Credit 2)

The proposed site is not connected to the municipal sewage system and therefore all wastewater has to be treated onsite. The proximity to the wetland areas and the Kawainui Marsh requires a comprehensive approach to mitigate, to the extent possible, any possible impacts from the wastewater that is produced on the proposed site.

In accordance with the increased need to avoid any significant impact of the released wastewater to the environmental and in particular to the adjacent wetland area, the design team proposes a comprehensive wastewater treatment design approach. This advanced wastewater treatment approach will go beyond the treatment efficiency of conventional septic systems.

The wastewater from the proposed development will basically resemble domestic wastewater, with the exception that the volume of wastewater will be smaller and that less organic waste will be from food preparation, dishwashing and garbage disposal. The wastewater treatment system will be designed to remove a significant amount of the biological oxygen demand (BOD), suspended solids matter (TSS), pathogens as well as nutrient agents such as nitrogen and phosphorus.

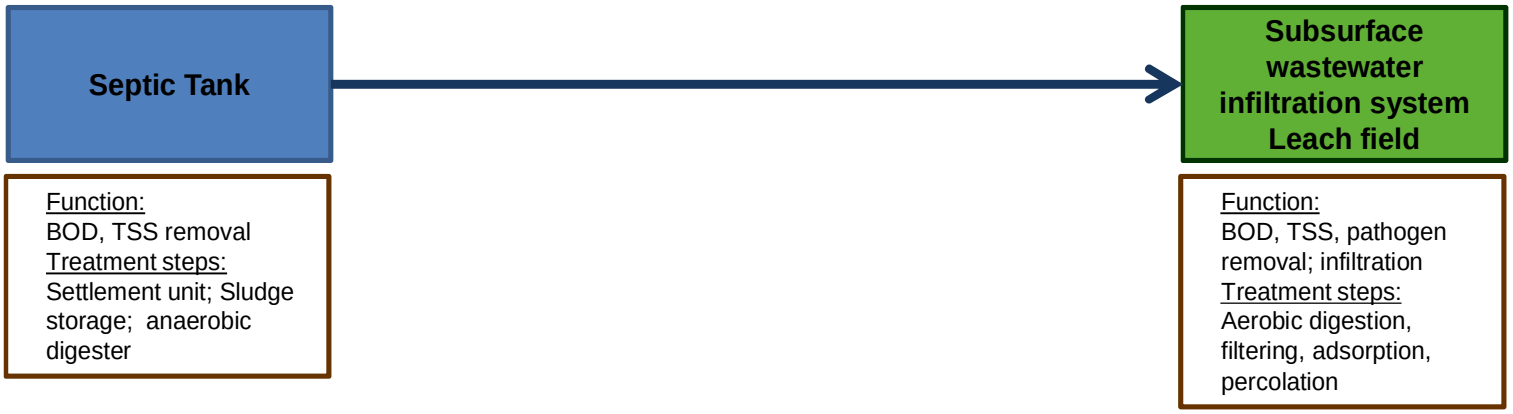
The proposed onsite wastewater treatment approach will employ a combination of conventional and alternative septic systems for the onsite wastewater treatment system. Figure SDA 3.12 shows the two approaches involving septic systems:

Type (A) in Figure SDA 3.12 shows the conventional process of septic systems where a septic tank represents the initial treatment step and a subsurface wastewater infiltration system (SWIS), e.g. leach field, is the second treatment step.

The <u>septic tank</u> is used to treat raw wastewater before it is discharged to a subsurface infiltration system. The tank provides primary treatment by creating quiescent conditions inside a process vessel, which is typically buried. The main primary treatment process is settling of particles of sewage to the bottom or collection of floatables in a surface scum layer, thereby separating solids and water. In addition the septic tank stores and partially digests settled and floating organic solids in sludge and scum layers. This can reduce the sludge and scum volumes by as much as 40 percent. Typical septic tank BOD removal efficiencies are typically between 30 to 50 percent.

<u>Subsurface wastewater infiltration systems (or leach fields)</u> are infiltrative surfaces which are located in permeable, unsaturated natural soil or imported fill material. The wastewater leaving the septic tank can infiltrate and percolate through the underlying soil to the ground water. As the wastewater infiltrates and percolates through the different soil layers, it is treated through a variety of physical, chemical, and biochemical processes and reactions.

Type A: Conventional onsite septic system:



Type B: Alternative onsite septic system:

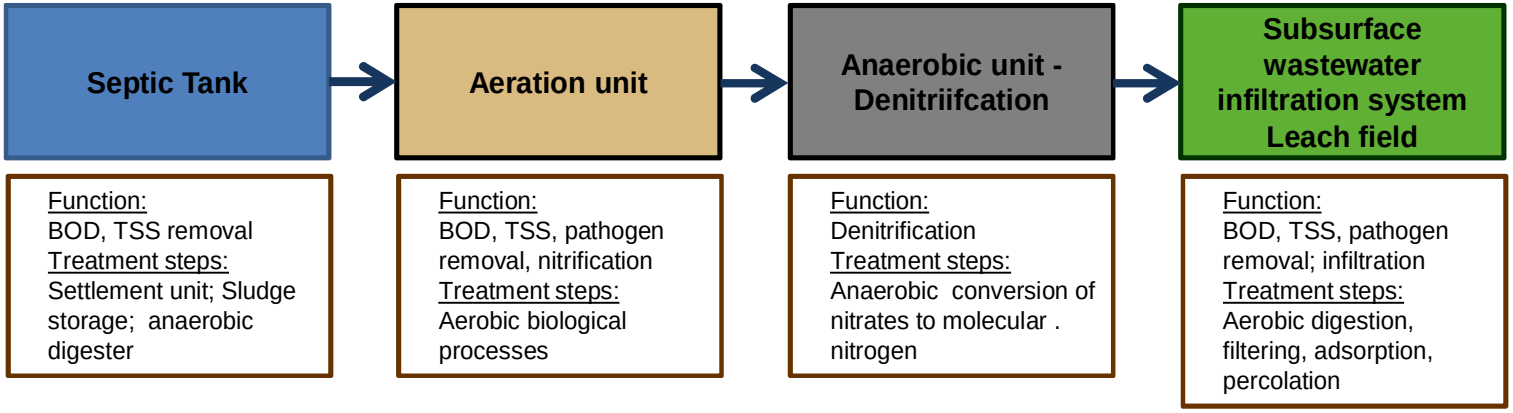


Figure SDA 3.12 Onsite wastewater treatment system – treatment options

The overall effectiveness of the conventional septic system depends on a variety of factors, such as organic loading, residence time, soil type, geometry of the construction, etc.. In general conventional septic have been performing well in regard to removal of BOD, TSS and pathogens, if design, site conditions and operations are done properly. The conventional can system result in insufficient treatment performance if the system operates close to environmentally sensitive areas and the water table and if nutrient removal (e.g. removal of nitrogen) is important.

Type (B) in Figure SDA 3.12 shows alternative septic process where an aeration process and a denitrification step removes significantly larger amounts of BOD, TSS and nitrogen than the amounts achievable with conventional septic systems. In the alternative process an aeration unit is added downstream of the septic tank to provide oxygen for BOD removal and nitrification. An anaerobic process step is then added to provide for denitrification; as a process variation the anaerobic process step is effectively done by recirculating the effluent from the aerobic unit to the pump chamber downstream of the septic tank. The pump chamber is basically anaerobic and has sufficient organic load for the denitrifying bacteria.

The alternative septic process significantly increases the overall removal rate for BOD, TSS and nitrogen. Excess amounts of nitrogen in the effluent can deteriorate the water quality of receiving water or ground water, e.g. in form of eutrophication. Since the discharge of the alternative septic system has a significantly lower organic load than the effluent from conventional septic tanks, the performance of the leach field are less prone to failure due to excessive and non-uniform application of wastewater in the infiltration field. Failures of the leach field can result in possible contamination of the groundwater or receiving waters.

Figure SDA 3.13 shows a concept process / flow diagram of the proposed onsite wastewater treatment system. Two types of septic systems will be used. The warehouses in the center of the development will discharge the wastewater into septic tanks (Type A) which do not have individual leach fields attached to them, since there might be structures and impermeable pavement which could negatively affect the performance of the leach fields downstream of the septic tanks. The wastewater from these septic tanks flows to the Type B alternative septic systems, which are located at the perimeter of the site where vegetated and pervious areas are located that can accommodate leach fields. (Figure SDA 3.14 shows where in the warehouse development septic systems type A and B would be used). Depending on the hydraulic head available the effluent of the Type A septic tanks either flows by gravity to the Type B septic systems or has to be pumped in batches.

The Type B septic systems have added aeration (aerobic) and anaerobic process steps to increase the removal of BOD, TSS, pathogens as well as nitrogen. The effluent of the Type B systems is either used for subsurface irrigation of the landscaped area at the perimeter of the site or is discharged through regular leach fields. The lower BOD in the effluent avoids possible

organic overload of the leach fields and results in effective hydraulic and treatment performance of the leach fields and infiltration.

The aeration process could be any of a host of processes currently on the market. The proposed configuration of the Type B treatment process includes a recirculating sand filter downstream of the septic tank. The generic design of the recirculating sand filter offers cost effective operation and an effluent that is very low in BOD, TSS and pathogens. In addition, sand filters can remove a significant amount of phosphorus, another detrimental nutrient in wastewater, due to adsorption processes in the upper layers of the filter. The pump chamber upstream of the sand filter collects the effluent of the septic tanks and lifts it to the top of the sand filter in timed doses. The sand filter is an aerobic process step which provides oxygen for BOD removal and nitrification. After passing through the filter the wastewater stream flow back to the pump chamber which is an anaerobic vessel where denitrification occurs. From here one part of the wastewater is recirculating to the top of the sand filter and the remainder is pumped to the leach field or irrigation systems. The total system has a very high removal rate (over 95%) of BOD, TSS and pathogens and a nitrogen removal rate in the order of 60-70%. Since the proposed industrial warehouse park will add leasable space over a couple of years. The aeration and leach field might be installed in modules to the design conditions of the expanding wastewater flow rates.

Figure SDA 3.13 shows the location of Type A and B septic systems. Type A septic systems are located in the center of the proposed warehouse development. These systems consist only of septic tanks and have no dedicated leach fields. Type B septic systems are located at the perimeter of the proposed warehouse development. Each of these systems consists of a septic tank and an added aeration process step and anaerobic denitrification which have the capacity of accommodating the Type a system flow that is connected to them. The quality of the effluent of the Type B septic systems is sufficient enough to be applied to the subsurface wastewater infiltration systems or irrigated landscapes at the perimeter of the proposed site.

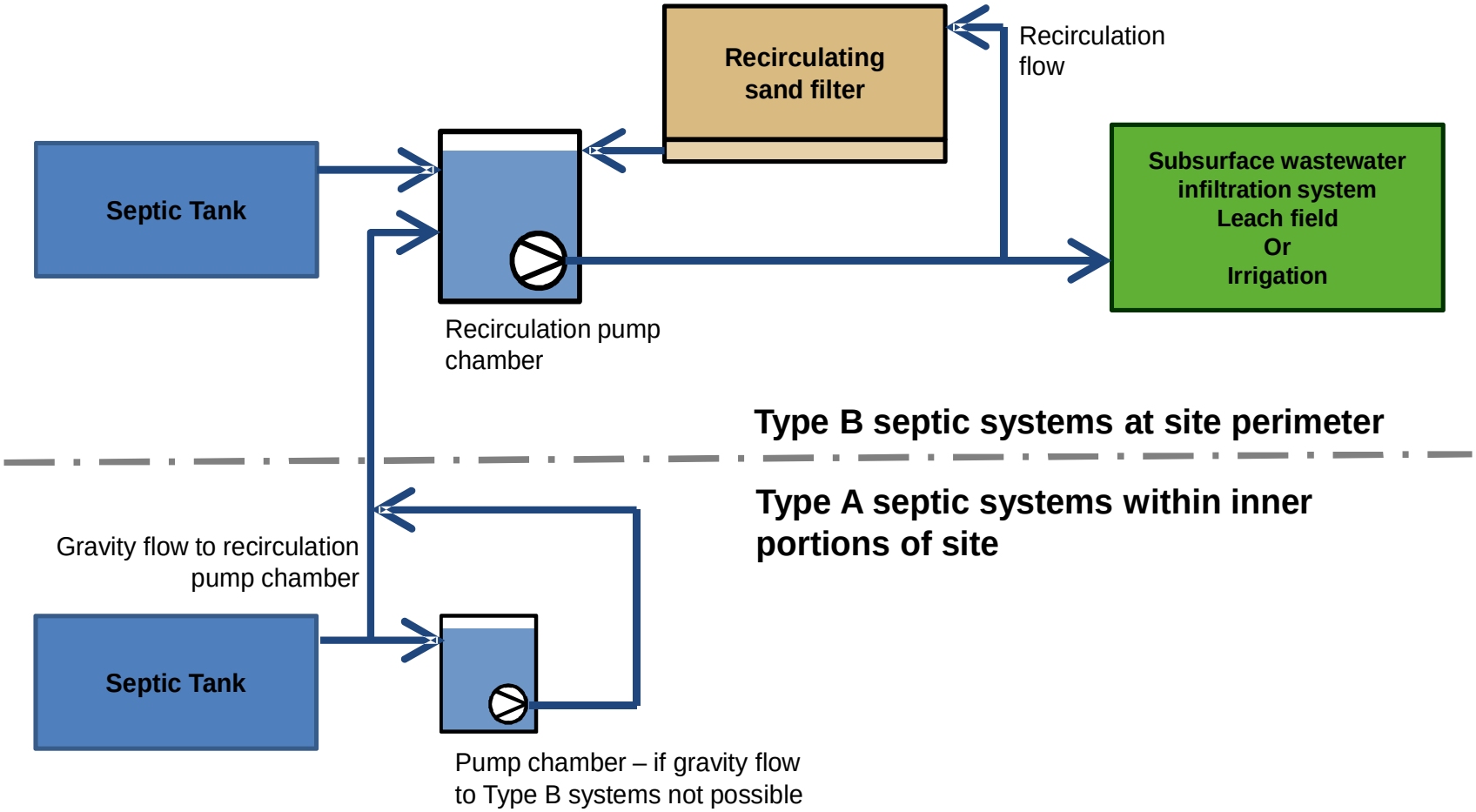


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Figure SDA 3.13 Onsite wastewater treatment system – process flow diagram

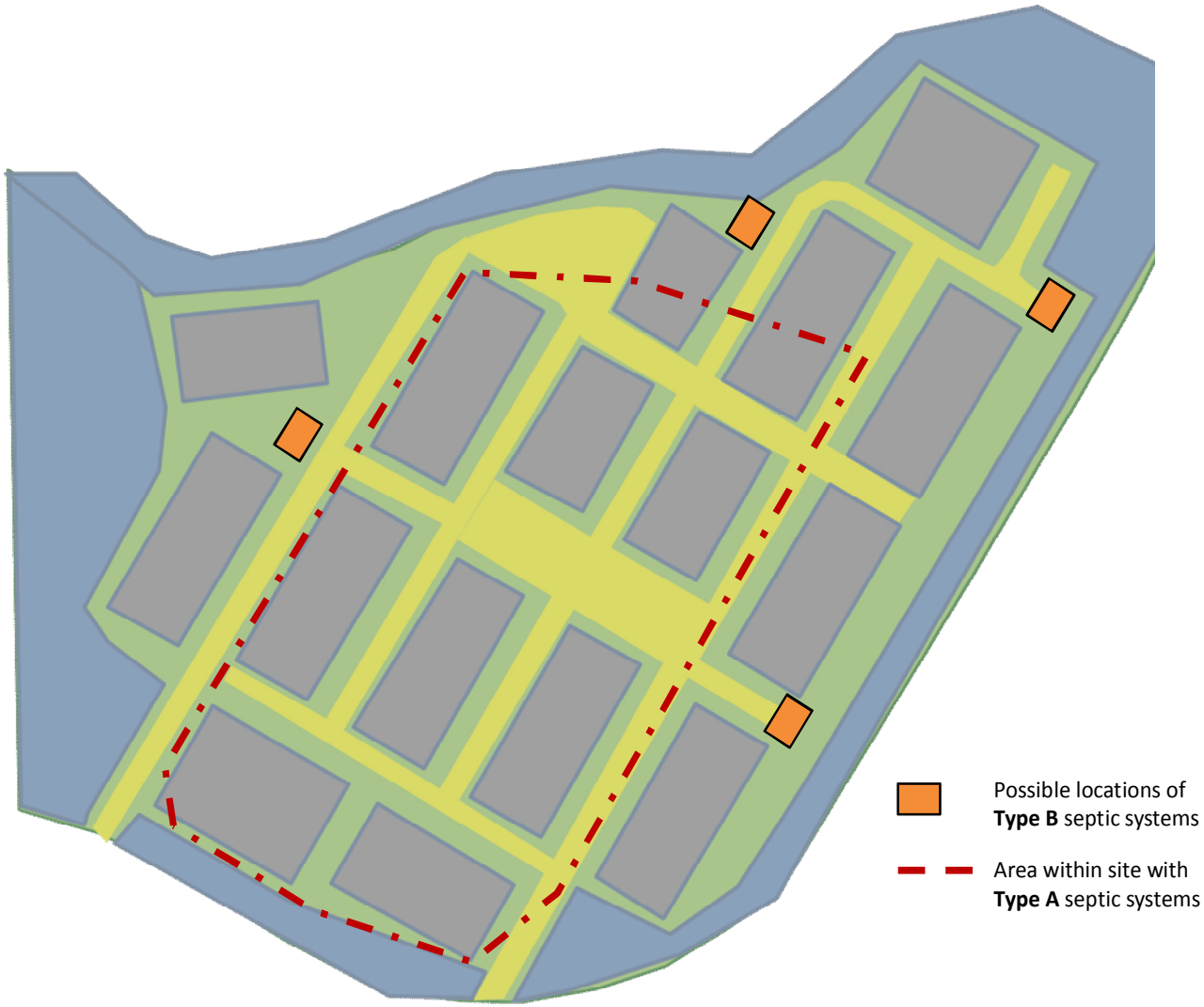

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Figure SDA 3.14 Onsite wastewater treatment system – location of alternative treatment septic systems

3.11 Water Use Reduction 40% Reduction (WE credit 3)

The water use in the buildings will be reduced by 40% by using water conserving fixtures in the building. In order to satisfy this credit the following fixtures have to achieve in aggregate a 40% reduction relative to the current baseline:

Water closets, urinals, lavatory faucets, showers, kitchen sink faucets and pre-rinse spray valves. Irrigation water is NOT included in the water use reduction assessment.

The project will utilize only those fixtures which have a documented water savings. Such water fixtures would include fixtures certified under the WaterSense program that is administered under the US-EPA.

Examples of water saving fixtures are:

Type of fixture	Current baseline Gal per flush or cycle	Water saving fixture Gal per flush or cycle	Savings in %
Water closet	1.6	1.28	20%
Water closet (High-Eff. Toilet)	1.6	1.1	30%
Urinals (high-efficiency)	1.0	0.5	50%
Urinals (waterless)	1.0	0	99%
Lavatory faucet	2.2	1.5	32%
Kitchen sink	2.2	1.8	18%
Showers	2.5	1.5	40%

A sample calculation assuming a LEED default water usage frequency of the applicable fixtures by full time employees, part time employees and transients users of the building, e.g. visitors/customers, would result in a 42% water savings by using water savings fixtures listed above, such as high-efficiency toilets, waterless urinals, as well as low flow lavatory faucets, showers and kitchen sinks.

3.12 Optimize Energy Performance (EA Credit 1)

An overall energy savings relative to the baseline, as defined by ASHRAE 90.1-2007 will be determined by a whole building energy simulation ,as required by the credit. An overall energy cost savings of at least 30% compared to the baseline case should be achieved by using a host of energy savings measures.

The following energy saving measures as well as additional measures will be used to reduce energy cost for the warehouses by the amount required:

Goals / Areas of Improvement	Strategies
Reduce internal loads	
Equipment and Appliances:	• Use efficient equipment and appliances, e.g. computers, monitors, printer, copy machine, water cooler, refrigerator, dishwasher, only with ENERGY STAR certification. • Use controls to minimize usage and waste; disconnect excess equipment • Educate building staff; encourage energy efficiency
Lighting:	• Use appropriate lighting power density: between 0.65 and 0.9 W/sq ft; depending on the required tasks to be performed (e.g. warehouse space, shop, office) • Use energy efficient lighting: in warehouse space use high-performance T-8 lamps and ballasts in an appropriate fixture configuration (e.g. tandem 8 feet long luminaries); lights fully shaded that light source is not in direct line of sight to skylight to reduce light pollution; in office space use ambient and supplemental task lights • Maximize the benefits of day-lighting: use skylights and some vertical glazing for the warehouse area and windows for office and lobby areas. • Use skylights & north-facing clerestories to daylight interior zones: • 5%-7% of roof area of translucent skylights; VLT in accordance to credit SS-8 Light Pollution Reduction requirements; 0.2 -0.4 SHGC • Use separate controls for lighting in areas near windows: stepped dimming system half off and full off at appropriate day lighting levels; automatic dimming or switching of all luminaires in day lighted areas • Use automatic controls that turn lighting off during unoccupied periods • Manual switches for task lighting.

Goals / Areas of Improvement	Strategies
	• External lighting should be limited in accordance with SS credit 8 (reduction of light pollution); select pulse-start metal halide, fluorescent, induction, or CFL amalgam lamps with electronic ballasts.
Reduce heat gain in building:	
Through Windows:	• Minimize windows east and west, maximize north and south • Low solar heat gain coefficient (SHGC) glazing where sun penetrates the window • External shade to reduce solar heat gain & glare through window: external light shelves or horizontal overhangs above the windows block direct sun penetration
Through building envelope:	• Roofs and walls with sufficient insulation: recommended construction standing-seam roofs with insulation blanket over purlins; use aerated wall construction for good insulation properties • Roof with high surface reflectance & emittance to produce "cool roof"; Solar reflectance index (SRI) > 78 is recommended for roofing material • Shade building surfaces with deciduous or coniferous trees as appropriate; Use vegetation on S/E/W to control solar heat gain (and glare)
Efficient building systems:	
Efficient HVAC systems:	• Select efficient cooling equipment: use 11.3 EER or lower AC unit and heat pump; • Improve outdoor air ventilation: • Improve fan power and air distribution: use variable speed fans; insulate and seal air ducts; • Use natural ventilation: Operable windows with screens so that air conditioning is necessary needs are reduced or eliminated; design building layout for effective cross-ventilation
Efficient service water heating systems:	• Minimize distribution losses; insulate pipes, size correctly to peak demand, supply temp. Max. 120 F • Hot water for work sinks and in restrooms from "instant hot" fixtures, not from traditional water heaters.

Goals / Areas of Improvement	Strategies
	• Use solar water heaters or site recovered energy; size to provide most of indoor hot water usage with solar energy or waste heat
Commission all components of the energy systems to ensure equipment is installed according to design and functions energy efficiently.	

By implementing the measures above, which are based on the recommendations contained in the ASHRAE Advanced Energy Design Guide for Small Warehouses and Self-Storage Buildings, a minimum of 30% energy savings when compared to those same warehouses designed to the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-1999, should be achievable. Since the project team will attempt the full credit allocation of 12 points for a minimum of 30% energy savings, a comprehensive energy modeling has to be performed.

3.13 On-Site Renewable Energy (EA Credit 2)

The credit requires onsite renewable energy generation to off-set building energy costs of at least 1% of the buildings annual energy costs. The building energy costs are determined by the whole building energy simulation. The eligible types of onsite renewable energy generation under this credit include the following types that represent viable candidates for the proposed project site:

- Photovoltaic (PV) systems
- Wind energy systems
- Solar thermal systems
- Biofuel-based electrical systems

From the above list of applicable renewable energy forms, biofuel based system will not be considered for the project as well as wind energy systems, due to the proximity to the marsh and the danger of bird strikes by the wind energy systems.

The onsite renewable energy generation capacity for the proposed project will be a combination of PV systems and solar-thermal systems. As the demand for hot water in the building depends on the specific usage (e.g. is there a kitchen or shower in the warehouse?) the scope of solar water heating applications versus PV-capacity will be determined at a later stage.

The annual electricity demand for PV for this credit is assumed in the order of 13,000 to 14,000 kWh, which is about 1% of total consumption. Considering the situation where only PV systems are utilized to generate the amount of required onsite renewable energy, the installed capacity of the PV system would be in the order of 8 kW.

4. Summary and Conclusions

Section Two and Three presented the selected approach of project team to achieve the LEED Silver certification goal for the proposed industrial development. This section discusses how the different credit categories provide to the certification goal. It must be noted that industrial developments of the type of the proposed warehouse park have less opportunities to implement green building features than project for residential, office and intuitional buildings. In addition, the proposed site and its location render some of the credits outright un-achievable. Therefore the expected LEED Silver certification is a very ambitious goal set forth by the development of the proposed warehouse park and it expresses the commitment to build the proposed light industrial park in the most environmentally friendly way and to use resources in an utmost responsible manner. Figure SDA 4-1 delineates how the attempted credits are distributed among the following credit categories:

SS	-	Sustainable Sites	IEQ	-	Indoor Environmental Quality
WE	-	Water Efficiency	ID	-	Innovation in Design
EA	-	Energy & Atmosphere	RP	-	Regional priority
MR	-	Materials & Resources			

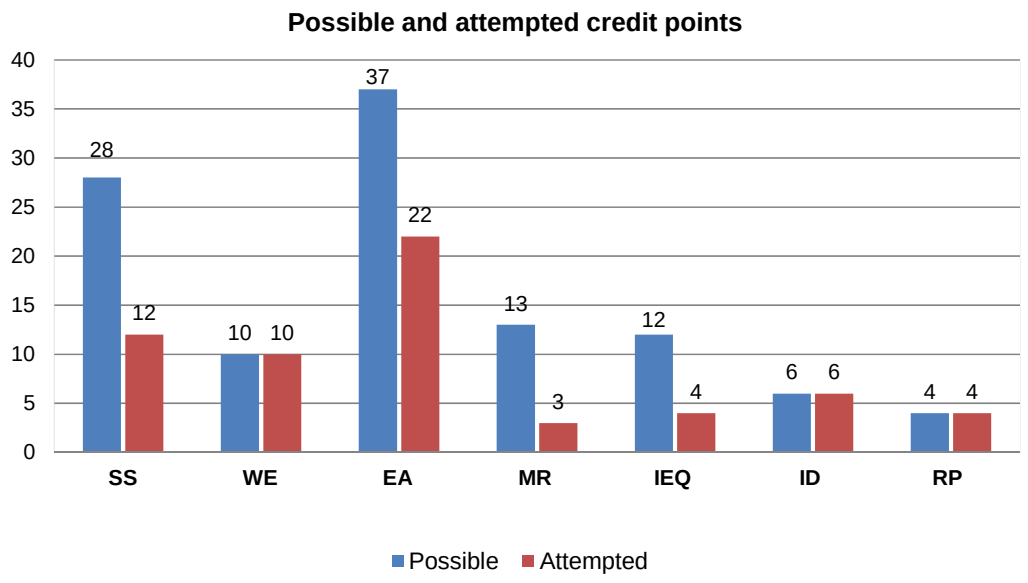

Figure SDA 4.1 Comparison between Possible and Attempted Credit Points per Category

Figure SDA 4-2 shows the percentage of available points within credit categories will be attempted:

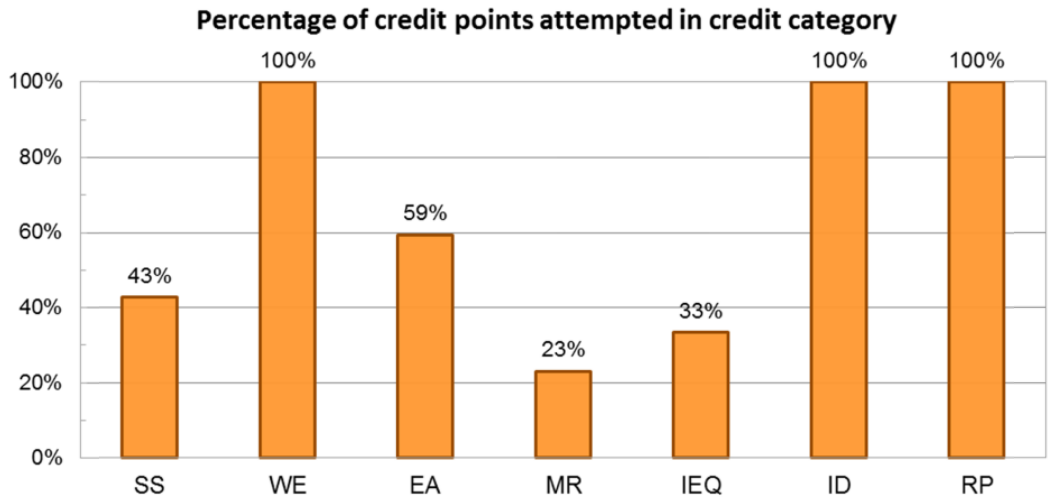

Figure SDA 4.2 Percentage of Attempted to Available Credit Points for Credit Category

Sections 4.1 through 4.7 discuss the objectives of attempting the credit points for the seven credit categories.

4.1. SS - Sustainable Sites

Although the proposed site is within the State of Hawaii "Urban" land use district and is not a greenfield development several of the SS credits which would result in high credit points do not apply. The proposed site is not directly connected to dense population centers and the required basic services do not exist at or close to the site. The proposed site has currently also no connection to public transportation and the plans of the developer to implement a private shuttle would not suffice for the alternative transportation credit without the public transportation option.

Although the proposed site will use a former landfill area and therefore satisfied the credit intent of brownfield developments, which reduce pressure undeveloped land, all credit requirements are not met for a brownfield development.

From the 28 available credit points of the Sustainable Site credit category the project team will attempt 12 credits. The attempted credits are addressing impacts and mitigation measures that are of significance to the environmentally sensitive land that surrounds the proposed site. The attempted credits are as follows:

- Incentivizing the use of alternative transportation by providing secure storage and changing / shower facilities for bicyclists and providing preferred parking for low emitting vehicles and carpools.
- Restoring habitat and maximizing open space within the site, by planting open space with native or adaptive plants to provide as much vegetative area within the development footprint as possible.
- Comprehensive stormwater treatment to control the quality and quantity of the stormwater runoff from the developed site, by providing pervious parking areas, harvesting stormwater from roofs and roadways for irrigation, removing pollutants from 100 % of the runoff through a multistage treatment system and providing flood control by means of an extended detention pond. The proposed design for a comprehensive stormwater treatment system far exceeds the basic credit requirements and **an exemplary performance will be attempted for the stormwater credit.**
- Reducing Light Pollution by controlling internal and external light sources during the night.
- Providing guidelines to the tenants to build-out spaces along the green building approach that was used for the Core & Shell certification. In going beyond a non-binding guideline status the developer will make the compliance of certain green building measures contractually mandatory, such as strict compliance with the reduction of light pollution measures. **For the contractually binding measures the project team will attempt an exemplary performance credit.**

4.2. WE - Water Efficiency

The close proximity of the proposed site to important wetland areas requires special consideration for all water related effect on the environment. Water relevant issues include stormwater runoff, water use for irrigation, water use in the buildings and wastewater treatment and disposal. While the stormwater control is treated under the Sustainable Site credit category all the remaining water related credit are grouped under the Water Efficiency credit category.

Figure SDA 4-1 and SDA 4-2 indicate that the project team will attempt all credit points that are available under the Water Efficiency category. In addition, an exemplary performance credit point will be attempted. The attempted credits under the category Water Efficiency are:

Water efficient landscaping, where harvested rainwater and recycled wastewater will be used for irrigation instead of potable water. Landscaping will preferably use native and adaptive plants that have lower needs for irriga**tion, pesticides and fertilizers then introduced plants. Innovative wastewater technologies** will include advanced onsite treatment systems that go far beyond the performance and effectiveness of conventional septic systems. Since the wastewater is treated onsite, due to the missing connection to the municipal sewer system, and the wastewater discharge occurs in close proximity to important wet-lands, advanced treatment steps are added to the septic systems on the site. Aerobic and anaerobic treatment process steps are added to remove more BOD and TSS loads and significantly reduce nutrients from the wastewater before it is infiltrated in irrigation or in leach fields. Since the proposed wastewater treatment system goes far beyond the basic credit requirements an exemplary performance point will be attempted for the innovative wastewater treatment systems.

Water use reduction measures will result in 40% water saving by installing only high performance water fixtures in the buildings.

4.3. EA - Energy & Atmosphere

The energy and atmosphere credit category implies mitigation of impacts that are relevant also to the island-wide environment and economy. The attempted credits involve efforts to save energy and impacts that result from the generation as well as verification that these measures are indeed implements. Hawaii has a very unique energy dependence on imported oil, since at the present about 90% of all its energy is made from oil. Efforts to save energy and generate energy from renewable energy sources will help the State of Hawaii in its declared effort to reduce the high oil dependence and substitute imported energy with indigenous energy forms.

Figure SDA 4-1 and SDA 4-2 indicates that 22 of 37 available credit points and 59% of the available points will be attempted, respectively. The attempted credits under the category Energy & Atmosphere are:

- Optimized energy performance by saving a minimum of 30% of the energy costs of a baseline building. The 30% energy savings is selected since it conforms to a realistically and cost efficient achievable energy saving goal when applying recommendation and guidelines set forth by ASHRAE.

- Onsite renewable energy will be produced to offset energy derived from imported fossil fuel, especially oil. The onsite renewable energy will be derived from solar thermal/waste heat recovery and PV energy systems.

- Measurement and verification will be done on the core and shell part of the buildings as well as in the tenant spaces. Continuous measurement and verification will support the park management and the tenants to monitor the success of energy savings and intervene if the saving goals are not met.

4.4. MR - Materials & Resources

The materials and resources credit category addresses island-wide concerns, since it combines efforts to divert as much construction waste from landfill and to conserve virgin material by reusing and recycling waste. In addition, the credit category advocates the use of locally extracted or manufactured materials in lieu of imported material.

Figure SDA 4-1 and SDA 4-2 indicates that 3 out of 13 available or 23% of the available credit point will be attempted. The attempted credits under the category Materials & Resources are:

- Construction waste management will be performed to reuse or recycle construction waste and therefore avoid disposal in landfills.
- Recycled materials will be used in the construction and products will be purchased that have a higher percentage of pre- and post-consumer recycled content.
- Regional extracted or manufactured material will be used to support indigenous resources and the economy of Hawaii.

4.5. IEQ - Indoor Environmental Quality

The Indoor environmental quality credit category addresses concerns about a health indoor environment for building occupants. IEQ impacts and their mitigation have only secondary significance to the exterior environment. In selecting what credits will be attempted the project endeavors to create synergy between increasing the indoor environmental conditions and to mitigate impacts to the exterior environment.

Figure SDA 4-1 and SDA 4-2 indicate that 4 out of 12 possible credits and 33% of the available credits will be attempted. The attempted credits under the category Indoor Environmental Quality are:

- A construction indoor air quality (IAQ) management plan will be developed and implemented that ensures that the buildings will not have an endemic indoor air quality problems that could be avoided if best management strategies are followed during construction. The construction IAQ management plan will also be provided to the tenants as part of the construction guidelines for the build out of the leasable space.
- Low VOC emitting paints and coatings as well as adhesives and sealants will be used in the core and shell part of building
- Ample day lighting will be provided as part of the improvement of indoor environmental quality, in synergy with the measures to reduce the energy demand of the warehouse.

4.6. ID - Innovation in Design

The Innovation in Design credit category includes measures to step outside the conventional design paradigm and implement mitigation measures in excess of the basic credit requirements or use innovative project initiative that create effective synergies that will make the project more "green".

Figure SDA 4-1 and SDA 4-2 shows that the project team is attempting 6 out of 6 available credits or 100% of the available credits under this category. The project team goes this route since the warehouse development will not be eligible for a range of credits and feels that this project calls for innovative and bold design to minimize impacts of the project to the environment and the community. The attempted credits under the category Innovation in Design are:

- An educational program will be implemented that will inform the public about features of the adjacent Kawainui Marsh as well as how green building technologies can avoid environmental impacts of industrial developments such as the proposed industrial park. The educational program will be a continuous public outreach initiative by the developer.

- The maintenance vehicles of the industrial park will use electric vehicles whenever the work tasks allow the use of smaller electric utility vehicles. The energy for the vehicles will come exclusively from renewable energy, either from onsite renewable energy or from offsite renewable energy sources.
- Since some of the LEED credit measures will be used also as important environmental impact mitigation measures that the developer has guaranteed to implement, certain measures that apply to core and shell will be part of the lease agreement and will be contractually binding. One important measure will be the need to reduce light pollution by controlling interior and exterior lights.
- Since water related impact mitigation measures are very important the basic requirements for storm water treatment and for the onsite wastewater treatment will far exceed the basic credit requirements. By doing so the project team will attempt two exemplary performance credits.
- The inclusion of at least one LEED-AP in the project team as a principle member will assure that the LEED certification will be facilitated and that the ambitious LEED Silver goals for the green industrial development will be met.

4.7. RP - Regional Priority

The credits of the regional priority category represent bonus point for the project to implement those credits that are most attractive to the regions. Figure SDA 4-1 and SDA 4-2 indicate that the project will quality for 4 out of 4 available credit points or 100% of the available credit points, respectively. This underlines the validity of the project team to select those credits that matter most for the region and Hawaii.

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Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 5:

Traffic Impact Analysis Report

<u>Appendix 5 is identical to Appendix 5 of DEIS</u>

January 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
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TRAFFIC IMPACT ANALYSIS REPORT FOR

KAPA'A LIGHT INDUSTRIAL PARK

IN KAILUA, OAHU, HAWAII

Prepared For

KAPA'A III, LLC
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December 7, 2009

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1. INTRODUCTION

Phillip Rowell and Associates has been retained to prepare a Traffic Impact Analysis Report for the proposed Kapa'a Light Industrial Park. The purpose of this study is to identify the traffic impacts of the proposed project and to identify potential improvements to mitigate the projects traffic impacts.

This introductory chapter discusses the location of the project, the proposed development, and the study methodology.

Project Location and Description

The following is a summary of the project:

1. The project is located along the north side of Kapa'a Quarry Access Road, which is located south of the H-3 freeway in the vicinity of Kalaheo High School in Kailua. Figure 1 indicates the approximate location on the Island of Oahu. Figure 2 is a vicinity map.

2. The project will consist of 663,000 of light industrial floor area to be developed in four phases between 2011 and 2026. Each phase is described in Chapter 4 of this report.

3. Access to and egress from the project will be provided via driveways along the north side of Kapa'a Quarry Access Road. A schematic drawing indicating the approximate locations of these driveways and the phase served by each driveway is presented as Figure 3.

Study Methodology

The following is a summary list of the tasks performed:

1. A field reconnaissance was performed to identify existing roadway cross-sections, intersection lane configurations, traffic control devices, and surrounding land uses.

2. Existing traffic volumes were obtained for the study intersections from traffic counts. These traffic counts counted the number of automobiles and trucks.

3. Existing levels-of-service of the study intersections were determined using the methodology described in the *2000 Highway Capacity Manual*.

4. Future background traffic volumes at the study intersections without traffic generated by the study project were estimated.

5. Peak hour traffic that the proposed project will generate was estimated using trip generation analysis procedures recommended by the Institute of Transportation Engineers.

6. Project generated traffic was assigned to the adjacent roadway network for each of the four development phases described previously.

7. A level-of-service analysis for future traffic conditions with traffic generated by the study project was performed.

8. The impacts of traffic generated by the proposed project at the study intersections was quantified and summarized.

9. Locations where project-generated-traffic significantly impacts traffic operating conditions were identified.

10. If required, improvements or modifications necessary to mitigate the traffic impacts of the project and to provide adequate access to and egress from the site were formulated.

11. A report documenting the conclusions of the analyses performed and recommendations was prepared.

Study Area

The study area for this study is consistent with the study area used in the preparation of traffic studies for other projects in the area and was reviewed with the Traffic Review Branch of the City and County of Honolulu Department of Planning and Permitting. These intersections are listed in Table 1.

Table 1 Study Intersections

Number	Intersection	Status	Jurisdiction
1	Kapa'a Quarry Road at Mokapu Boulevard	Existing	State
2	Kapa'a Quarry Road at Kalanianaole Highway	Existing	State
3	Kapa'a Quarry Road at Kapa'a Quarry Access Road	Existing	City & County

Order of Presentation

Chapter 2 describes existing traffic conditions, the level-of-service (LOS) concept and the results of the level-of-service analysis of existing conditions.

Chapter 3 describes the process used to estimate 2016 and 2026 background traffic volumes and the resulting background traffic projections. Background conditions are defined as future background traffic conditions without traffic generation by the study project.

Chapter 4 describes the methodology used to estimate the traffic characteristics of the proposed project, including 2016 and 2026 background plus project traffic projections.

Chapter 5 describes the traffic impacts of the proposed project, conclusions of the impact analysis and recommended mitigation measures.

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to the proposed project. The level-of-service (LOS) concept and the results of the LOS analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project, which are described in a subsequent chapter.

Existing Streets and Intersection Controls

The primary streets and roadways serving the project are Mokapu Boulevard, Kalanianaole Highway and Kapa'a Quarry Road. These streets and the lane configurations of the study intersections are shown as Figure 4. Also shown are the method of right-of-way control at the study intersections.

Existing Peak Hour Traffic Volumes

The existing peak hour traffic volumes were estimated from manual traffic counts at the study intersections. The total peak hour vehicular volumes are shown in Figures 5 and 6.

1. The traffic counts include buses, trucks, motorcycles, mopeds and heavy vehicles. Heavy vehicles are defined in the *Highway Capacity Manual* as vehicles with more than four tires and may be trucks or buses[1]. Therefore, any vehicle with more than four tires touching the pavement counted and factored into the capacity calculations. The peak hourly volumes of heavy vehicles are shown in Figure 7.

[1] Transportation Research Board, *Highway Capacity Manual*, 2000, Washington, D.C., page 16-4.

2. Bicycles and pedestrians were not counted.

3. All intersections were counted from 6:30 AM to 8:30 AM and from 3:30 PM to 5:30 PM on either a Tuesday or a Thursday.

4. The traffic volumes shown are the results of manual counts and may not agree with traffic counts obtained from other agencies. Traffic counts obtained from State and County agencies may be machine counts that a subject to some error as machine counts are based on the number axles crossing the traffic counter tubes that cross the roadway.

5. The traffic volumes of adjacent intersections may not match the volumes shown for an adjacent intersection because the peak hours of the adjacent intersections may not coincide and there are driveways between the intersections.

6. Pedestrian activity was negligible during the traffic counts.

Existing Peak Hour Traffic Into and Out of Industrial Park

Existing peak hour traffic into and out of the existing industrial park is summarized in Table 2. Also shown are the number of autos, medium size vehicles and large vehicles.

Table 2 Peak Hour Traffic Into and Out of Industrial Park

Time Period	AM Peak Hour				PM Peak Hour			
	In	Out	Total	%	In	Out	Total	%
Autos	111	41	152	69%	49	143	192	91%
Heavy Vehicles	26	41	67	31%	14	6	20	9%
Total	137	82	219	100%	63	149	212	100%

Notes:
(1) The sum of inbound plus outbound was used to identify the peak hour. The peak hour of the inbound trips may not coincide with the peak hour of the outbound trips.

Level-of-Service Concept

Signalized Intersections

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LOS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 3. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. ***Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.*** As the proposed project is within the State "urban" district, this standard is applicable.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of

traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 3 Level-of-Service Definitions for Signalized Intersections[(1)]

Level of Service	Interpretation	Volume-to-Capacity Ratio[(2)]	Stopped Delay (Seconds)
A	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<10.0
B			10.1 - 20.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	20.1-35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	35.1-55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	55.1-80.0
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 4 summarizes the definitions for level-of-service and the corresponding delay.

Table 4 Level-of-Service Definitions for Unsignalized Intersections[(1)]

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Roadway Segments

The levels-of-service of the roadways links north of and south of Kapa'a Quarry Access Road were analyzed using the roadway segment methodology described in the *Highway Capacity Manual*. The level-of-service is defined by the percent of time that a vehicle will spend following another vehicle along the segment of highway being analyzed. The criteria for the level-of-service analysis is summarized in Table 5.

Table 5 Level-of-Service Criteria for Class II Two-Lane Highway(1)

Level-of-Service	Percent Time-Spent-Following
A	≤ 40.0
B	> 40 to 55
C	> 55 to 70
D	> 70 to 85
E	> 85
F	See Note (3) Below

Notes:
(1) Source: Institute of Transportation Engineers, *Highway Capacity Manual*, 2000, page 20-4.
(2) This means that the primary function of the roadway is to serve adjacent development.
(3) Level-of-Service F applies whenever the flow rate exceeds the segment capacity.

Level-of-Service Analysis of Existing Conditions

The existing levels-of-service of the signalized study intersections are summarized in Table 6. The results shown in the table are the volume-to-capacity ratios, delays and levels-of-service of the overall intersections and each lane group. As shown all movements operate at Level-of-Service D, or better. Several movements have delays that result is Level-of-Service E or F. However, all the volume-to-capacity ratios are well below 0.90. As described in the *Highway Capacity Manual*, this implies that the long delays and levels-of-service are the result of the long traffic signal cycle length[2].

The results of the Level-of-Service analysis of the unsignalized study intersections are summarized in Table 7. The methodology for unsignalized intersections does not calculate the volume-to-capacity ratio. Only the delays are calculated. All movements operate at Level-of-Service A or B, which implies minimal delays and good operating conditions.

[2] Transportation Research Board, Highway Capacity Manual, 2000, Washington, D.C., page 16-35.

Table 6 Existing (2009) Levels-of-Service of Signalized Intersections

Intersection	AM Peak Hour			PM Peak Hour		
	V/C(1)	Delay(2)	LOS(3)	V/C	Delay	LOS
Kapa'a Quarry Road at Mokapu Boulevard	***0.58***	***18.2***	***B***	***0.67***	***25.5***	***C***
Eastbound Left	0.19	9.7	A	0.02	9.2	A
Eastbound Thru & Right	0.68	20.6	C	0.78	26.6	C
Westbound Left	0.37	12.0	B	0.36	24.0	C
Westbound Thru	0.56	15.1	B	0.35	12.9	B
Westbound Right	0.04	10.1	B	0.01	9.8	A
Northbound Left & Thru	0.38	33.8	C	0.55	60.8	E
Northbound Right	0.05	27.9	C	0.11	48.2	D
Southbound Left, Thru & Right	0.12	28.7	C	0.02	46.8	D
Kapa'a Quarry Road at Kalanianaole Highway	***0.78***	***17.0***	***B***	***0.78***	***15.6***	***B***
Eastbound Left	0.48	82.4	F	0.44	70.9	E
Eastbound Thru	0.42	3.8	A	0.82	9.5	A
Westbound Thru	0.84	17.9	B	0.60	13.8	B
Westbound Right	0.09	6.0	A	0.06	7.9	A
Southbound Left	0.44	67.8	E	0.52	69.4	E
Southbound Right	0.07	61.9	E	0.03	61.1	E

NOTES:
1. V/C denotes ratio of volume to capacity. V/C ratios are not calculated for unsignalized intersections.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Table 7 Existing Levels-of-Service of Unsignalized Intersections

Intersection and Movement	AM Peak Hour		PM Peak Hour	
	Delay 1	LOS 2	Delay	LOS
Kapa'a Quarry Road at Kapa'a Quarry Access Road North				
Eastbound Left	12.6	B	12.0	B
Kapa'a Quarry Road at Kapa'a Quarry Access Road South				
Eastbound Right	10.1	B	9.4	A
Kapa'a Quarry Access Road at Kapa'a Access Road South				
Northbound Left	8.3	A	8.3	A
Kapa'a Quarry Access Road at Existing Industrial Access				
Southbound Left	9.9	A	6.5	A

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.

Segment Analysis for Existing Conditions

The results of the segment analysis are summarized in Table 8. The assumptions such as shoulder widths, lane widths, percent no passing zones and free flow speed used in the analysis assume worse-case conditions. The traffic characteristics were calculated from the results of the traffic counts at the intersection of Kapa'a Quarry Road at Kapa'a Quarry Access Road.

The conclusions of the segment analysis are:

1. Kapa'a Quarry Road north of Kapa'a Quarry Access Road operates at Level-of-Service C during the morning peak hour and Level-of-Service B during the afternoon peak hour.

2. Kapa'a Quarry Road south of Kapa'a Quarry Access Road operates at Level-of-Service B during both peak periods.

3. Kapa'a Quarry Access Road between Kapa'a Quarry Road and the entrance to the existing industrial park operates at Level-of-Service B during both peak periods.

Table 8 Results of Roadway Segment Level-of-Service Analysis - Existing Conditions

Road	Kapa'a Quarry Rd				Kapa'a Quarry Access Rd	
Location	North of Kapa'a Quarry Access Rd		South of Kapa'a Quarry Access Rd		West of Kapa'a Quarry Rd	
Time Period	AM	PM	AM	PM	AM	PM
Inputs and Assumptions						
Class	II		II		II	
Terrain	Level		Level		Level	
Shoulder Width (ft) (1)	0.0		0.0		0.0	
Lane Width (ft) (2)	11.0		11.0		11.0	
Segment Length (mi)	0.5		1.5		0.2	
Two Way Volume	460	405	360	360	235	220
Directional Split	65/35	63/37	60/40	53/47	62/38	68/32
Peak Hour Factor	0.90	0.97	0.90	0.97	0.90	0.97
% Trucks & Buses	14%	4%	8%	5%	29%	9%
% Recreational Vehicles	0%	0%	0%	0%	0%	0%
% No Passing Zone	100%	100%	100%	100%	100%	100%
Access Points	2		2		3	
Free Flow Speed (mph) (3)	25		25		25	
Results of Level-of-Service Analysis						
% Time Spent Following	58.2	53.1	52.0	51.8	44.5	43.1
Level-of-Service	C	B	B	B	B	B
Volume-to-Capacity Ratio	0.18	0.13	0.13	0.12	0.10	0.08

Notes:
(1) No shoulders were assumed as a worse-case condition.
(2) 11.0 foot lanes were assumed as a worse-case condition.
(3) 25 miles per hour is the minimum speed allowed for the segment analysis.

3. PROJECTED BACKGROUND TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate background traffic conditions. Background traffic conditions are defined as future traffic volumes without the proposed project.

Future traffic growth consists of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. This growth factor also considers traffic associated with minor, or small, projects for which no traffic data are available.

The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Design Year for Traffic Forecasts

The design, or horizon, year of a project is the future year for which background traffic conditions are estimated. A preliminary level-of-service analysis concluded that mitigation was required to accommodate 2026 background traffic projections and traffic generated by Phases A through D. A separate level-of-service analysis was therefore performed to determine if mitigation will be required before Phase D of the project is initiated. The analysis determined that no mitigation will be required to accommodate 2016 traffic projections and Phases A through C of the proposed project,

Background traffic projections were estimated for the design years of each phase: 2011, 2014, 2016 and 2026. However, as a level-of-service analysis was needed for 2016 and 2026 only, background traffic projections for these two design years are presented.

Background Traffic Growth

The background growth rates was estimated by comparing the traffic counts performed in 2009 to State of Hawaii Department of Transportation traffic count data for Mokapu Boulevard and Kalanianaole Highway in the vicinity of the study intersections. This analysis concluded that between 2005 and 2009, traffic volumes along Mokapu Boulevard increased 2% per year during the morning peak hour and 4% during the afternoon peak hour. Traffic along Kalanianaole Highway decreased 1% per during the morning peak hour and increased 1.2% per year during the afternoon peak hour. See Table 9. A growth rate 1% was used to estimate background growth rather than the negative growth rate calculated for morning traffic along Kalanianaole Highway was not used.

The average annual increase along Kapa'a Quarry Road was estimated to be 1.5% during the afternoon peak hour and 2.6% during the afternoon peak hour, which are the respective averages of the growth rates along Mokapu Boulevard and Kalanianaole Highway. Growth rates were not applied to traffic into and out of the quarry or the existing industrial park.

Table 9 Calculation of Background Growth Rate Along Mokapu Boulevard and Kalanianaole Highway[1]

	Mokapu Boulevard		Kalanianaole Highway	
Year	AM	PM	AM	PM
2005	2,014	1,967	3,241	3,521
2009	2,177	2,324	3,203	3,692
Calculated Growth Rate [2]	2.0%	4.0%	-1.0%	1.2%
Growth Rate [2] Used in Calculations	2.0%	4.0%	1.0%	1.2%

Notes:
1. Source: SDOT
2. Average annual growth rate per year.

The growth factors were calculated using the following formula:

$$F = (1 + i)^n$$

where F = Growth Factor
i = Average annual growth rate
n = Growth period, in years

Related Projects

The second component in estimating background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are under construction or have been approved for construction and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements.

No related project were identified that should be used in addition to the background growth rates discussed above.

2016 and 2026 Background Traffic Projections

Background traffic projections were calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects. The resulting 2016 background peak hour traffic projections are shown in Figures 8 and 9 and the 2026 background traffic projections are shown on Figures 10 and 11.

Projections of 2016 and 2026 peak hour heavy vehicles volumes are shown on Figures 12 and 13, respectively. The heavy vehicles projections were estimated using the existing vehicle classifications for through traffic along Kapa'a Quarry Road. It was assumed that vehicle classifications into and out of the quarry and the existing industrial park would not change.

2016 and 2026 Background Levels-of - Service Without Project Traffic

The results of the level-of-service analysis for 2016 and 2026 background conditions are summarized in Tables 10 and 11. For the signalized intersections and 2016 traffic conditions, all movements and lane groups operate at acceptable levels-of-service and all volume-to-capacity ratios are less than 1.00 during both peak periods. For 2026 conditions, all movements are acceptable during the morning peak hour. During the afternoon peak hour, several movements have volume-to-capacity ratios greater than 1.0. The results imply that the signalized intersections will operate at acceptable levels-of-service through 2016 without mitigation. Mitigation will be required to provide acceptable levels-of-service for 2026 traffic conditions, which implies that mitigation is required.

All controlled movements at the unsignalized intersections will operate at Level-of-Service C, or better. This implies that no mitigation is required to accommodate 2016 or 2026 background traffic projections at acceptable levels-of-service.

Table 10 2016 and 2026 Levels-of-Service of Signalized Intersections Without Project Traffic

	2016 Background Without Project						2026 Background Without Project					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Kapa'a Quarry Road at Mokapu Boulevard	***0.62***	***26.7***	***C***	***0.85***	***33.3***	***C***	***0.75***	***21.1***	***C***	***1.31***	***126.3***	***F***
Eastbound Left	0.21	13.3	B	0.03	7.9	A	0.33	13.5	B	0.06	12.0	B
Eastbound Thru & Right	0.72	29.6	C	0.94	34.8	C	0.87	25.1	C	1.34	196.8	F
Westbound Left	0.43	21.1	C	0.79	79.7	E	0.63	31.2	C	1.23	328.0	F
Westbound Thru	0.56	18.7	B	0.46	14.9	B	0.69	14.2	B	0.74	15.4	B
Westbound Right	0.04	12.0	B	0.00	10.1	B	0.04	7.5	A	0.00	8.0	A
Northbound Left & Thru	0.43	63.4	E	0.08	57.8	E	0.50	39.1	D	0.80	236.3	F
Northbound Right	0.05	80.0	F	0.24	88.0	F	0.05	29.5	C	0.62	145.6	F
Southbound Left, Thru & Right	0.15	48.9	D	0.03	46.9	D	0.15	30.7	C	0.03	46.3	D
Kapa'a Quarry Road at Kalanianaole Highway	***0.86***	***23.1***	***C***	***0.87***	***18.6***	***B***	***0.94***	***27.4***	***C***	***0.99***	***35.8***	***D***
Eastbound Left	0.36	68.2	E	0.55	73.2	E	0.68	98.1	F	0.52	64.2	E
Eastbound Thru	0.45	3.8	A	0.90	13.5	B	0.50	4.2	A	1.03	37.6	D
Westbound Thru	0.95	29.8	C	0.66	15.5	B	0.99	34.9	C	0.82	25.6	C
Westbound Right	0.12	7.6	A	0.08	8.3	A	0.13	5.9	A	0.12	12.0	B
Southbound Left	0.50	52.0	D	0.67	66.3	E	0.58	70.2	E	0.79	69.3	E
Southbound Right	0.08	61.0	E	0.04	58.5	E	0.24	64.1	E	0.05	58.3	E

NOTES:
1. V/C denotes ratio of volume to capacity. V/C ratios are not calculated for unsignalized intersections.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Table 11 2016 and 2026 Levels-of-Service of Unsignalized Intersections without Project Traffic

	2016 Background Without Project				2026 Background Without Project			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS
Kapa'a Quarry Road at Kapa'a Quarry Access Road North								
Eastbound Left	13.0	B	13.3	C	13.8	B	15.0	B
Kapa'a Quarry Road at Kapa'a Quarry Access Road South								
Eastbound Right	10.3	B	10.0	A	10.6	B	10.3	B
Kapa'a Quarry Access Road at Kapa'a Access Road South								
Northbound Left	10.0	B	10.0	A	10.3	B	0.96	A
Kapa'a Quarry Access Road at Existing Industrial Park								
Southbound Left	0.8	A	9.9	A	9.8	A	9.9	A

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.

2016 and 2026 Segment Levels-of - Service Without Project Traffic

The results of the segment analysis are summarized in Table 12. The assumptions such as shoulder widths, lane widths, percent no passing zones and free flow speed used in the analysis assume worse-case conditions. The traffic characteristics were calculated from the results of the traffic projection calculations.

The conclusion of the segment analysis is that all segments analyzed will operate at Level-of-Service B, or better.

Table 12 Results of Roadway Segment Level-of-Service Analysis - Background Conditions

	2016 Background Without Project						2026 Background Without Project					
Road	Kapa'a Quarry Rd				Kapa'a Quarry Access Rd		Kapa'a Quarry Rd				Kapa'a Quarry Access Rd	
Location	North of Kapa'a Quarry Access Rd		South of Kapa'a Quarry Access Rd		West of Kapa'a Quarry Rd		North of Kapa'a Quarry Access Rd		South of Kapa'a Quarry Access Rd		West of Kapa'a Quarry Rd	
Time Period	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Inputs and Assumptions												
Class	II		II		II		II		II		II	
Terrain	Level		Level		Level		Level		Level		Level	
Shoulder Width (ft) (1)	0.0		0.0		0.0		0.0		0.0		0.0	
Lane Width (ft) (2)	11.0		11.0		11.0		11.0		11.0		11.0	
Segment Length (mi)	0.5		1.5		0.2		0.5		1.5		0.2	
Two Way Volume	490	460	390	415	235	220	545	555	445	505	235	220
Directional Split	64/36	62/38	60/40	53/47	62/38	68/32	64/36	61/39	61/39	54/46	62/38	68/32
Peak Hour Factor	0.90	0.97	0.90	0.97	0.90	0.97	0.90	0.97	0.90	0.97	0.90	0.97
% Trucks & Buses	14%	10%	8%	5%	29%	22%	13%	4%	7%	4%	29%	22%
% Recreational Vehicles	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% No Passing Zone	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Access Points	2		2		3		2		2		3	
Free Flow Speed (mph) (3)	25		25		25		25		25		25	
Results of Level-of-Service Analysis												
% Time Spent Following	59.7	56.1	53.8	55.0	44.5	43.2	62.0	60.5	57.0	58.7	44.5	43.2
Level-of-Service	C	C	B	B	B	B	C	C	C	C	B	B
Volume-to-Capacity Ratio	0.19	0.16	0.14	0.14	0.10	0.08	0.19	0.18	0.16	0.17	0.10	0.08

Notes:
(1) No shoulders were assumed as a worse-case condition.
(2) 11.0 foot lanes were assumed as a worse-case condition.
(3) 25 miles per hour is the minimum speed allowed for the segment analysis.

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter discusses the methodology used to identify the traffic-related impacts of the proposed project. This chapter presents the generation, distribution and assignment of project generated traffic and the background plus project traffic projections. The results of the level-of-service analysis of background plus project conditions is presented in the following chapter.

Methodology

Generally, the process involves the determination of weekday peak-hour trips that would be generated by the proposed project, distribution and assignment of these trips on the approach and departure routes, and finally, determination of the levels-of-service at affected intersections and driveways subsequent to implementation of the project.

The proposed project will be developed in four phases (Phases A through D). The square footage in each of the phases and the anticipated year of completion of each phase is summarized in Table 13.

Table 13 Proposed Development Plan By Phase

Phase	Square Footage	Completion Year
A	80,000	2011
B	147,000	2014
C	81,000	2016
D	355,000	2026
Total	663,000	

Trip Generation of Proposed Development

It was assumed that the proposed development would have trip generation characteristics comparable to the existing industrial park. Trip generation rates based of the gross floor areas and the directional distribution of peak hour traffic was calculated from the traffic counts. These calculations as summarized in Table 14. As a comparison, the morning and afternoon peak hour generation rates for light industrial uses provided in *Trip Generation* are 0.92 and 0.98, respectively[3]. Therefore, the trip generation rates calculated for the existing industrial park are lower that the Institute of Transportation Engineers rates.

The trip generation calculations are summarized in Table 15.

Table 14 Trip Generation Rates Calculations

	AM Peak Hour			PM Peak Hour		
	Total In	Total Out	Total	Total In	Total Out	Total
Autos	111	41	152	49	143	192
Heavy Vehicles	26	41	67	14	6	20
Total Trips	137	82	219	63	149	212
Trips per TGSF(2)	0.54	0.32	0.87	0.25	0.59	0.84
Percent	63%	37%	100%	30%	70%	100%

Notes:
(1) The sum of inbound plus outbound was used to identify the peak hour. The peak hour of the inbound trips may not coincide with the peak hour of the outbound trips.
(2) Trip generation calculations are based on 253,000 gross square feet.

Table 15 Summary of Trip Generation Analysis

Time Period	Direction	Trips per TGSF or Percent	Phase A	Phase B	Phase C	Phase D	Total Project Trips
			80,000	147,000	81,000	355,000	
			Trips	Trips	Trips	Trips	
AM Peak Hour	Total	0.87	70	130	70	300	570
	In	63%	45	80	45	190	360
	Out	37%	25	50	25	110	210
PM Peak Hour	Total	0.84	65	125	65	290	545
	In	30%	20	35	20	85	160
	Out	70%	45	90	45	205	385

Notes:
(1) All numbers of trips are rounded to nearest five (5).

[3] Institute of Transportation Engineers, Trip Generation 7th Edition, 2003, Washington, D.C. pages 100 - 101

Trip Distribution and Assignments

The project-related trips were distributed based on the existing approach and departure routes as determined from the traffic counts. This assumes that the approach and departure patterns will be comparable to the existing traffic to and from the industrial park. The trip distributions are shown on Figure 14.

The peak hour trip assignments of the total vehicles generated by Phases A, B and C are shown as Figures 15 thru 16. Peak hour trip assignments of the total vehicle trips generated by Phases A, B, C and D are shown as Figures 17 and 18.

The peak hour trip assignments of the heavy vehicles generated by Phases A, B and C are shown as Figure 19. Peak hour trip assignments of the heavy vehicle trips generated by Phases A, B, C and D are shown as Figure 20.

Future Background Plus Project Projections

Background plus project traffic conditions is defined as future background traffic conditions plus project related traffic. The incremental difference between background and background plus project is the traffic impact of the project under study. Background plus project traffic projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the background peak hour traffic volumes presented in Chapter 3. The 2016 background plus the project traffic projections are shown on Figures 21 and 22. 2026 background plus project traffic projections are shown on Figures 23 and 24. 2016 and 2026 background plus project heavy vehicle projections are shown as Figure 25 and 25, respectively.

5. TRAFFIC IMPACT ANALYSIS

The purpose of this chapter is to summarize the results of the level-of-service analysis, which identifies the project-related impacts. In addition, any mitigation measures necessary and feasible are identified and other access, egress and circulation issues are discussed.

The impact of the project was assessed by analyzing the changes in levels-of-service at the study intersections. Mitigation measures are described in the following chapter.

The results of the level-of-service analysis for the driveways along Kapa'a Quarry Access Road are discussed separately from the study intersections.

Methodology for Level-of-Service Analysis

1. Synchro 6 was used to perform the level-of-service analysis.

2. We have used the Institute of Transportation Engineers standard that a Level-of-Service D is the minimum acceptable level-of-service and that the criteria is applicable to the overall intersection rather than each controlled lane group. Side street approaches and minor movements can operate a Level-of-Service E or F for short periods. If project generated traffic causes the level-of-service of the overall intersection to drop below Level-of-Service D, then mitigation should be provided to improve the level-of-service to Level-of-Service C or better. If the Level-of-Service is E or F without project generated traffic and project generated traffic causes the delay to increase, then mitigation should be provided to improve the delay to be equal to or less than the delay for background without project conditions.

3. As the *Highway Capacity Manual* defines level-of-service by delay, we have used the same definitions.

Results of the Level-of-Service Analysis

The level-of-service analysis for the study intersections was performed for 2016 and 2026 background plus project conditions. The level-of-service analysis was performed using the existing lane configurations and traffic signals timing for the existing study intersections.

The results of the level-of-service analysis of the signalized intersections are summarized in Table 16. And the results for the unsignalized intersections is summarized in Table 17.

Table 16 2016 and 2026 Levels-of-Service of Signalized Intersections With Project Traffic

	2016 Background Plus Project						2026 Background Plus Project					
	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
Intersection	V/C(1)	Delay(2)	LOS(3)	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Kapa'a Quarry Road at Mokapu Boulevard	***0.70***	***29.2***	***C***	***0.94***	***39.5***	***D***	***0.96***	***31.1***	***C***	***1.44***	***149.4***	***F***
Eastbound Left	0.23	14.9	B	0.03	7.9	A	0.33	13.5	B	0.06	12.0	B
Eastbound Thru & Right	0.78	32.6	D	0.95	36.7	D	0.98	37.8	D	1.37	196.8	F
Westbound Left	0.55	36.6	D	0.89	97.8	F	0.91	60.9	E	1.48	328.0	F
Westbound Thru	0.54	16.2	B	0.46	14.9	B	0.69	14.2	B	0.74	15.4	B
Westbound Right	0.04	10.5	B	0.00	10.1	B	0.04	7.5	A	0.00	8.0	A
Northbound Left & Thru	0.61	69.5	E	0.92	103.7	F	0.89	69.2	E	1.33	236.3	F
Northbound Right	0.07	75.9	E	0.48	72.6	E	0.10	30.1	C	1.10	145.6	F
Southbound Left, Thru & Right	0.15	49.0	D	0.04	47.0	D	0.17	31.2	C	0.03	46.3	D
Kapa'a Quarry Road at Kalanianaole Highway	***0.87***	***19.6***	***B***	***0.89***	***20.0***	***B***	***0.99***	***30.6***	***E***	***1.03***	***41.1***	***D***
Eastbound Left	0.71	99.3	F	0.66	80.2	F	1.09	182.8	F	0.71	73.9	E
Eastbound Thru	0.45	3.8	A	0.90	13.5	B	0.50	4.2	A	1.03	37.6	D
Westbound Thru	0.91	21.8	C	0.66	15.5	B	0.99	34.9	C	0.82	25.6	C
Westbound Right	0.15	6.3	A	0.09	8.4	A	0.21	6.5	A	0.15	12.3	B
Southbound Left	0.57	57.0	E	0.82	75.1	E	0.71	75.9	E	1.07	123.3	F
Southbound Right	0.15	56.0	E	0.05	46.6	D	0.41	69.5	E	0.07	57.4	E

NOTES:
1. V/C denotes ratio of volume to capacity. V/C ratios are not calculated for unsignalized intersections.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Table 17 2016 and 2026 Levels-of-Service of Unsignalized Intersections with Project Traffic

	2016 Background Plus Project				2026 Background Plus Project			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection and Movement	Delay 1	LOS 2	Delay	LOS	Delay	LOS	Delay	LOS
Kapa'a Quarry Road at Kapa'a Quarry Access Road North								
Eastbound Left	15.8	C	17.4	C	25.2	D	49.9	E
Kapa'a Quarry Road at Kapa'a Quarry Access Road South								
Eastbound Right	10.6	B	10.5	B	11.3	B	11.6	B
Kapa'a Quarry Access Road at Kapa'a Access Road South								
Northbound Left	12.9	B	12.4	B	22.3	C	15.8	c

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.

The conclusions of the level-of-service analysis are:

2016 Traffic Conditions

1. The intersection of Mokapu Boulevard at Kapa'a Quarry Road will operate at Level-of-Service C during the morning peak hour and Level-of-Service D during the afternoon peak hour. All lane groups have volume-to-capacity ratios less than 1.0. No mitigation is required.

2. The intersection of Kalanianaole Highway at Kapa'a Quarry Road will operate at Level-of-Service B during the both peak hours. All lane groups have volume-to-capacity ratios less than 1.0. No mitigation is required.

3. All lane groups at the unsignalized intersections will operate at Level-of-Service C, or better.

2026 Traffic Conditions

1. During the morning peak hour, the intersection of Kapa'a Quarry Road at Mokapu Boulevard will operate at Level-of-Service C and all movements have volume-to-capacity ratios less than 1.00. During the afternoon peak hour, the intersection will operate at Level-of-Service F and the volume-to-capacity ratio is 1.44. This implies that mitigation will be required to accommodate 2026 background and project generated traffic.

2. The intersection of Kapa'a Quarry Road at Kalanianaole Highway will operate at Level-of-Service E during the morning and Level-of-Service D during afternoon peak hour. The volume-to-capacity ratios are 0.99 and 1.44 respectively. Mitigation is required. It should be noted that the problem movements are the eastbound and westbound through movements. The volume-to-capacity ratios of these movements are the same without and with project generated traffic. The proposed project adds no traffic to these movements. The reduced level-of-service is the result of increased background traffic as a result of background growth

3. During the afternoon peak hour, left turns at the intersection eastbound Kapa'a Quarry Access Road to northbound Kapa'a Quarry Road will operate at Level-of-Service E, which implies long delays and long queues. Mitigation should be implemented.

Project Driveways

The results of the Level-of-Service analysis of the project driveways are summarized in Table 18. It was assumed that all driveways will be unsignalized and that there will be no separate left or turn lanes into or out of the project, respectively. All movements will operate at Level-of-Service C, or better, without mitigation.

Table 18 2016 and 2026 Levels-of-Service of Project Driveways

	2016 Background Plus Project				2026 Background Plus Project			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS
Kapa'a Quarry Access Road at Existing Industrial Park and Phase A								
Eastbound Left & Thru	0.0	A	0.0	A	0.0	A	0.0	A
Southbound Left & Right	12.3	B	12.8	B	12.4	B	12.8	B
Kapa'a Quarry Access Road at Phases B and C								
Eastbound Left & Thru	0.0	A	0.0	A	0.0	A	0.0	A
Southbound Left & Right	9.7	A	9.7	A	9.4	B	9.7	A
Kapa'a Quarry Access Road at Phase D								
Eastbound Left & Thru					0.0	A	0.0	A
Southbound Left & Right					18.3	C	20.8	C

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.

2016 and 2026 Segment Levels-of - Service With Project Traffic

The results of the segment analysis are summarized in Table 19. The assumptions such as shoulder widths, lane widths, percent no passing zones and free flow speed used in the analysis assume worse-case conditions. The traffic characteristics were calculated from the results of the traffic projection calculations.

The conclusions of the segment analysis are:

1. For 2016 conditions with traffic generated by Phases A, B and C, all roadway segments will operate at Level-of-Service C.

2. For 2016 conditions with traffic generated by Phases A, B, C and D, Kapa'a Quarry Road north of Kapa'a Quarry Access Road will operate at Level-of-Service D during the morning peak hour. All the remaining segments will operate at Level-of-Service C.

Table 19 Results of Roadway Segment Level-of-Service Analysis - With Project Traffic

	2016 Background Without Project						2026 Background Without Project					
Road	Kapa'a Quarry Rd				Kapa'a Quarry Access Rd		Kapa'a Quarry Rd				Kapa'a Quarry Access Rd	
Location	North of Kapa'a Quarry Access Rd		South of Kapa'a Quarry Access Rd		West of Kapa'a Quarry Rd		North of Kapa'a Quarry Access Rd		South of Kapa'a Quarry Access Rd		West of Kapa'a Quarry Rd	
Time Period	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Inputs and Assumptions												
Class	II		II		II		II		II		II	
Terrain	Level		Level		Level		Level		Level		Level	
Shoulder Width (ft) (1)	0.0		0.0		0.0		0.0		0.0		0.0	
Lane Width (ft) (2)	11.0		11.0		11.0		11.0		11.0		11.0	
Segment Length (mi)	0.5		1.5		0.2		0.5		1.5		0.2	
Two Way Volume	665	545	490	520	510	450	915	890	645	720	805	760
Directional Split	63/37	61/39	55/45	51/49	62/38	73/27	63/37	67/33	52/48	50/50	63/37	70/30
Peak Hour Factor	0.90	0.97	0.90	0.97	0.90	0.97	0.90	0.97	0.90	0.97	0.90	0.97
% Trucks & Buses	18%	7%	13%	6%	31%	11%	21%	6%	14%	6%	31%	10%
% Recreational Vehicles	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% No Passing Zone	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Access Points	2		2		3		2		2		3	
Free Flow Speed (mph) (3)	25		25		25		25		25		25	
Results of Level-of-Service Analysis												
% Time Spent Following	64.2	60.2	59.7	59.5	61.0	57.5	71.8	68.8	64.4	64.9	68.7	65.0
Level-of-Service	C	C	C	C	C	C	D	C	C	C	C	C
Volume-to-Capacity Ratio	0.24	0.18	0.19	0.17	0.19	0.16	0.33	0.29	0.23	0.23	0.30	0.25

Notes:
(1) No shoulders were assumed as a worse-case condition.
(2) 11.0 foot lanes were assumed as a worse-case condition.
(3) 25 miles per hour is the minimum speed allowed for the segment analysis.

Mitigation Measures for 2026 Conditions

Mitigation should be considered for two of the study intersections to mitigation anticipated 2026 traffic conditions. No mitigation is required to accommodate 2016 traffic conditions. The following is a summary of the recommended mitigation measures for 2026 conditions.

Kapa'a Quarry Road at Mokapu Boulevard

This intersection will operate at acceptable levels-of-service during the morning peak hour, but during the afternoon peak hour, the volume-to-capacity ratio and levels-of-service are unacceptable. The addition of a an eastbound to southbound right turn and deceleration lane will improve the afternoon volume-to-capacity ratio 0.81 and all volume-to-capacity ratios will be less than 1.00.

Kapa'a Quarry Road at Kalanianaole Highway

This intersection will operate at Level-of-Service E during both peak periods without mitigation. The addition of a second eastbound left turn lane will mitigate the unacceptable level-of-service for this movement. However, the eastbound and westbound through movements will still be overcapacity. The proposed project adds no traffic to these through movements. The low levels-of-service are the result of background traffic growth.

Other Recommendations

1. The project should provide shuttle bus service along Kapa'a Quarry Road between the project and Mokapu Boulevard and Kalanianaole Highway to provide transportation for employees that can use The Bus, which has routes along each of these roadways.

2. No additional improvements are required to accommodate project traffic volumes along Kapa'a Quarry Access Road and the projected traffic volumes of traffic between the various phases is minimal. However, the background traffic along Kapa'a Quarry Road is mostly larger, heavy vehicles. As such, the turning movements into and out of the various phases will have an adverse impact on there through vehicles. Accordingly, the feasibility of a "frontage" road connection the phases should be investigated. Figure 26 show possible location for connections between the Phases. If this does not prove to be feasible, left turn storage lanes should be provided.

3. It is understood from the Department of Planning and Permitting that a sidewalk will be required along Kapa'a Quarry Access Road.

4. It is recommended that an update of this TIAR be performed after completion of Phase C and prior to Phase D. As the mitigation is required to accommodate 2026 conditions. The purpose of the updated TIAR would be to confirm the background traffic growth estimates, the confirm the trip generation rates calculated for the industrial park and the quantify the reduction of peak hour traffic as a result of the traffic management plan.

REFERENCES

1. Transportation Research Board, Highway Capacity Manual (HCM), 2000

2. Institute of Transportation Engineers, Trip Generation 7th Edition, 2003

3. Institute of Transportation Engineers, Trio Generation Handbook 2nd Edition, 2004

4. Institute of Transportation Engineers, Transportation Impact Analyses for Site Development: A Recommended Practice, 2006

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Figure 27	Approximate Locations of Internal Connections

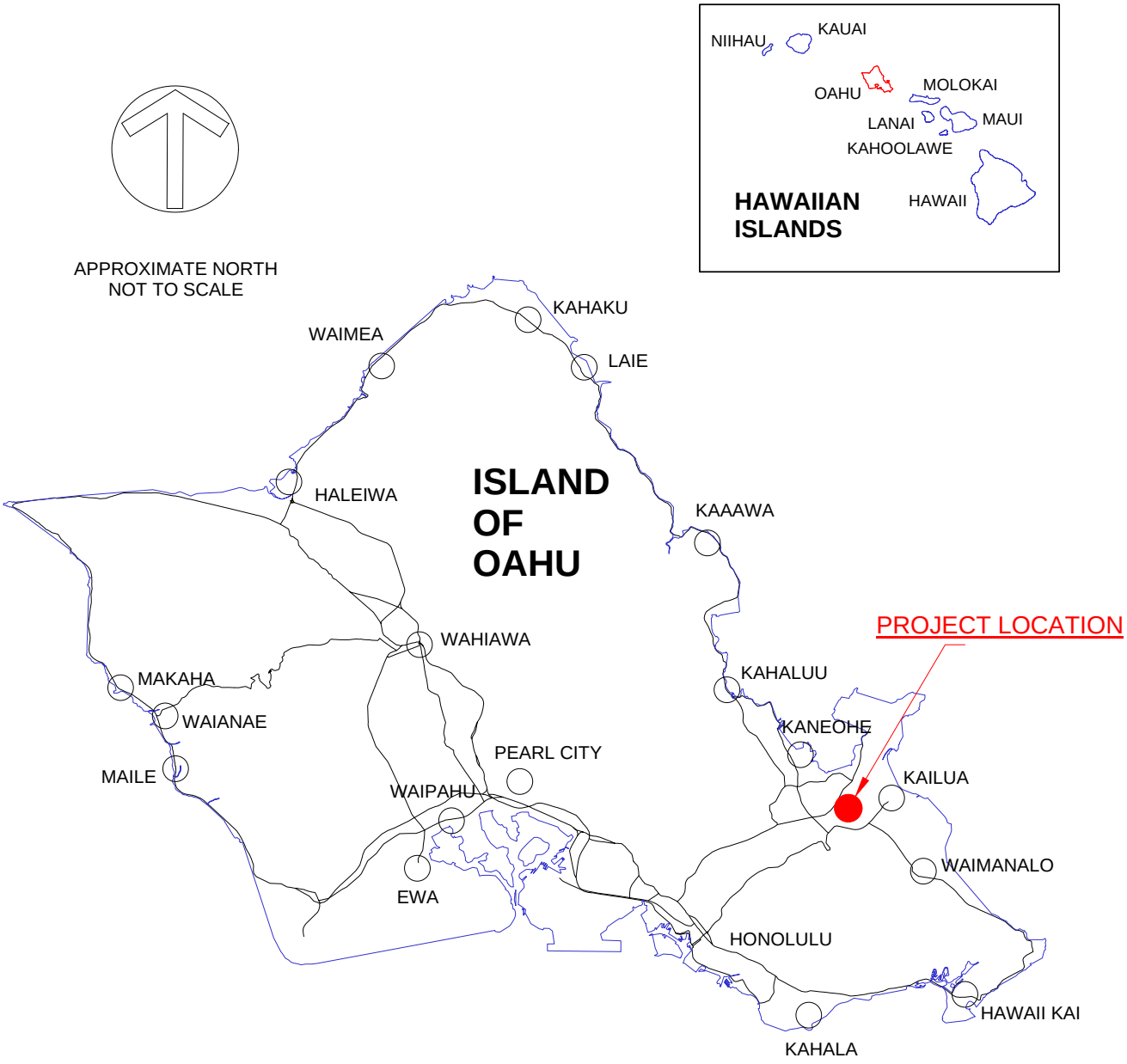


Figure 1
PROJECT LOCATION ON OAHU

Source:
Marc M. Siah & Associates, Inc.
Draft Environmental Assessment for Kapa'a Light Industrial Park
November 2008

Figure 2
VICINITY MAP

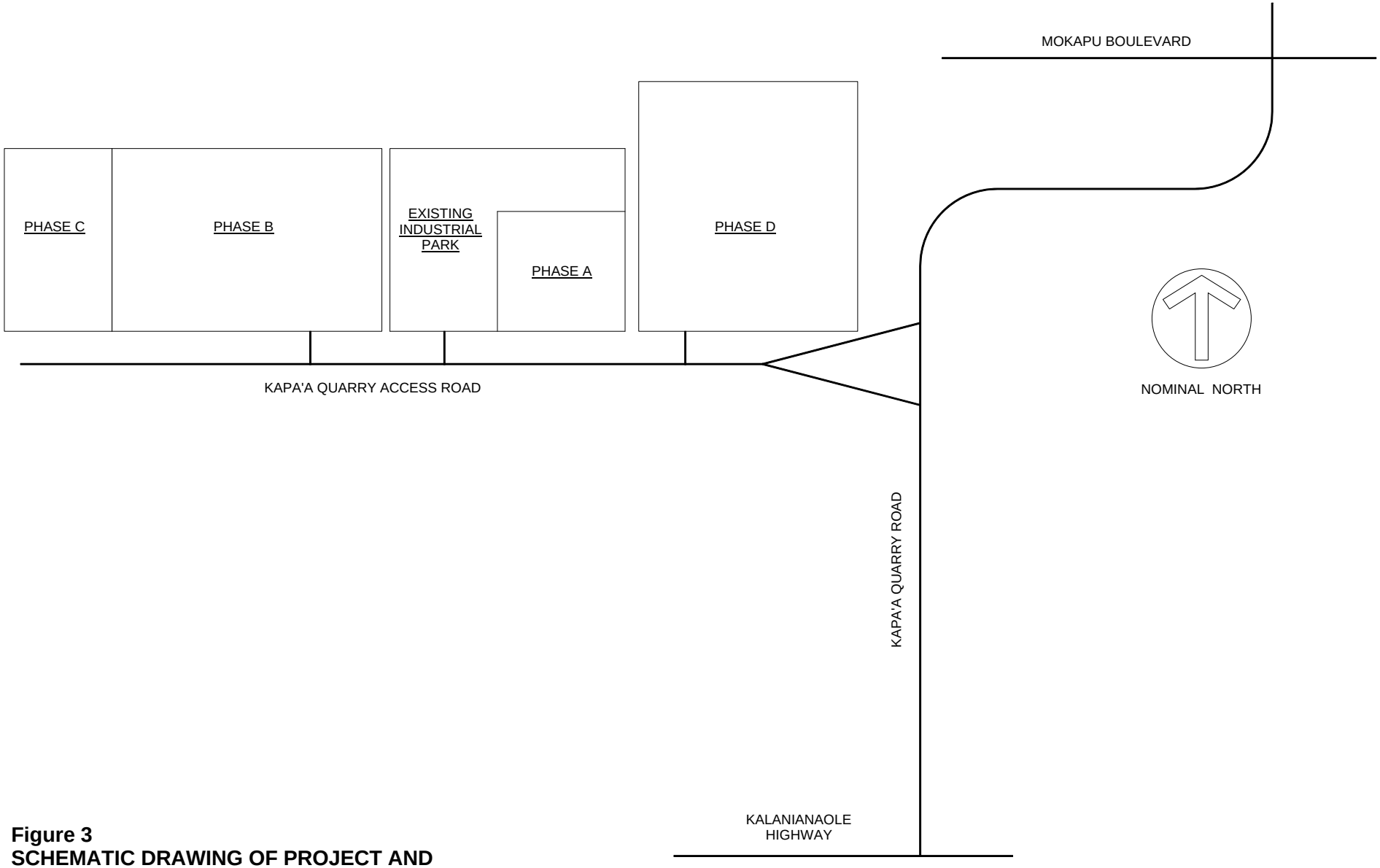


Figure 3
SCHEMATIC DRAWING OF PROJECT AND ADJACENT ROADWAY NETWORK

Phillip Rowell and Associates

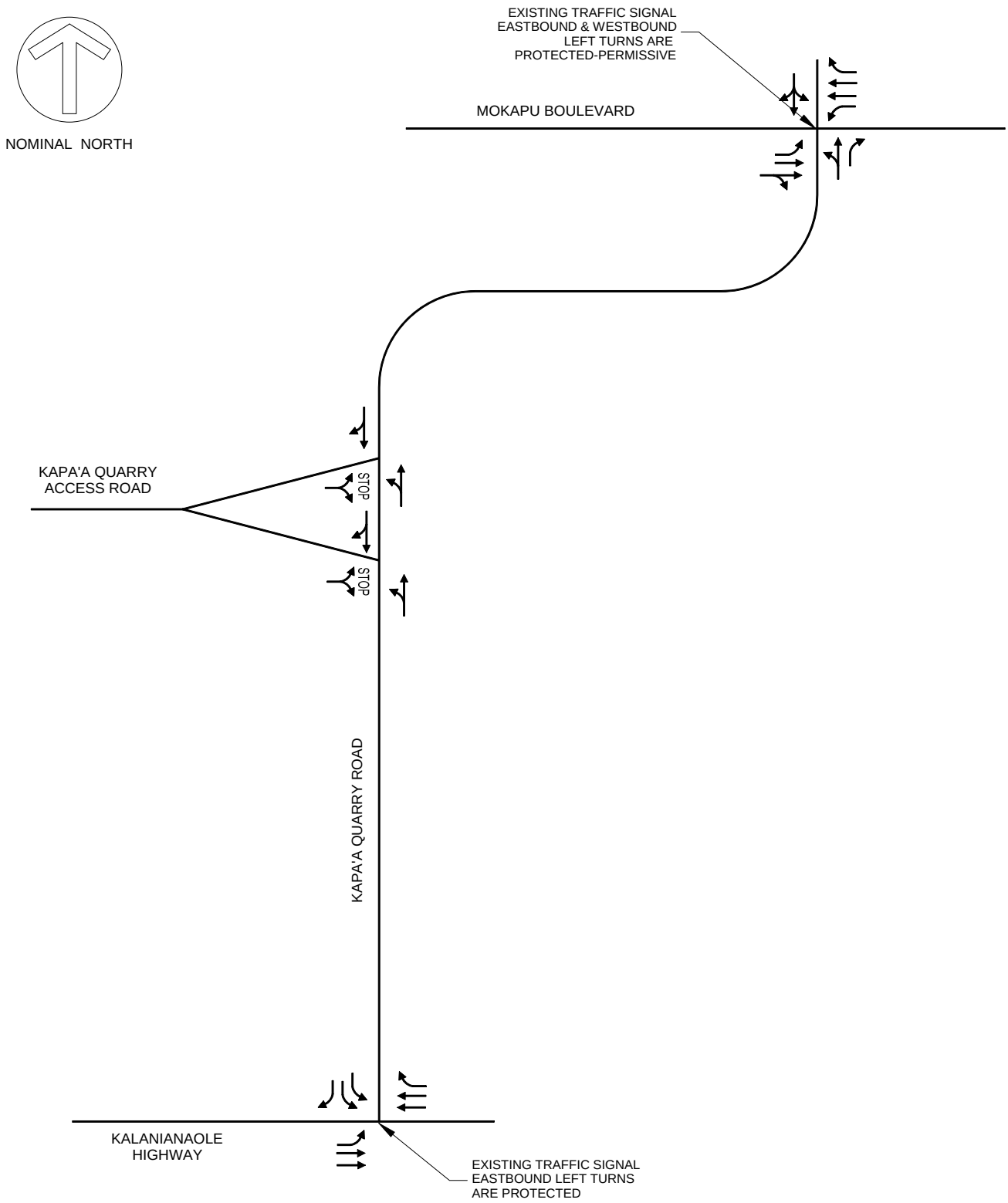
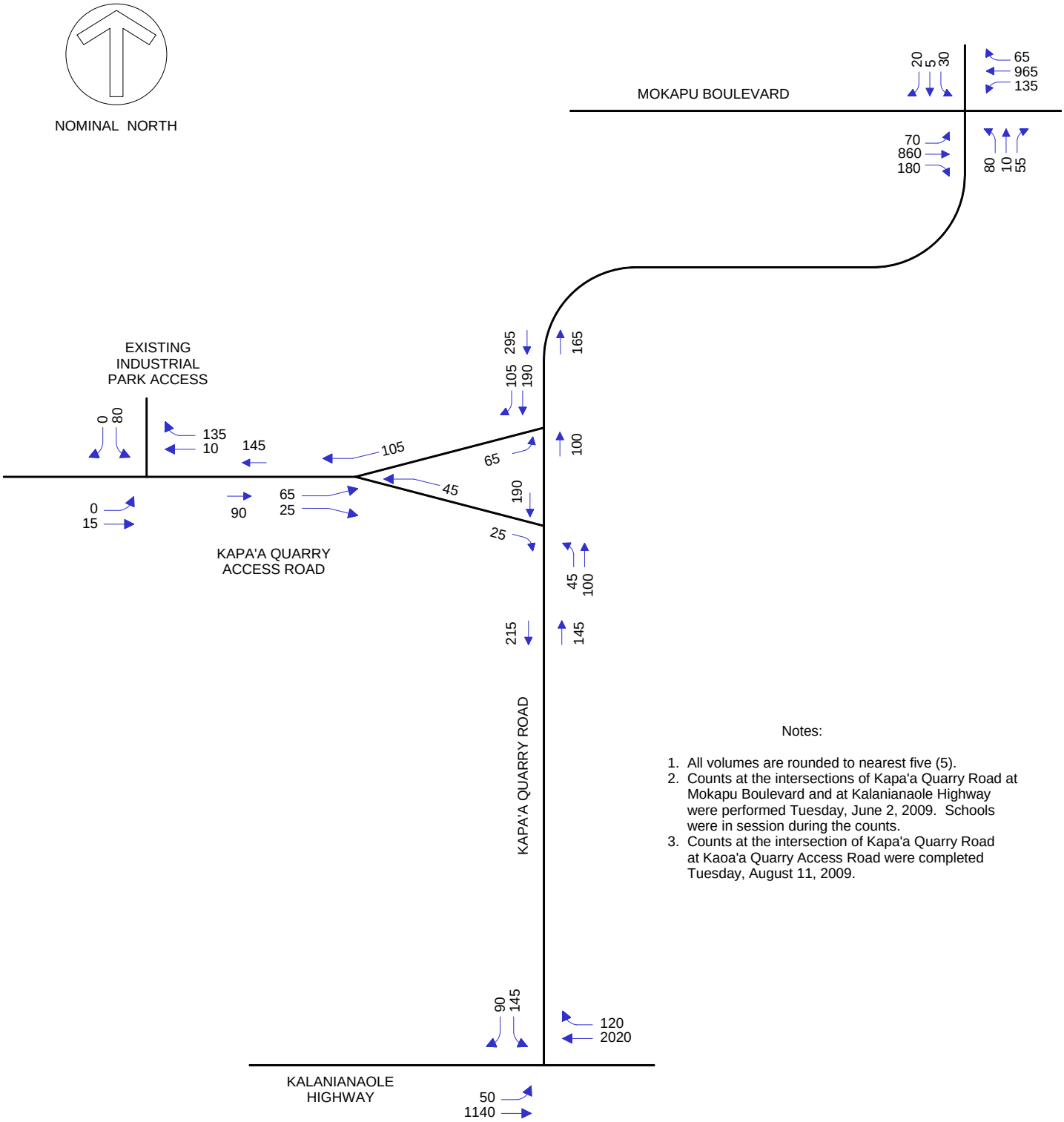


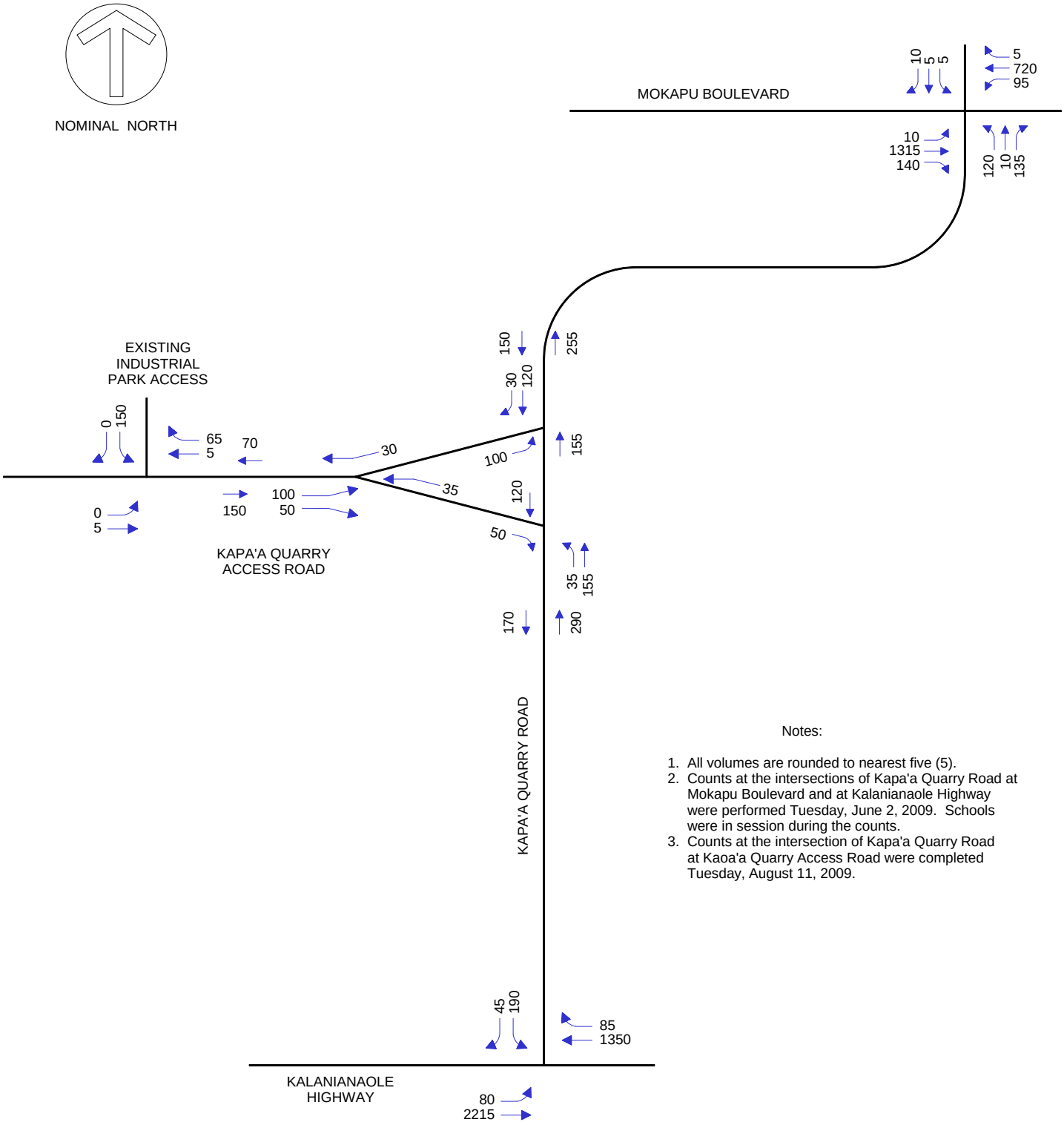
Figure 4
EXISTING LANE CONFIGURATION AND RIGHT-OF-WAY CONTROLS



Notes:

1. All volumes are rounded to nearest five (5).
2. Counts at the intersections of Kapa'a Quarry Road at Mokapu Boulevard and at Kalanianaole Highway were performed Tuesday, June 2, 2009. Schools were in session during the counts.
3. Counts at the intersection of Kapa'a Quarry Road at Kaoa'a Quarry Access Road were completed Tuesday, August 11, 2009.

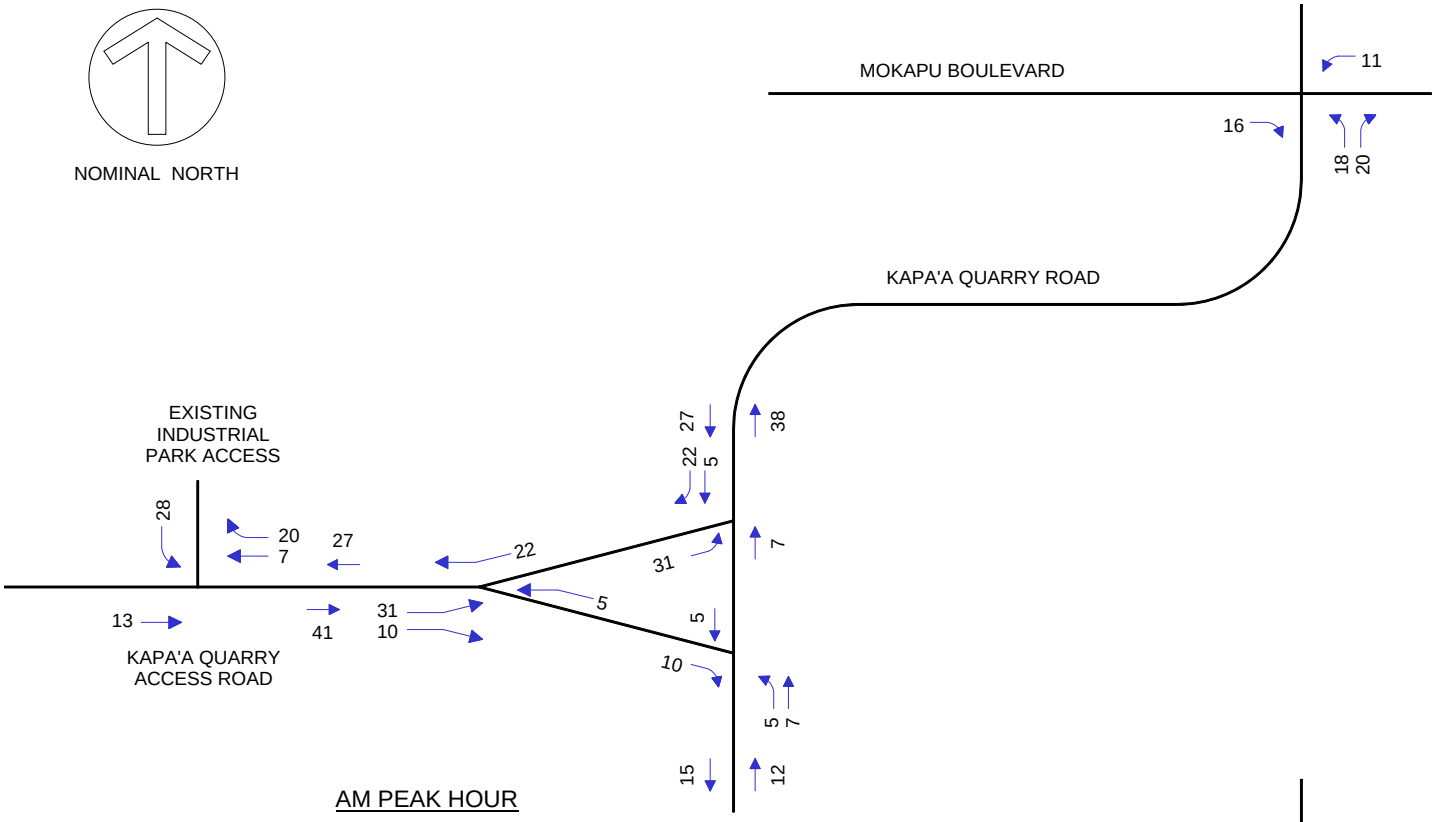
Figure 5
EXISTING (2009) AM PEAK HOUR TRAFFIC VOLUMES

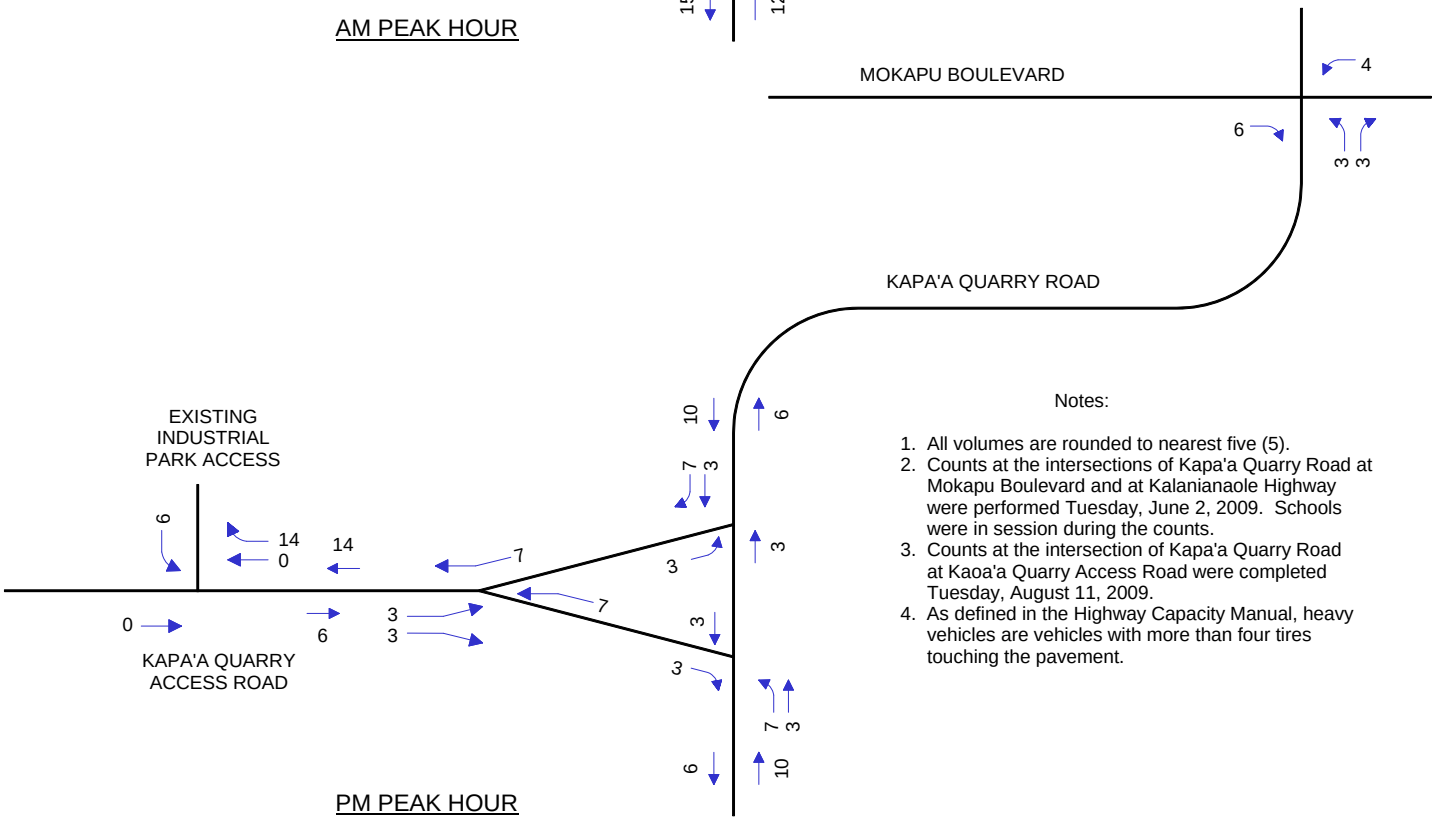


Notes:

1. All volumes are rounded to nearest five (5).
2. Counts at the intersections of Kapa'a Quarry Road at Mokapu Boulevard and at Kalanianaole Highway were performed Tuesday, June 2, 2009. Schools were in session during the counts.
3. Counts at the intersection of Kapa'a Quarry Road at Kaoa'a Quarry Access Road were completed Tuesday, August 11, 2009.

Figure 6
EXISTING (2009) PM PEAK HOUR TRAFFIC VOLUMES

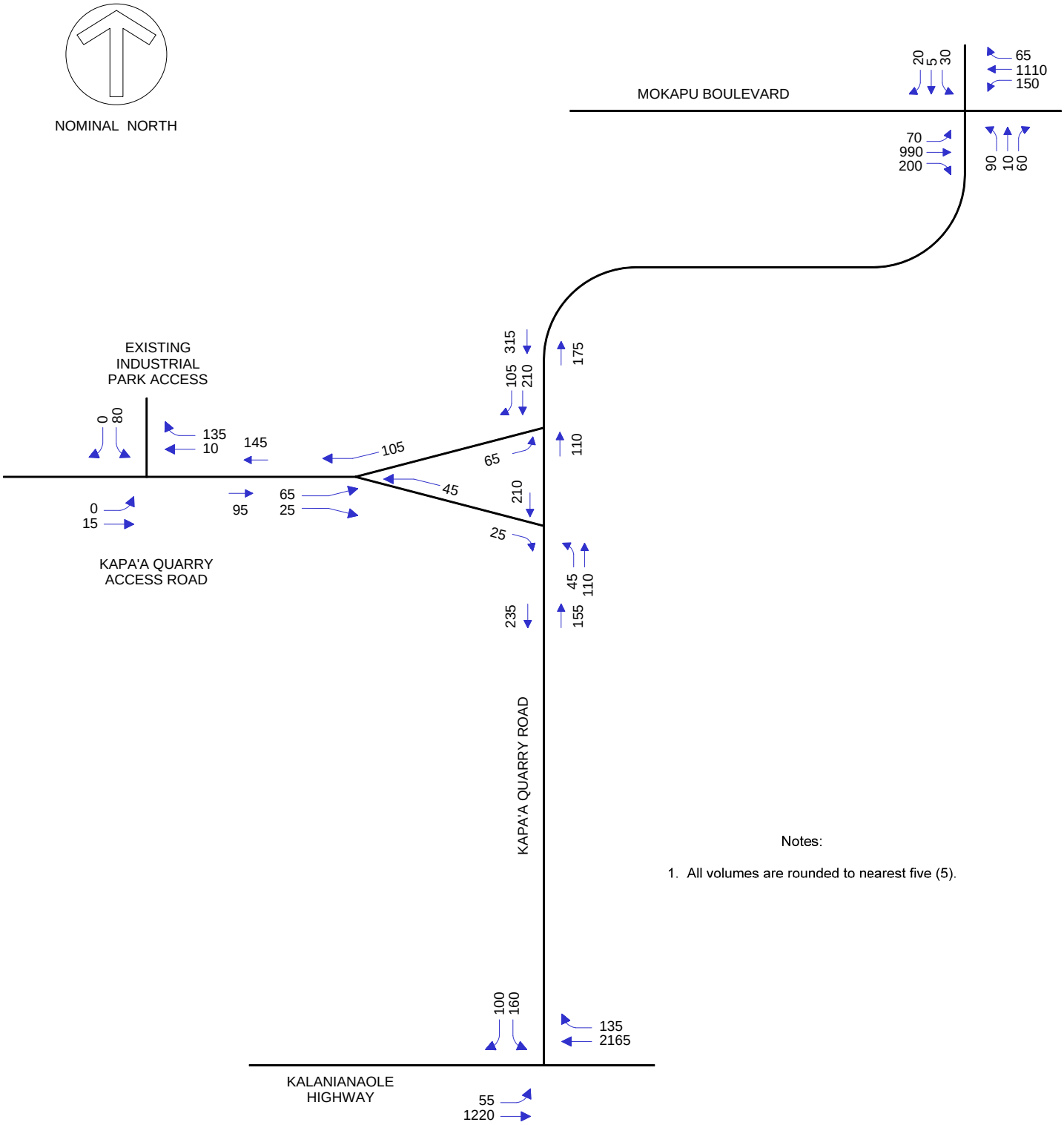




Notes:

1. All volumes are rounded to nearest five (5).
2. Counts at the intersections of Kapa'a Quarry Road at Mokapu Boulevard and at Kalanianaole Highway were performed Tuesday, June 2, 2009. Schools were in session during the counts.
3. Counts at the intersection of Kapa'a Quarry Road at Kaoa'a Quarry Access Road were completed Tuesday, August 11, 2009.
4. As defined in the Highway Capacity Manual, heavy vehicles are vehicles with more than four tires touching the pavement.

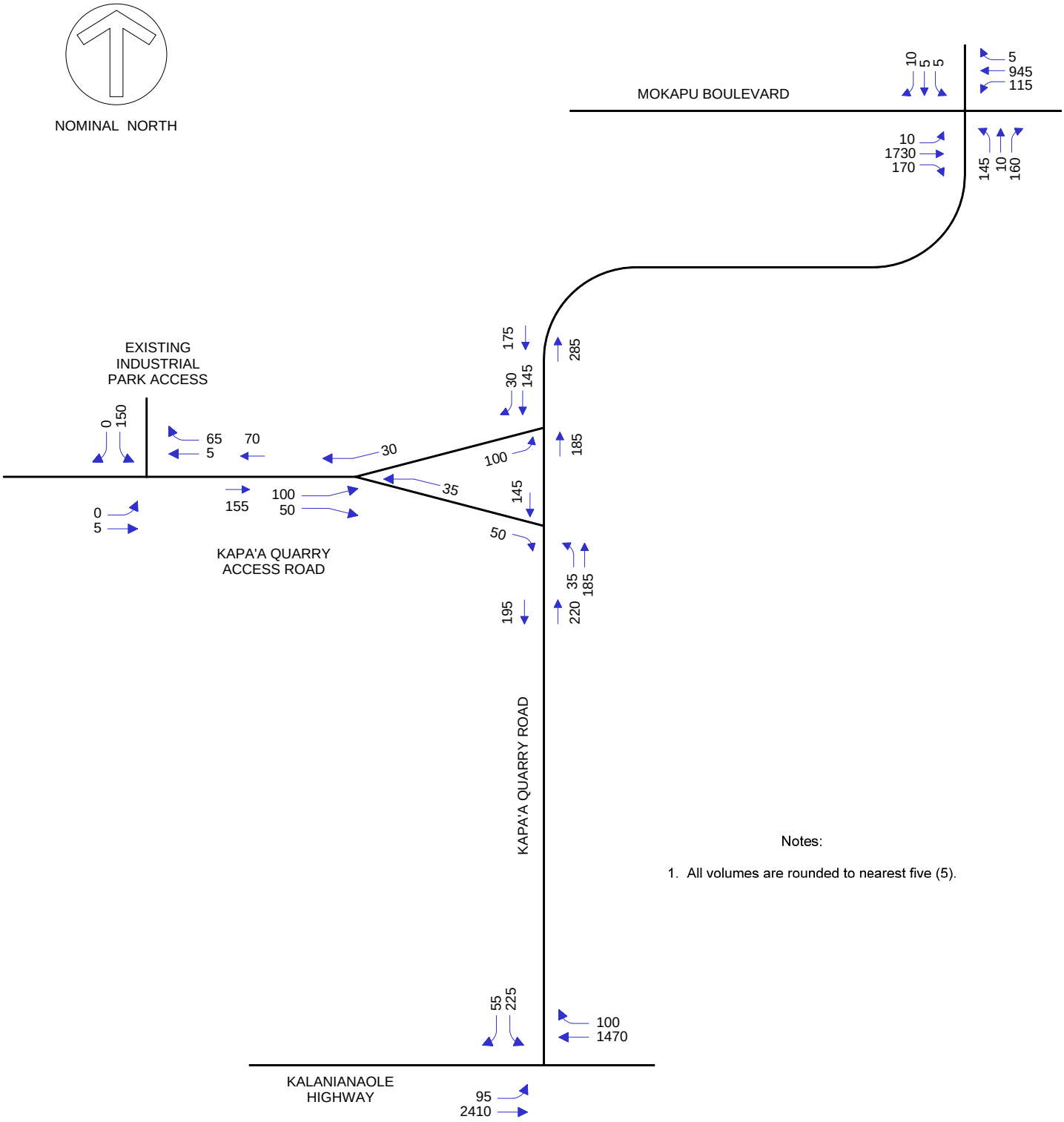
Figure 7
EXISTING (2009) HEAVY VEHICLE PEAK HOUR VOLUMES



Notes:

1. All volumes are rounded to nearest five (5).

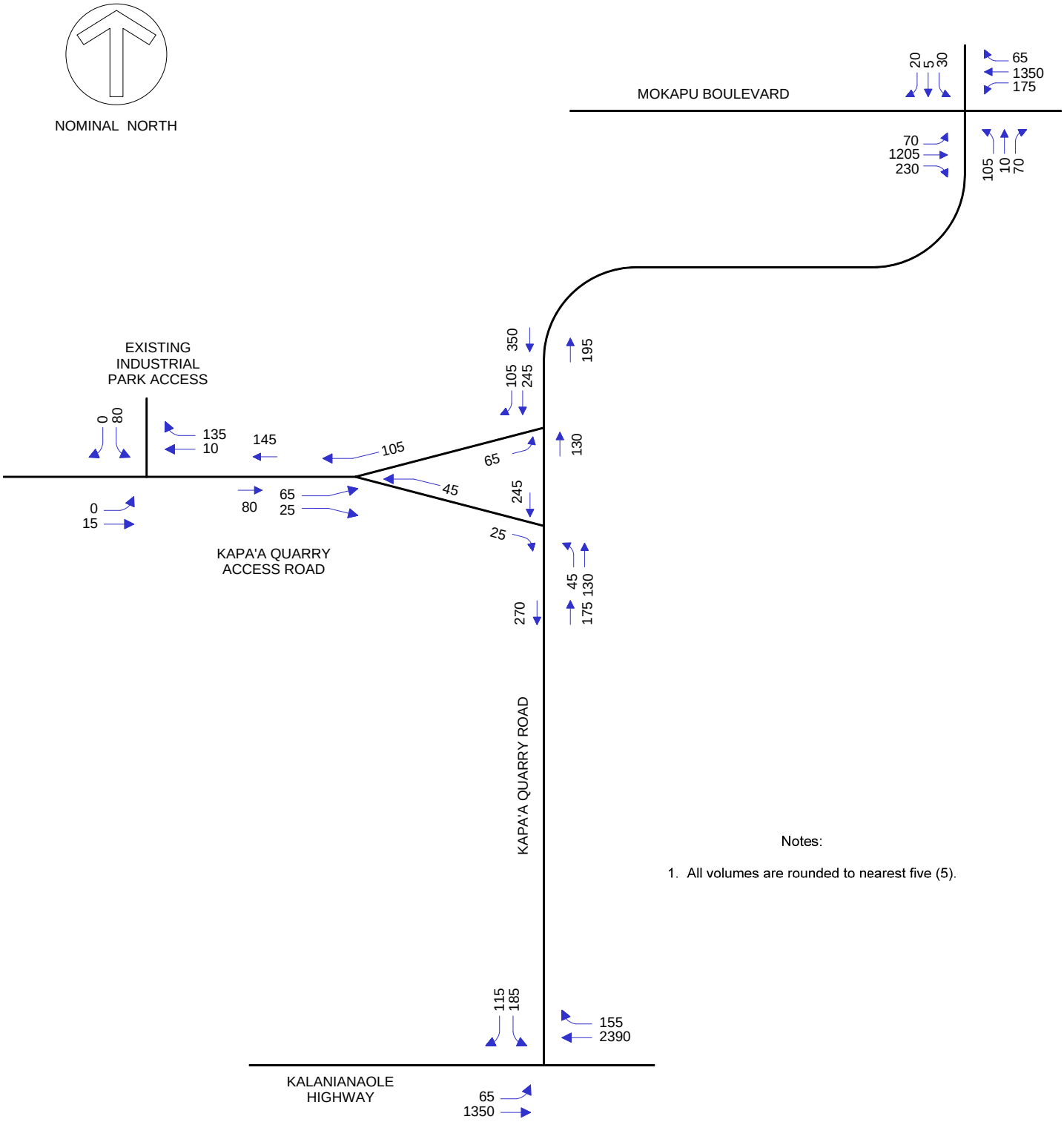
Figure 8
2016 BACKGROUND AM PEAK HOUR TRAFFIC PROJECTIONS



Notes:

1. All volumes are rounded to nearest five (5).

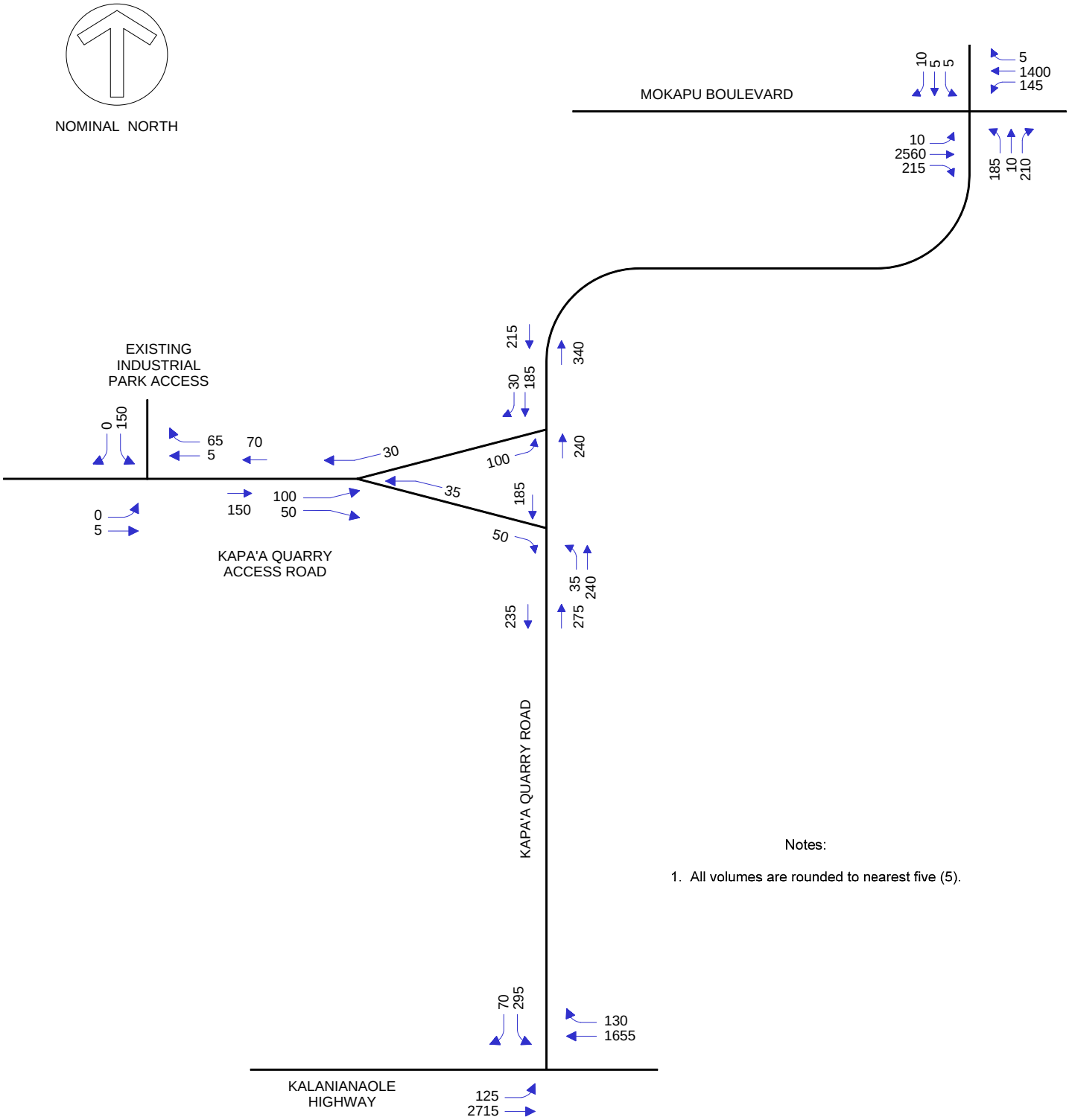
Figure 9
2016 BACKGROUND PM PEAK HOUR TRAFFIC PROJECTIONS



Notes:

1. All volumes are rounded to nearest five (5).

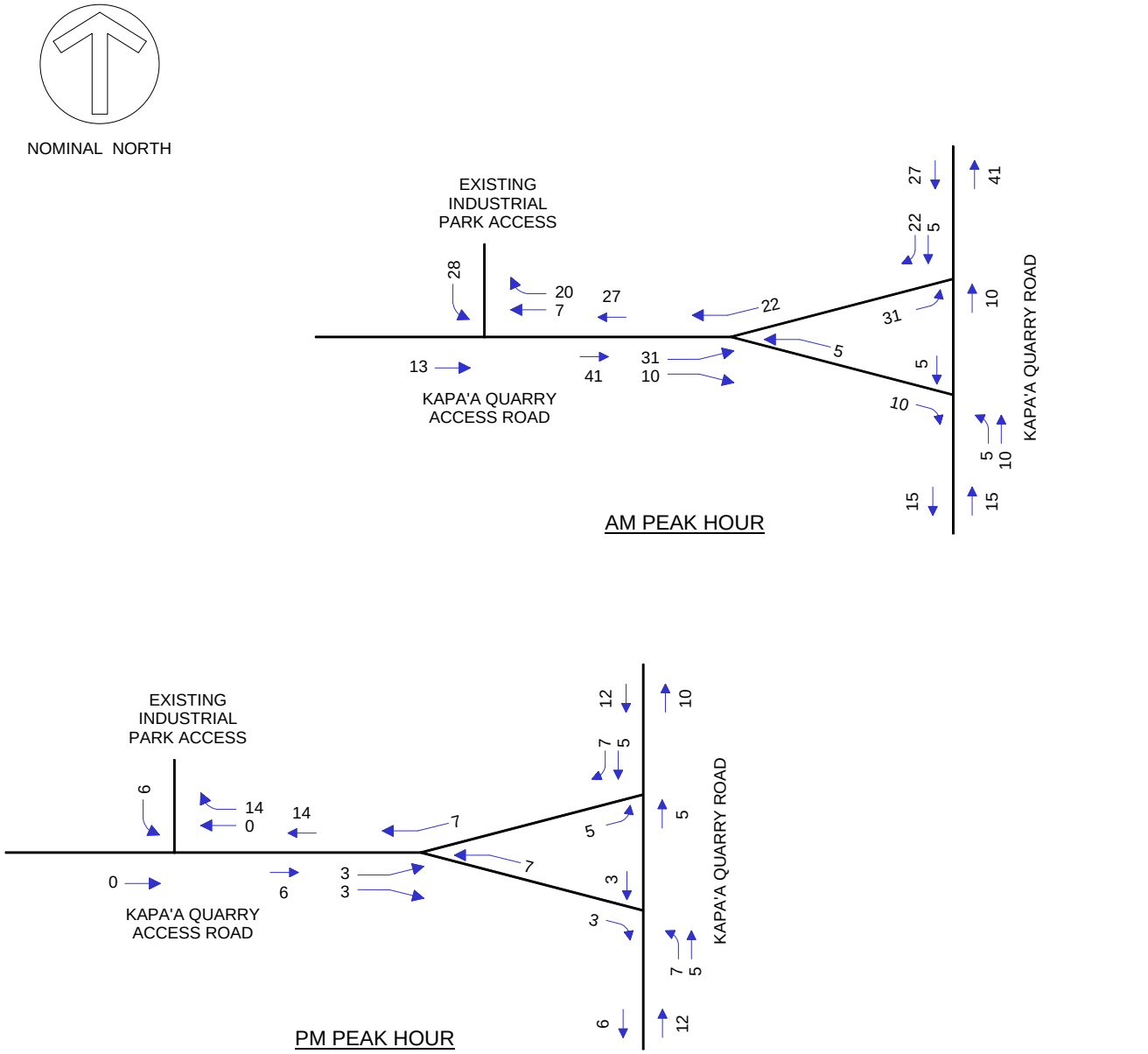
Figure 10
2026 BACKGROUND AM PEAK HOUR TRAFFIC PROJECTIOS



Notes:

1. All volumes are rounded to nearest five (5).

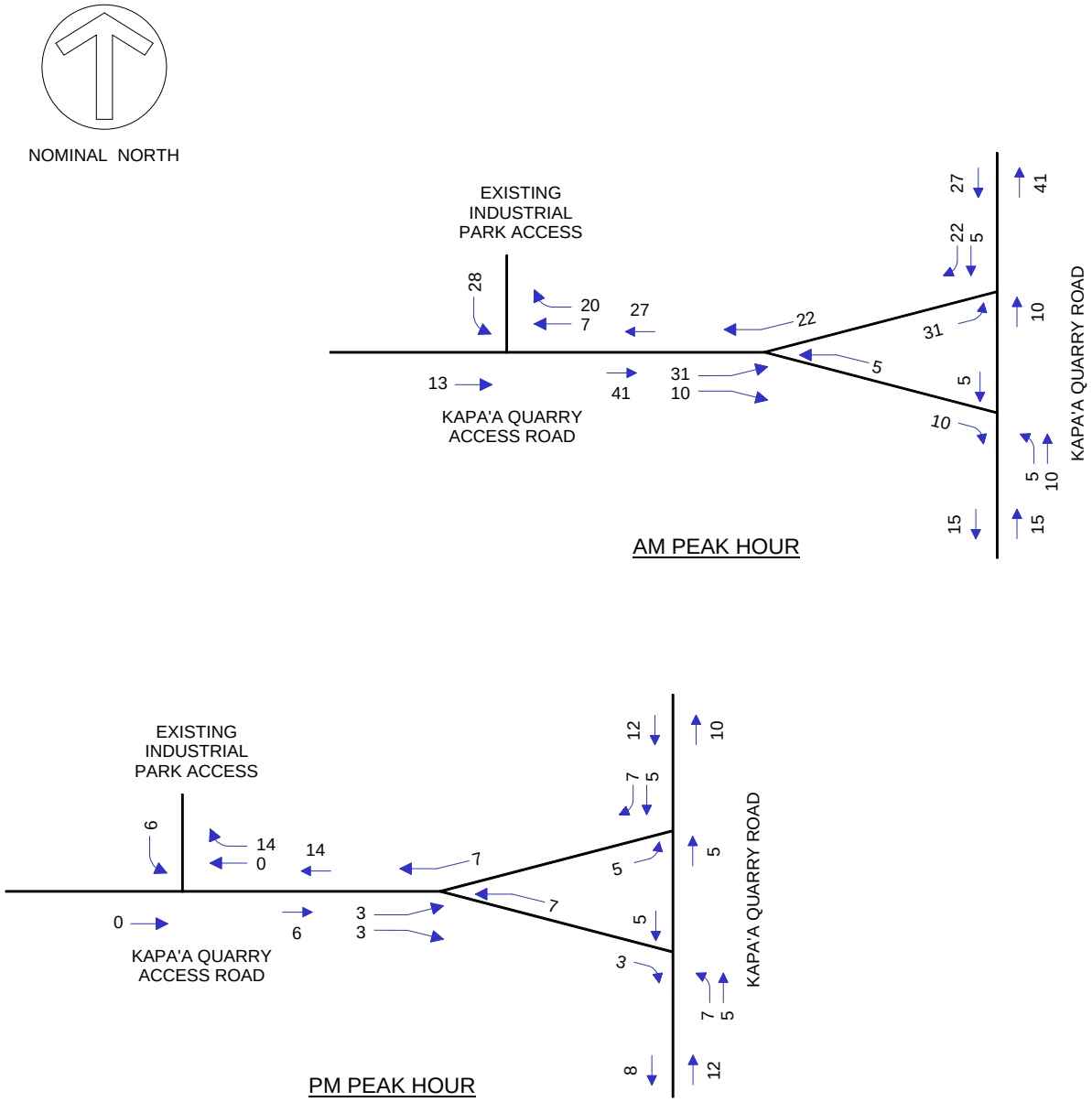
Figure 11
2026 BACKGROUND PM PEAK HOUR TRAFFIC PROJECTIONS



Notes:

1. All volumes are rounded to nearest five (5).
2. As defined in the Highway Capacity Manual, heavy vehicles are vehicles with more than four tires touching the pavement.

Figure 12
2016 BACKGROUND HEAVY VEHICLE PEAK HOUR PROJECTIONS



Notes:

1. All volumes are rounded to nearest five (5).
2. As defined in the Highway Capacity Manual, heavy vehicles are vehicles with more than four tires touching the pavement.

Figure 13
2026 BACKGROUND HEAVY VEHICLE PEAK HOUR PROJECTIONS

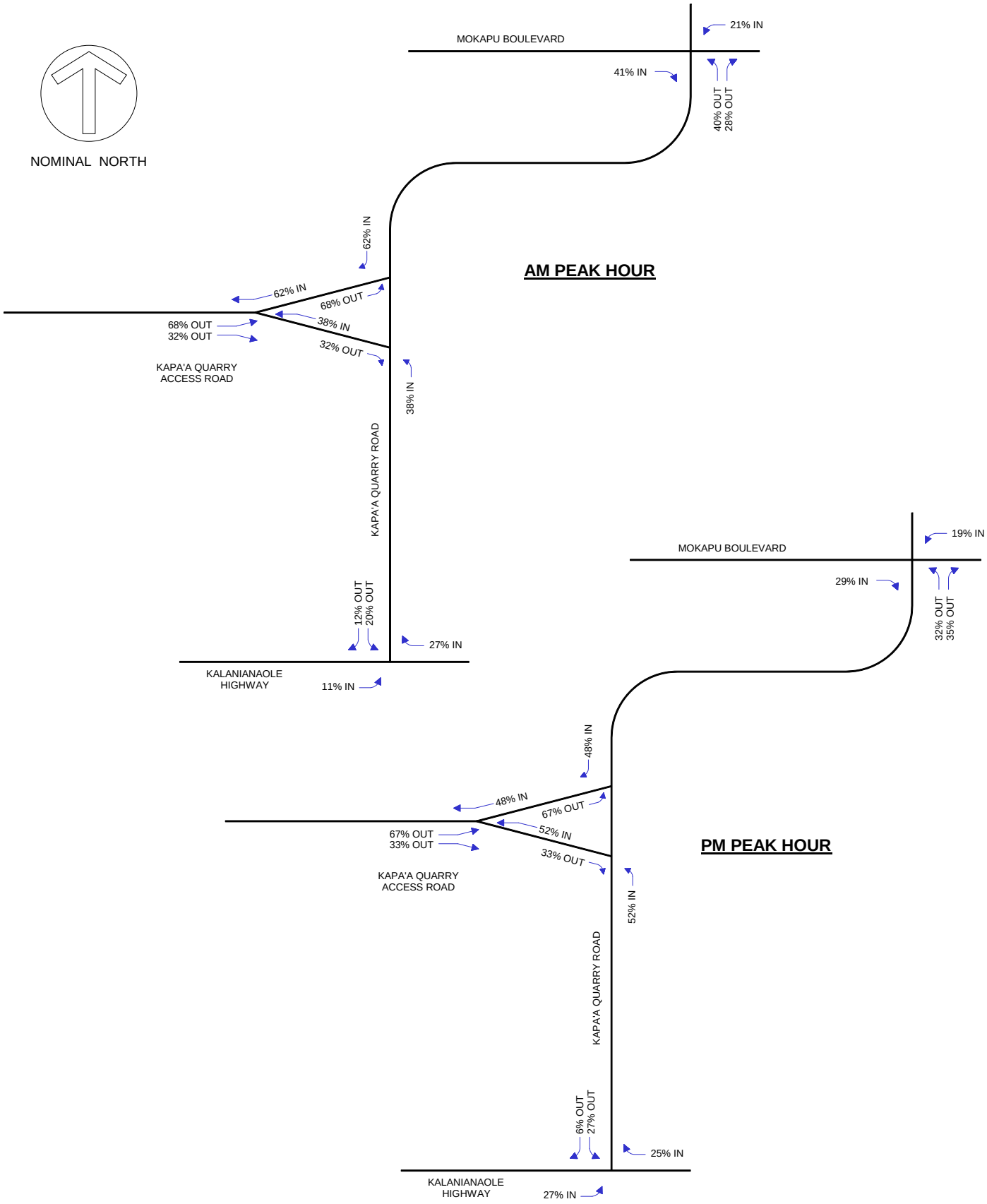
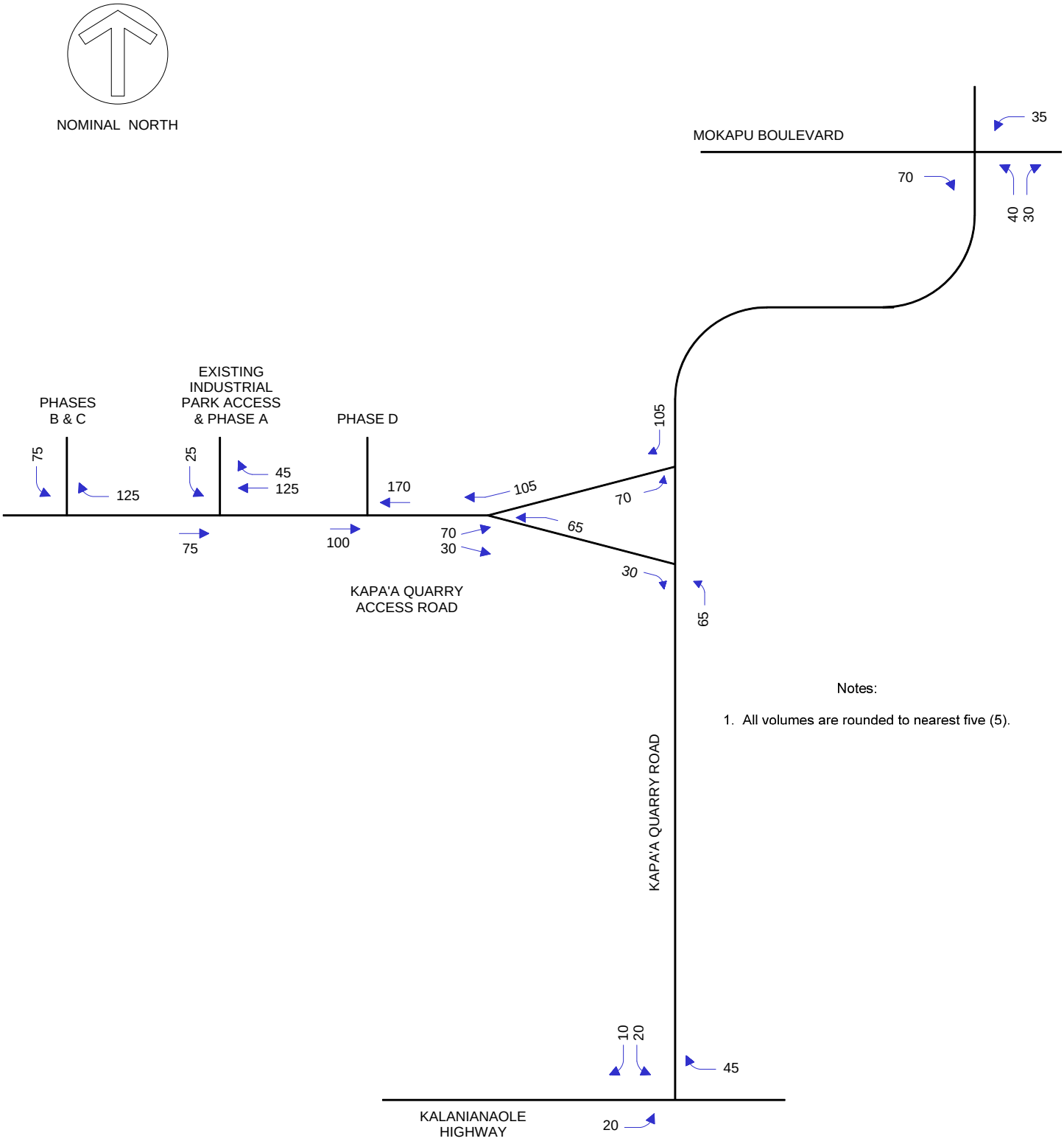


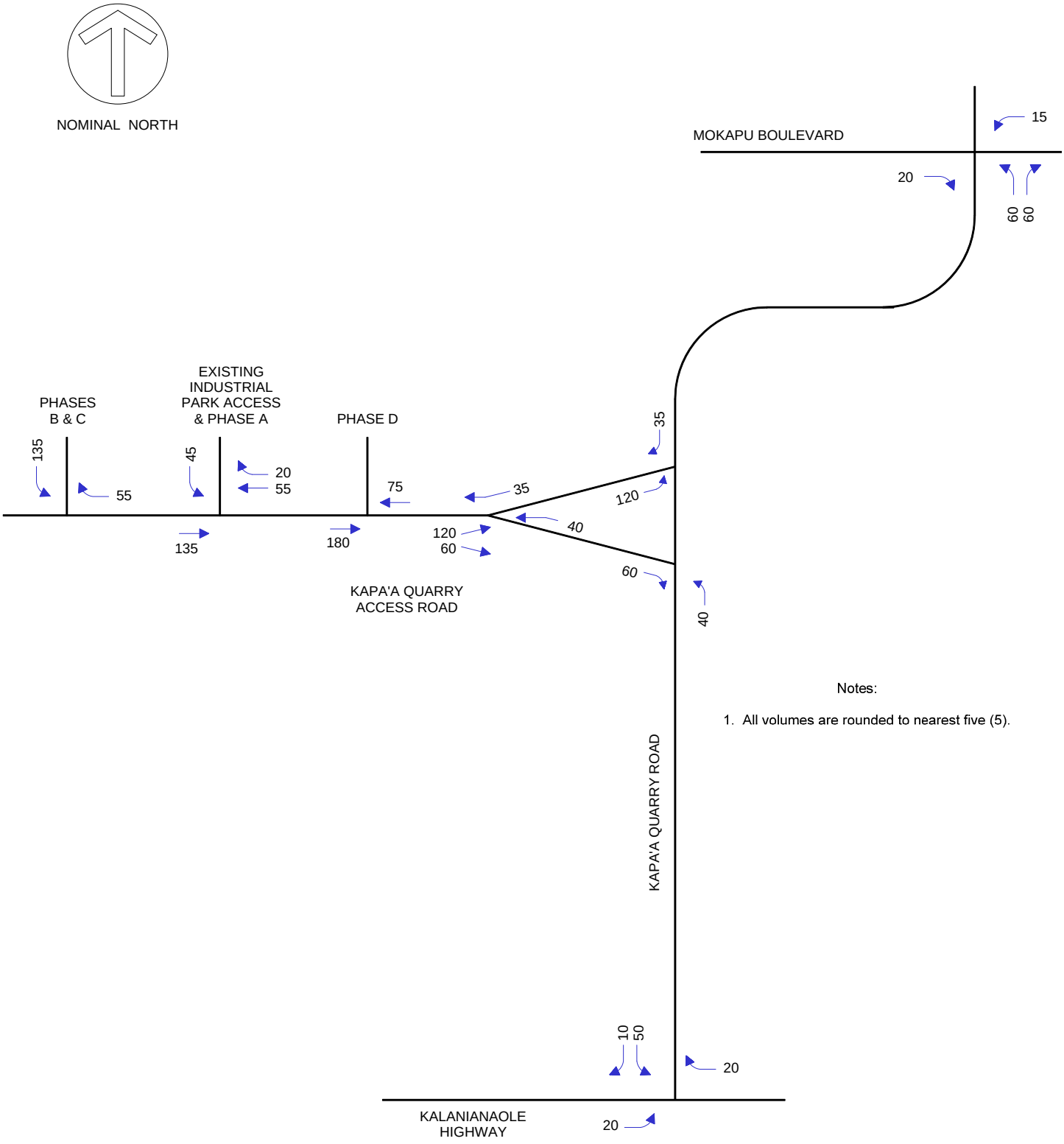
Figure 14
AM AND PM PEAK HOUR TRIP DISTRIBUTIONS



Notes:

1. All volumes are rounded to nearest five (5).

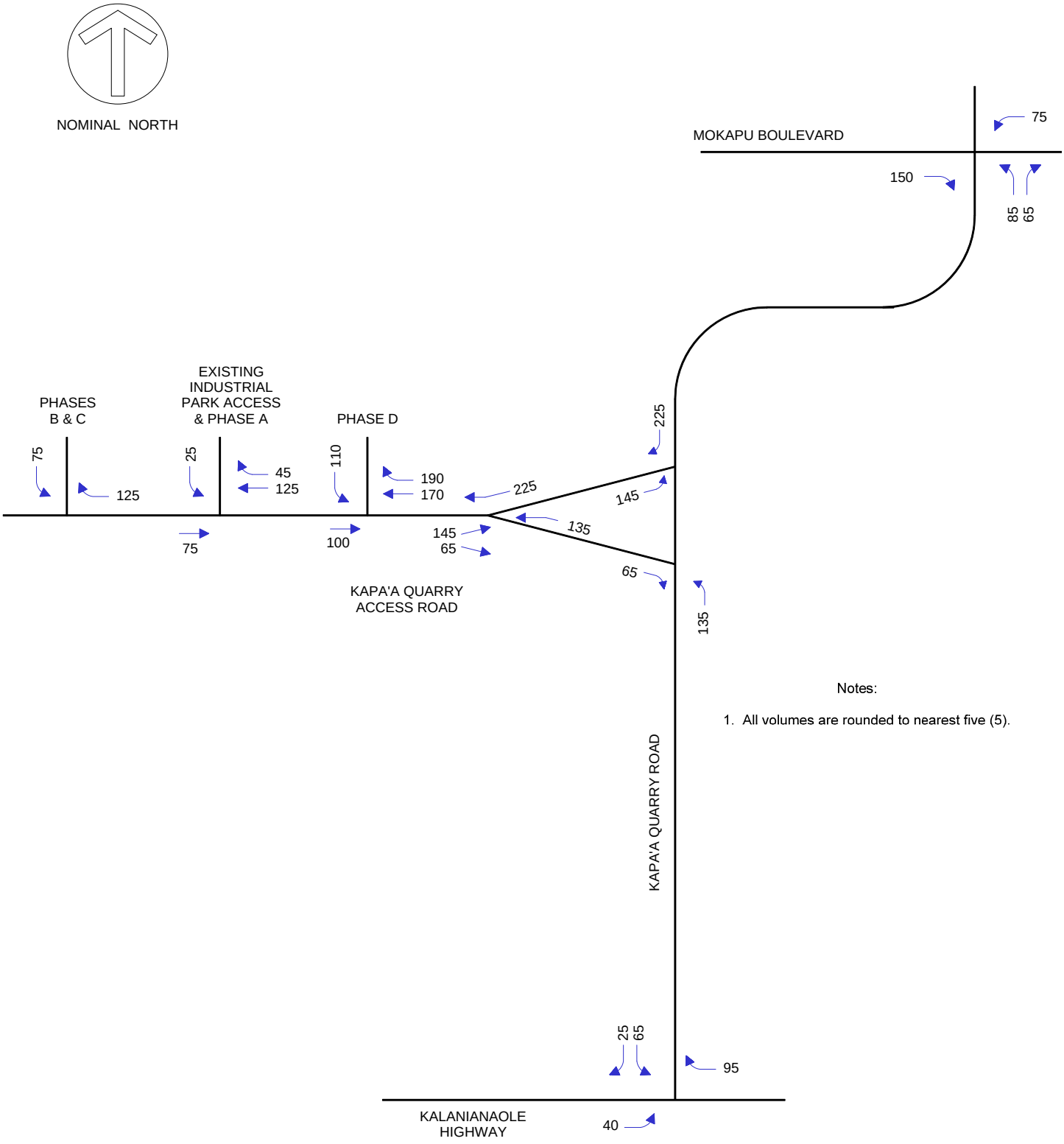
Figure 15
AM PEAK HOUR PROJECT TRIP ASSSIGNMENTS - PHASES A, B AND C



Notes:

1. All volumes are rounded to nearest five (5).

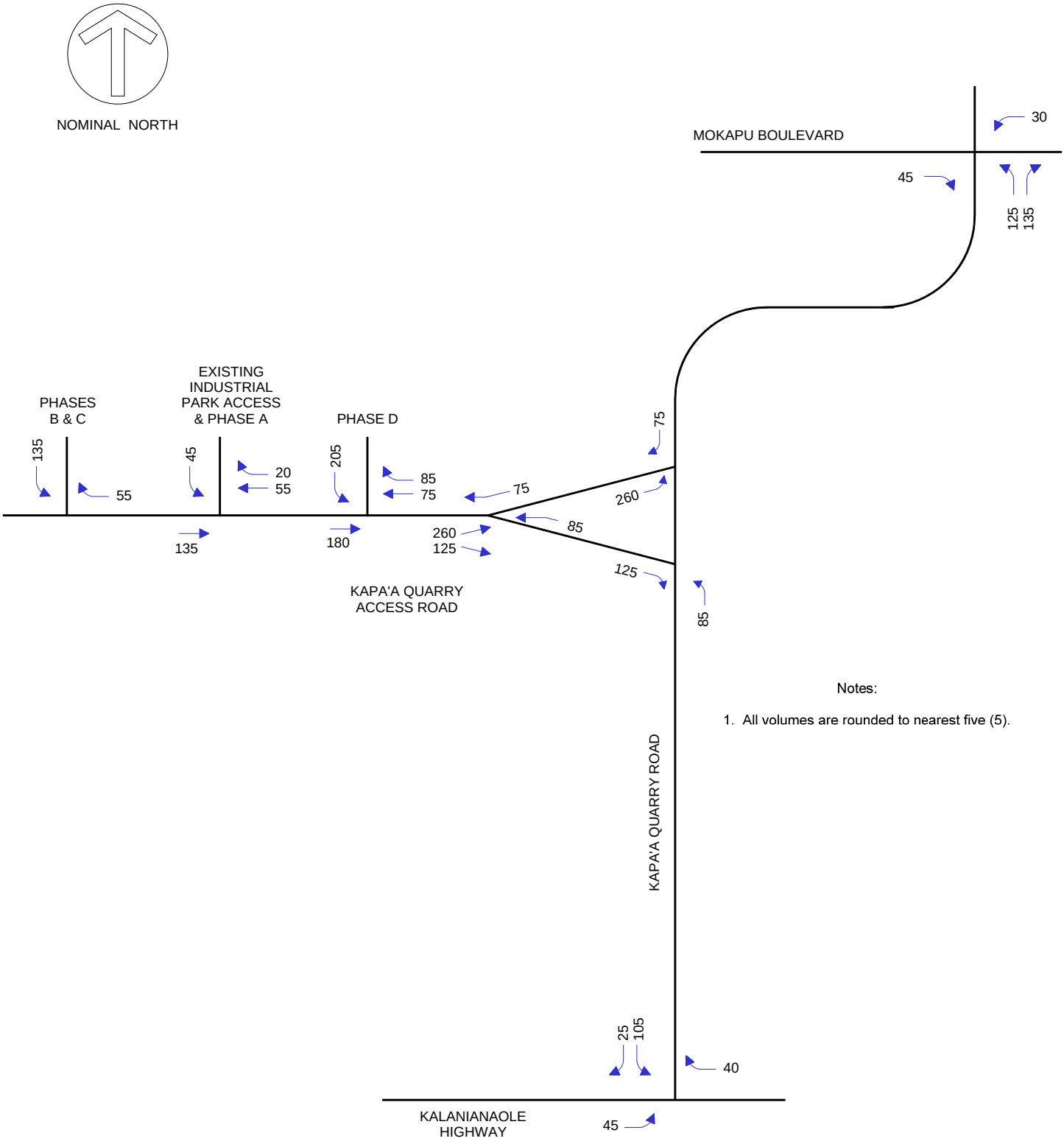
Figure 16
PM PEAK HOUR PROJECT TRIP ASSSIGNMENTS - PHASES A, B AND C



Notes:

1. All volumes are rounded to nearest five (5).

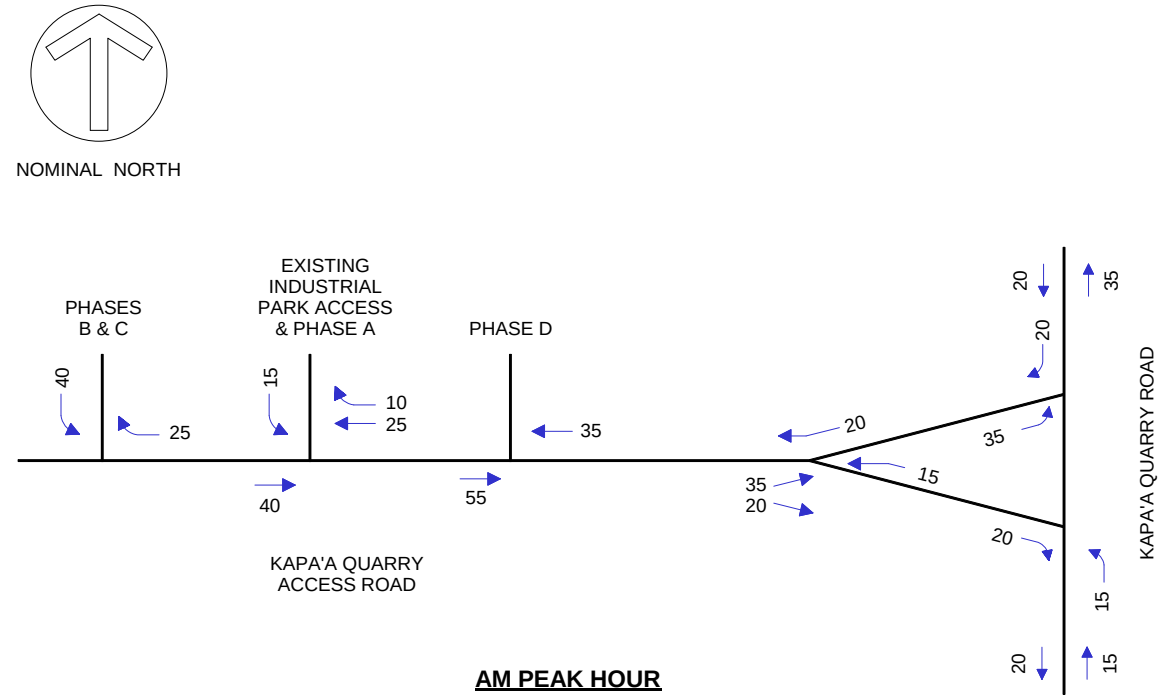
Figure 17
AM PEAK HOUR PROJECT TRIP ASSSIGNMENTS - PHASES A, B, C AND D

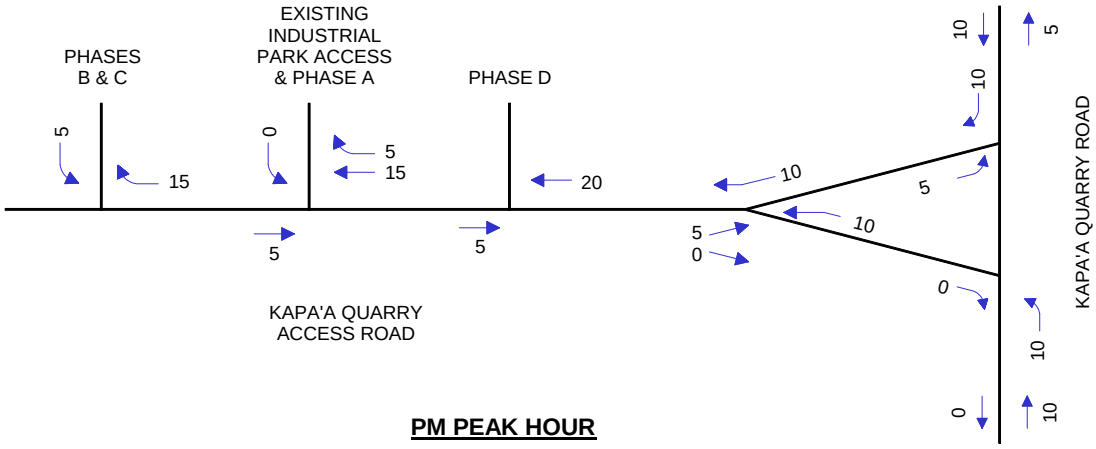


Notes:

1. All volumes are rounded to nearest five (5).

Figure 18
PM PEAK HOUR PROJECT TRIP ASSSIGNMENTS - PHASES A, B, C AND D

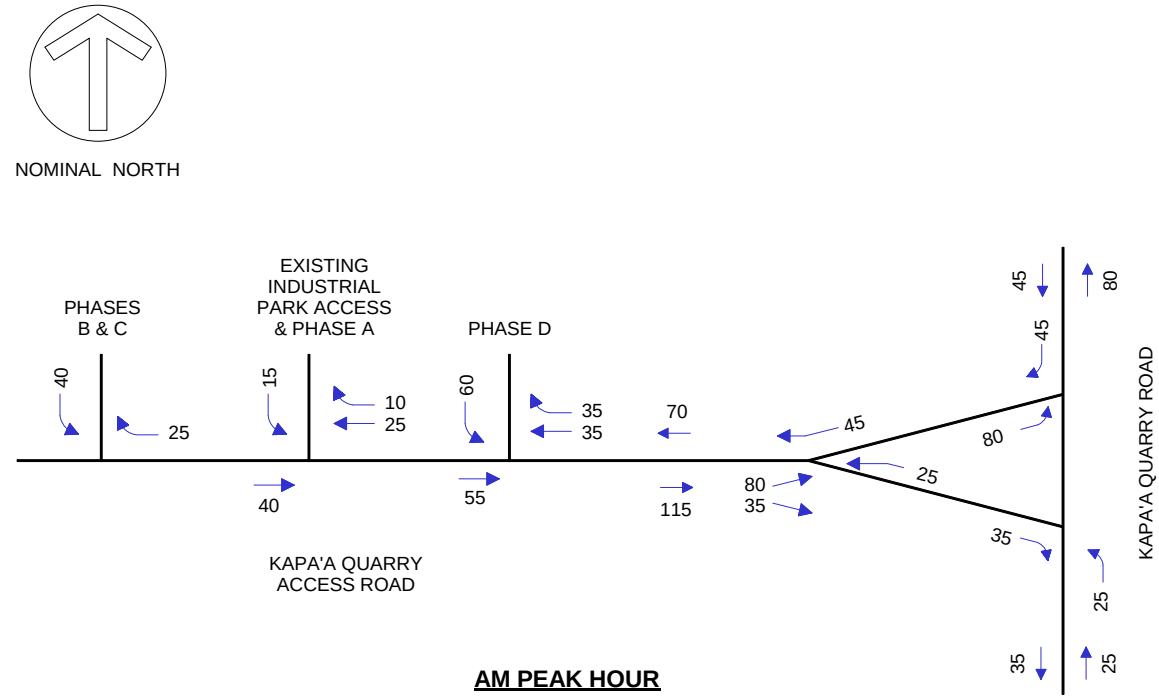


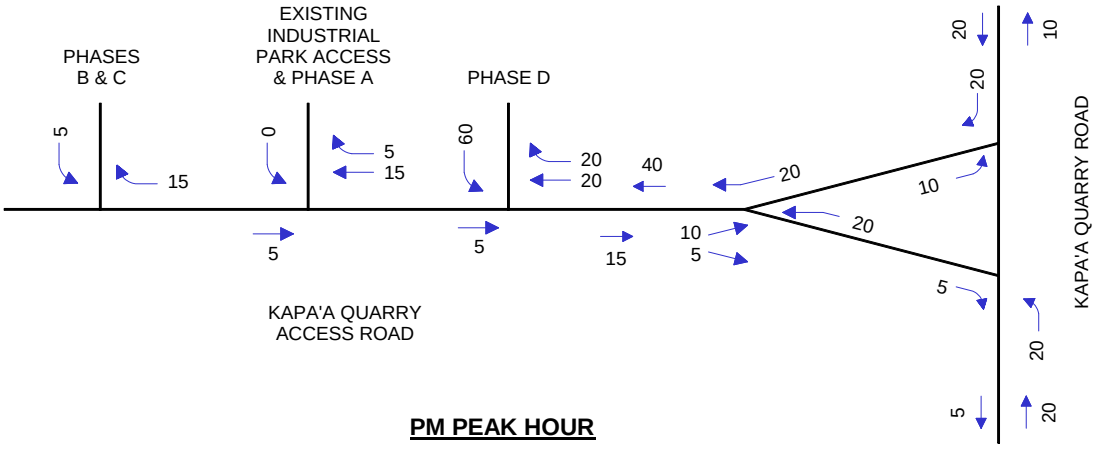


Notes:

1. All volumes are rounded to nearest five (5).

Figure 19
2016 HEAVY VEHICLES TRIP ASSSIGNMENTS - PHASES A, B AND C

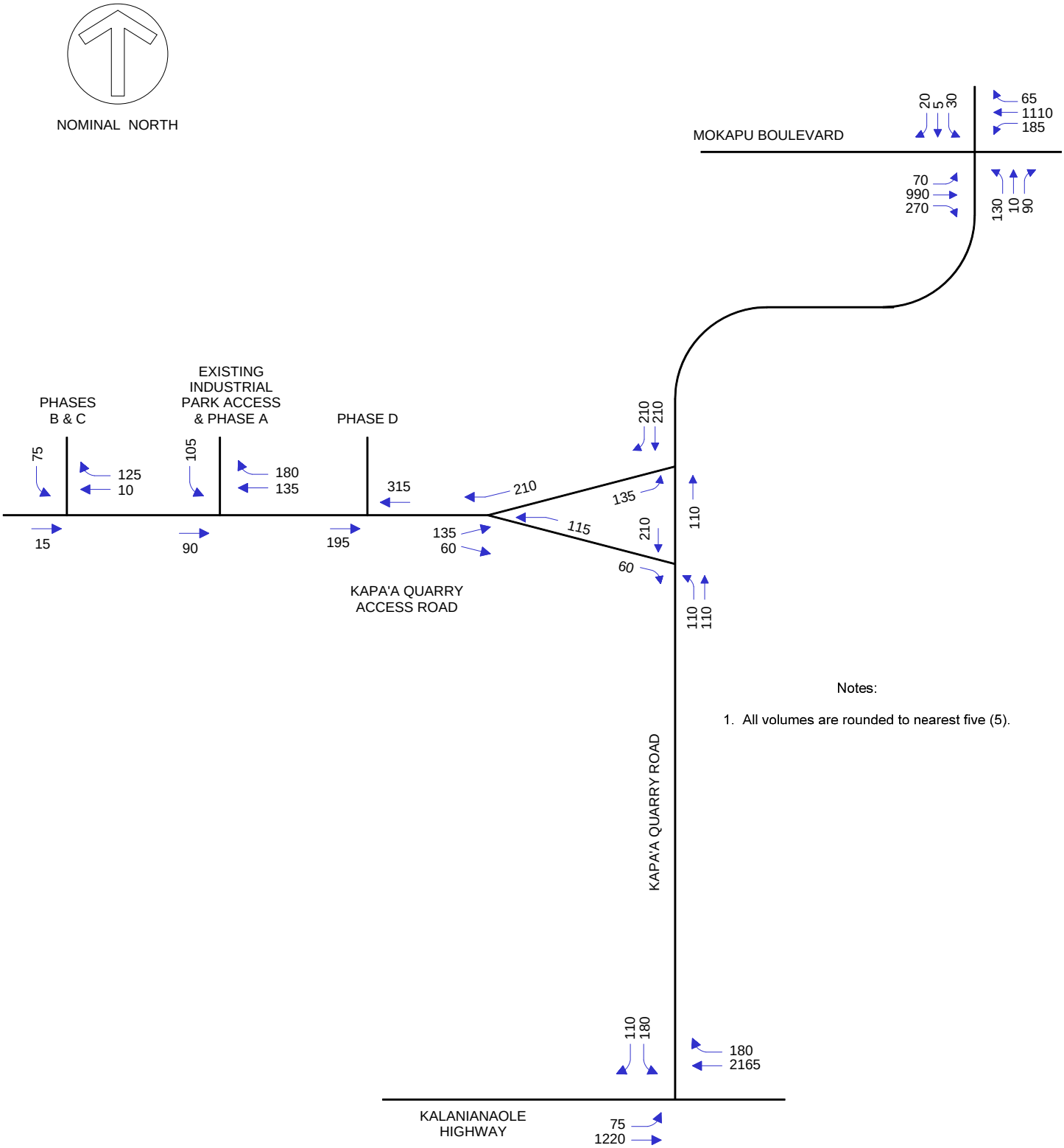




Notes:

1. All volumes are rounded to nearest five (5).

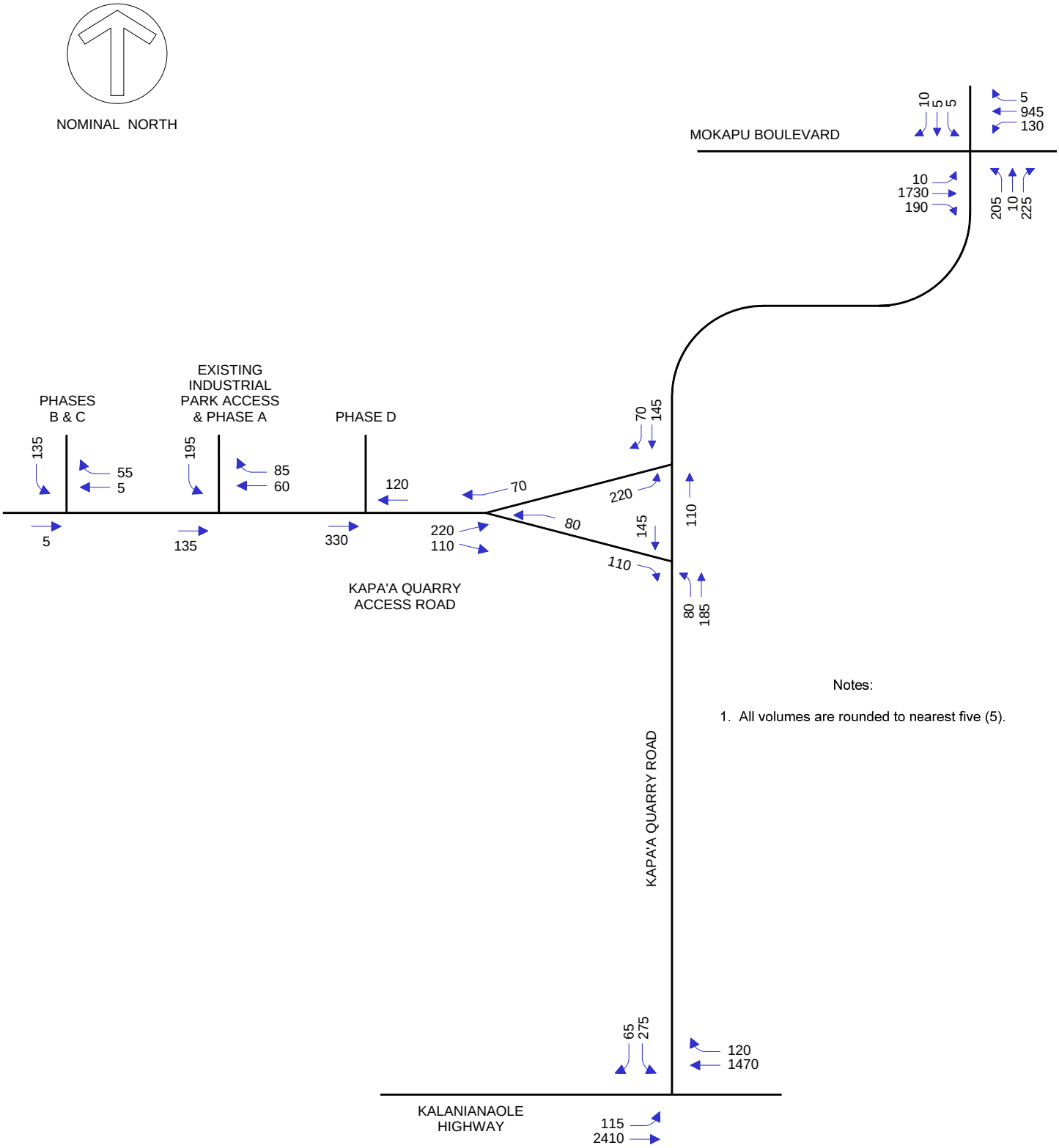
Figure 20
2026 HEAVY VEHICLES TRIP ASSSIGNMENTS - PHASES A, B, C AND D



Notes:

1. All volumes are rounded to nearest five (5).

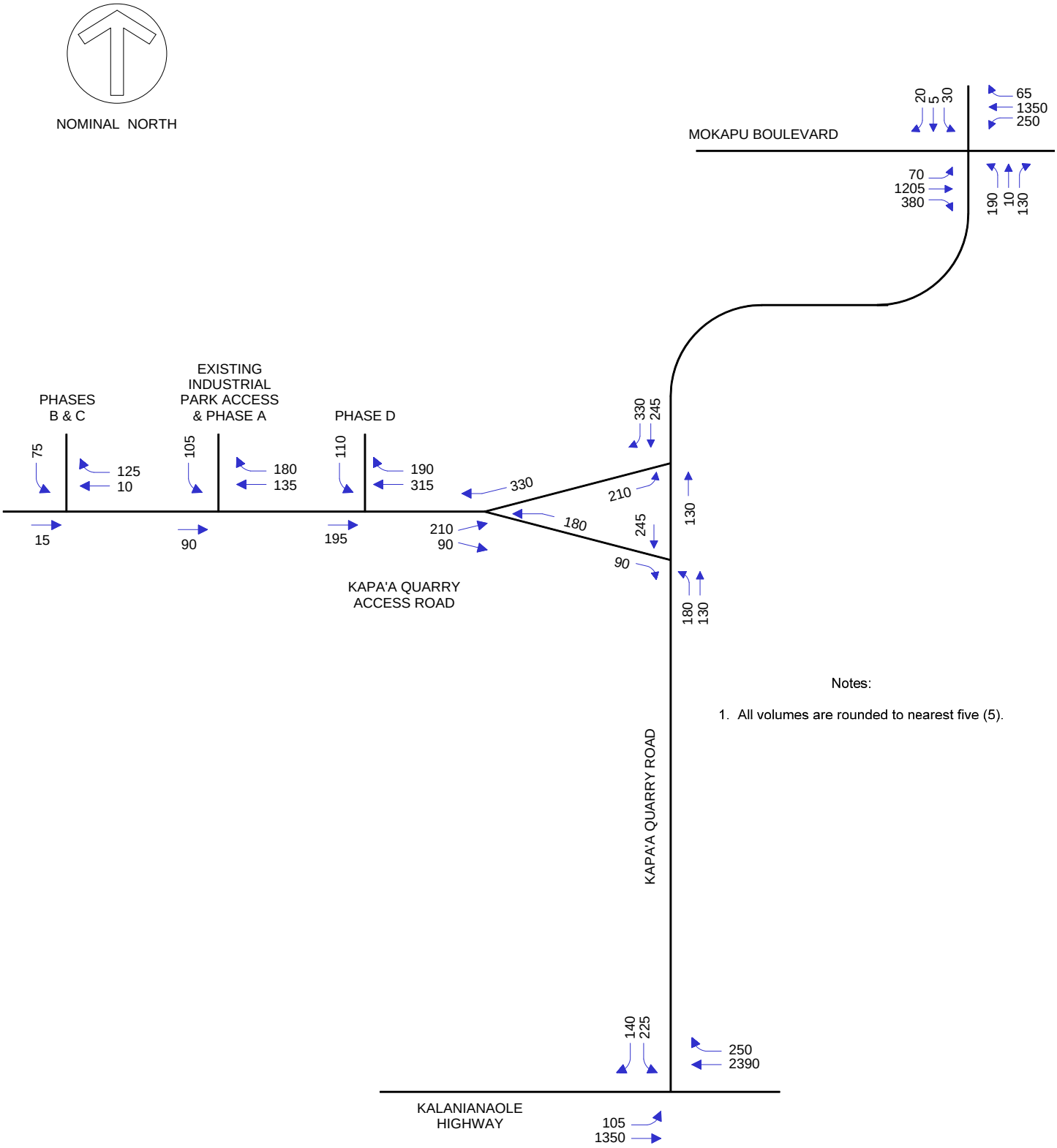
Figure 21
2016 BACKGROUND PLUS PROJECT AM PEAK HOUR PROJECT TRAFFIC PROJECTIONS



Notes:

1. All volumes are rounded to nearest five (5).

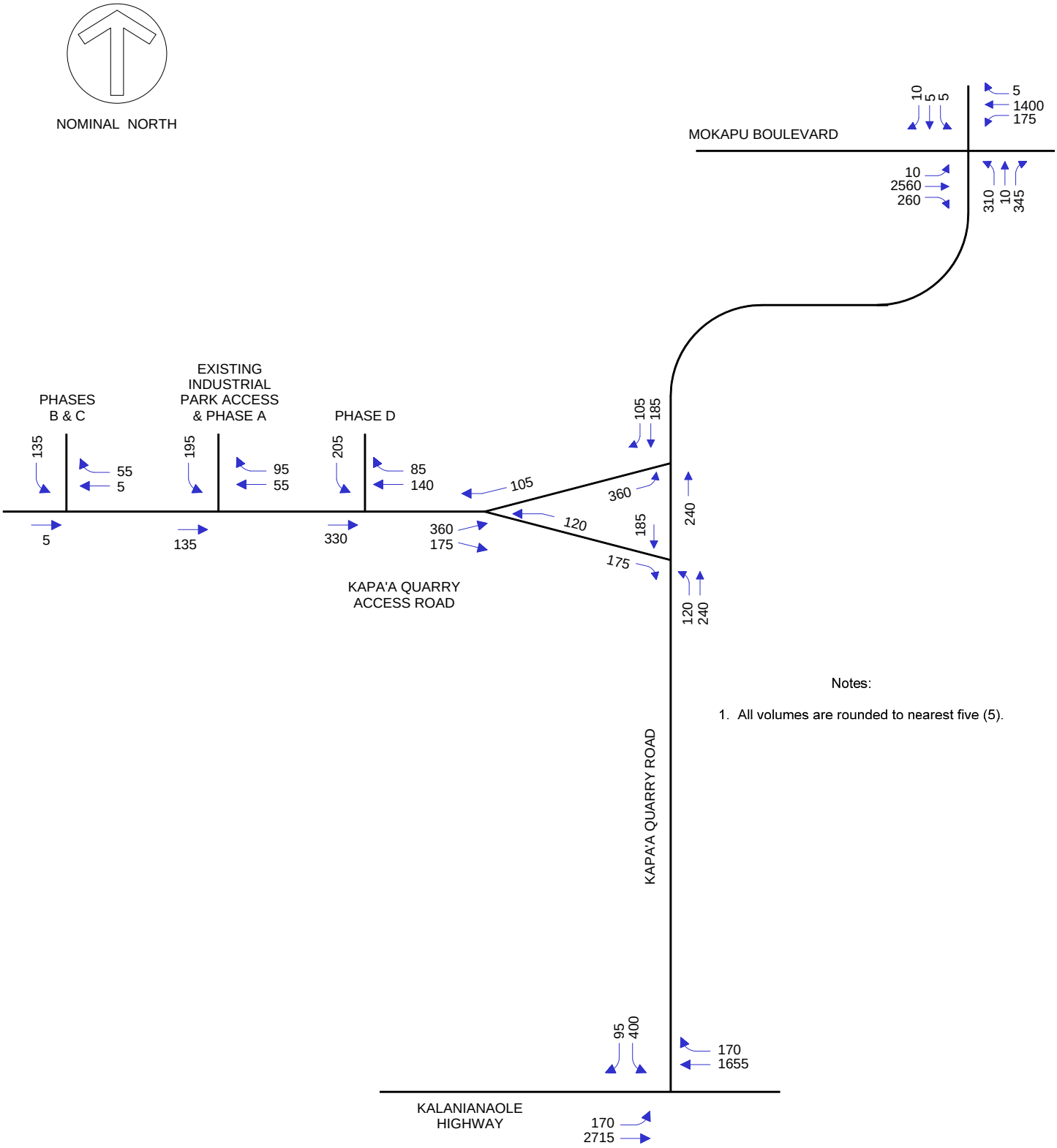
Figure 22
2016 BACKGROUND PLUS PROJECT PM PEAK HOUR PROJECT TRAFFIC PROJECTIONS



Notes:

1. All volumes are rounded to nearest five (5).

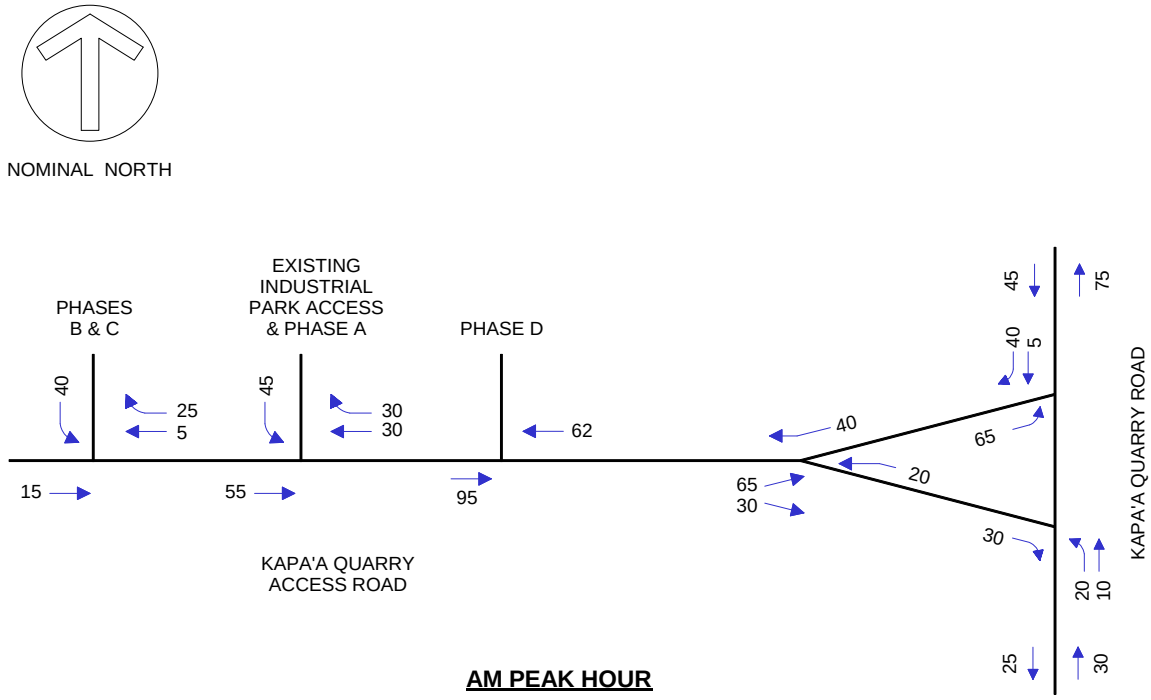
Figure 23
2026 BACKGROUND PLUS PROJECT AM PEAK HOUR PROJECT TRAFFIC PROJECTIONS

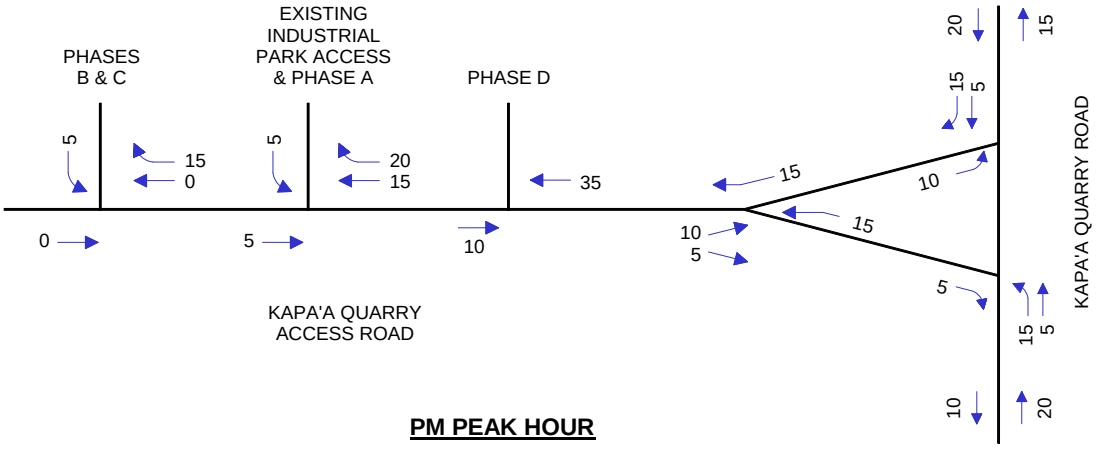


Notes:

1. All volumes are rounded to nearest five (5).

Figure 24
2026 BACKGROUND PLUS PROJECT PM PEAK HOUR PROJECT TRAFFIC PROJECTIONS

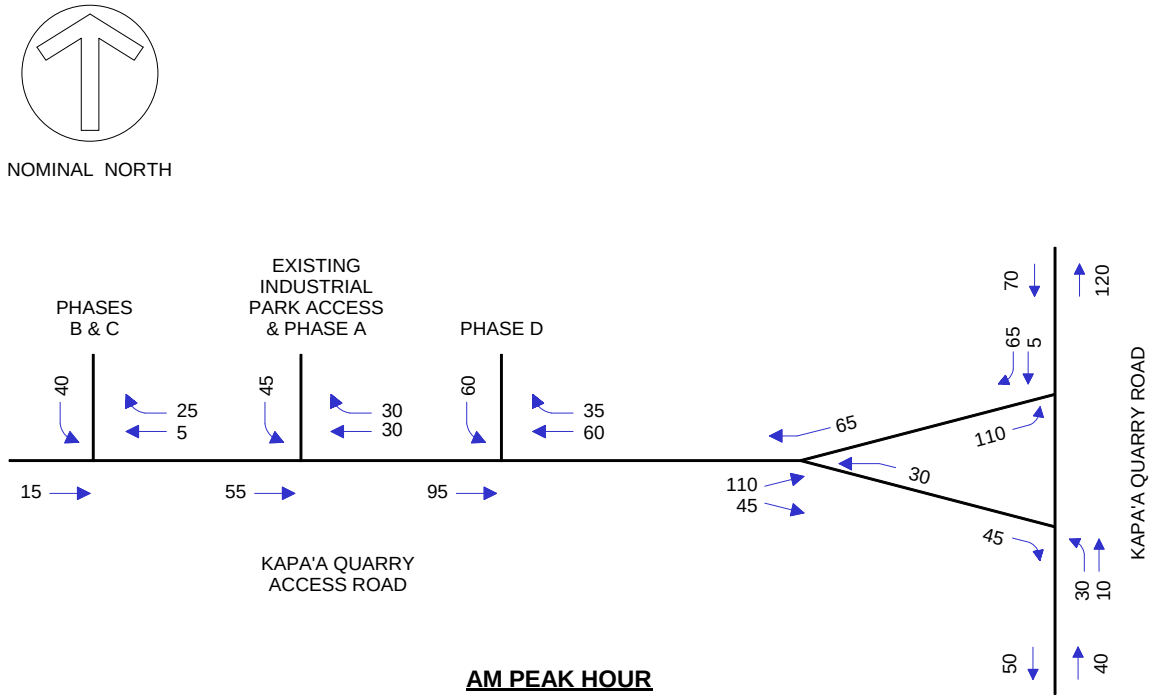


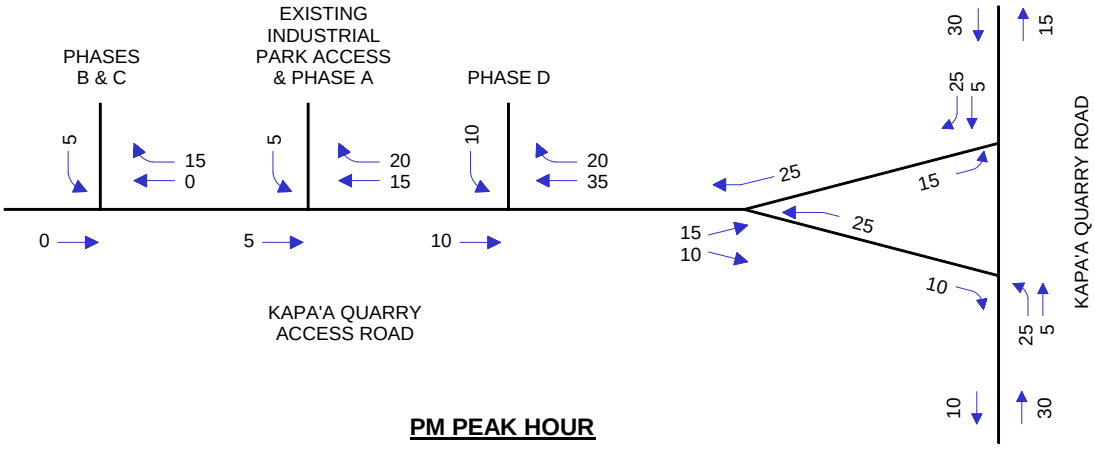


Notes:

1. All volumes are rounded to nearest five (5).

Figure 25
2016 BACKGROUND PLUS PROJECT HEAVY VEHICLES PEAK HOUR TRAFFIC PROJECTIONS





Notes:

1. All volumes are rounded to nearest five (5).

Figure 26
2026 BACKGROUND PLUS PROJECT HEAVY VEHICLES PEAK HOUR TRAFFIC PROJECTIONS

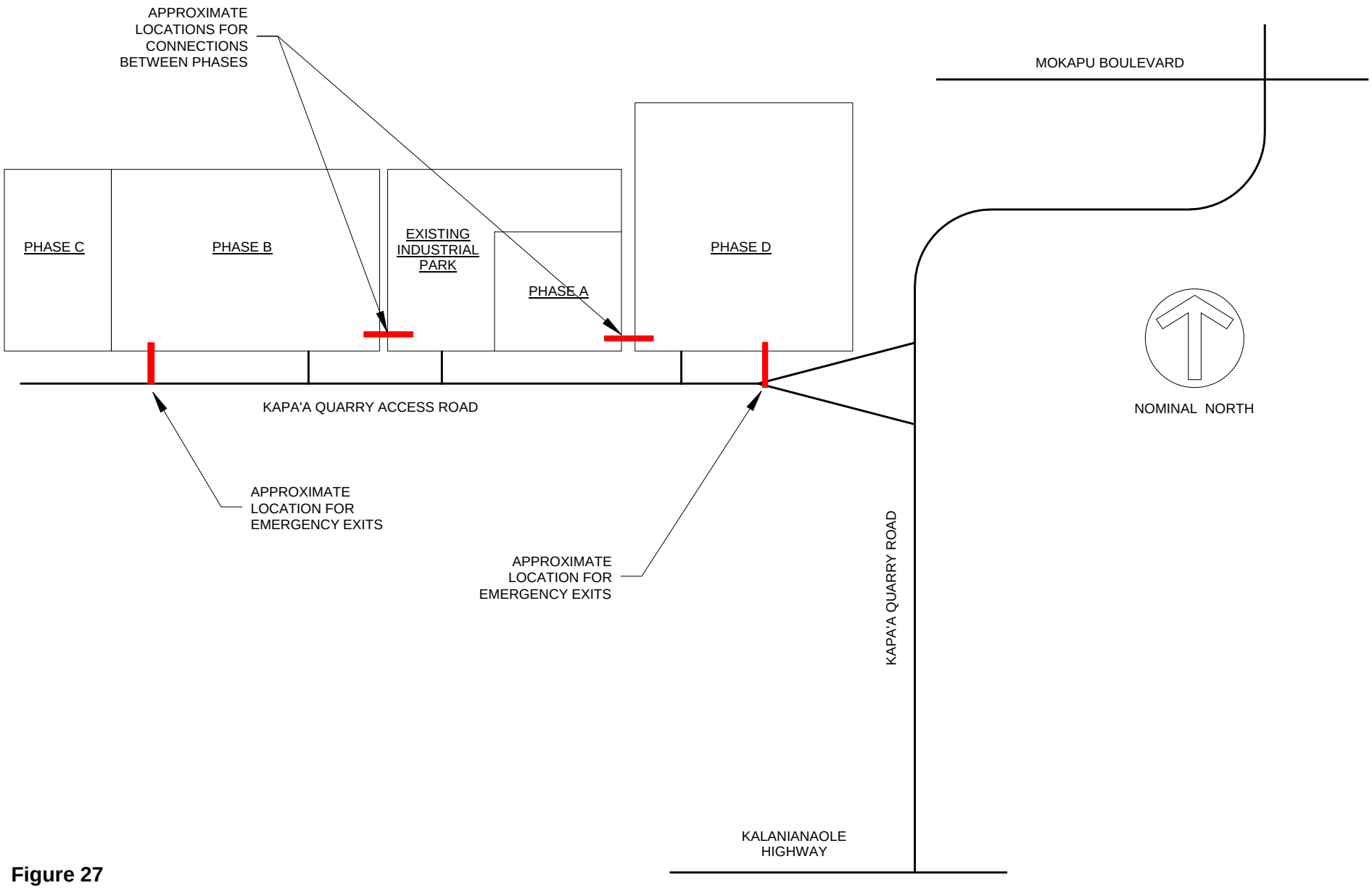


Figure 27
APPROXIIMATE LOCATIONS FOR INTERNAL CONNECTIONS

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Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 6:

Sight Distance Assessment Study

<u>Appendix 1 contains changes from Appendix 1 of DEIS</u>

September 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
www.sustain-hi.com

Appendix 6 - Contains revisions as indicated in the text

APPENDIX 6 - Sight Distance Analysis

This sight distance analysis is performed for the three driveways of the proposed industrial development. All three driveways of the proposed development connect the interior roadways with the Kapa'a Quarry Access Road.

The relevant sight distance criterion for the driveways of the proposed development is for intersections with stop sign control. The vehicles stopped at the driveways must have sufficient sight distance to permit a safe departure.

Approach:

Departure sight triangles are developed for the three driveways. The graphical depiction of the sight distance triangles is used to determine any possible obstructions for all possible maneuvers from the driveways.

The design speed for vehicles on the Kapa'a Quarry Access Road is 25 mph (compare Table 8 of the Traffic Impact Assessment Report).

Figure SDA-1 illustrates the two type of maneuvers that need to be considered for the driveways.

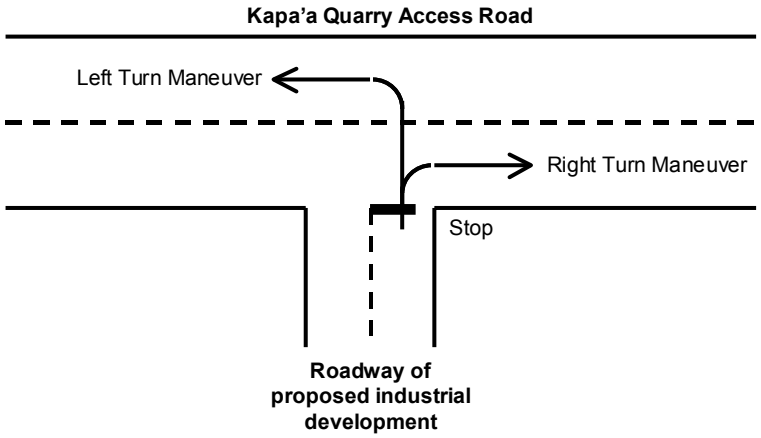


Figure SDA-1: Two types of maneuvers at driveways of proposed development

<u>Turning left into Kapa'a Quarry Access Road:</u>

As illustrated in Figure SDA-1 the left turn maneuver requires the clearing of the traffic on the left and then entering the traffic stream on the right of the quarry access road in the direction of the Kapa'a Quarry Road. The required sight distance for the left turn maneuver is determined by the time it takes for the stopped vehicles to turn left, clearing the traffic from the left, and reach design running speed while avoiding to affect the speed of the approaching vehicle. For the

design speed of 25 mph and according to the AASTHO "Green Book" ([1]) the recommended sight distance for this maneuver is 280 feet.

Turning right into Kapa'a Quarry Access Road:

As illustrated in Figure SDA-1 the right turn maneuver requires sufficient sight distance to permit entrance into the quarry access road and then accelerate to the design speed, while avoiding to affect the speed of the approaching vehicle. For the design speed of 25 mph and according to the AASTHO "Green Book" the recommended sight distance for this maneuver is 240 feet.

The geometry of the three driveways should be such that there are no obstructions blocking the view from the stopped car to the approaching traffic within the range of the recommended sight distance.

Description of Traffic Situation at Driveways and Findings:

Figure SDA-2 shows an overview of the proposed site and the location of the three driveways for which the sight distance analysis is carried out. The proposed site consists of the upper and lower portion. The upper portion of the proposed site is served by two driveways, Driveways No.1 and No. 2. The lower portion is served by one drive way, Driveway No. 3, for regular traffic and one auxiliary driveway that would be reserved for emergency vehicles (e.g. fire trucks, police and ambulances). No sight distance analysis is performed for the auxiliary driveway.

Figure SDA-3 provides more details of the Driveways No. 1 and No. 2, which serve the upper portion of the proposed site.

> Driveway No. 1 is an existing driveway that connects existing warehouses with the quarry road. Driveway No. 1 would be modified for the proposed development and would connect the proposed warehouses of development Phases B and C with the quarry access road. Under the proposed design approach a vertical retaining wall would be constructed between the closest new warehouse and the roadway of Driveway No. 1. The retaining wall is flared at the junction with the quarry road in order to improve adequate sight distance.
>
> Driveway No. 2 is an existing driveway that connects existing warehouses with the quarry road. For the proposed development Driveway No. 2 would be kept in the existing form or would only have minor modifications. The Driveway would connect proposed warehouses of Development Phase A with the quarry access road.

[1] AASHTO GREEN BOOK - A Policy on Geometric Design of Highways and Streets American Association of State and Highway Transportation Officials

Figure SDA-4 provides more details of Driveway No. 3 and the auxiliary driveway, which serve the lower portion of the proposed site.

> Driveway No. 3 would be a new driveway that would connect all warehouses of development Phase D, in the lower portion of the proposed site, with the quarry access road. There are trees along the quarry access road on both sides of Driveway No. 3. The trees belong to the extensive vegetative buffer zones around the lower portion of the proposed site.
>
> The auxiliary drive way would be a new driveway. This driveway would not be available for regular traffic but would be reserved for emergency vehicles. No sight distance analysis is performed for this auxiliary driveway.

Figure~~s~~ SDA-5 and ~~SDA-6~~ ~~show~~ shows the planned layout of and possible sight obstructions at Driveway No.1. The driveway is controlled by a stop sign for traffic leaving the proposed industrial warehouse development. Because of the sight obstruction caused by the vertical retaining wall along the mauka side of the internal roadway leading to Driveway 1, the stop sign bar (line) is placed as close to the intersecting Kapa'a Quarry Access Road as possible. ~~The crosswalk crossing the internal roadway is therefore moved back from the quarry access road.~~ Possible sight obstructions on the makai side of Driveway No. 1 are due to trees that would be planted along the quarry access road. **Note: Figures SDA-5 is revised in accordance with the comments received from the City & County of Honolulu, Dept. of Transportation Services. Figures SDA-6 is deleted.**

Figure SDA-7 shows the departure sight triangle for the left-turn maneuver from Driveway No. 1. The location of the observer in the departing vehicle is located 10 feet back from the stop bar. The retaining wall does not represent a sight obstruction for the recommended sight distance of 280 feet. Therefore sight distance for the left-turn maneuver is adequate.

Note: Figures SDA-7 is revised with new Driveway No. 1 configuration.

Figure SDA-8 shows the departure sight triangle for the right-turn maneuver from Driveway No. 1. The location of the observer in the departing vehicle is located 10 feet back from the stop bar. The trees do not represent a sight obstruction and there are no other sight obstructions for the recommended sight distance of 240 feet. Therefore sight distance for the right-turn maneuver is adequate.

Note: Figures SDA-8 is revised with new Driveway No. 1 configuration.

Figures SDA-9 and SDA-10 show the planned layout of and possible sight obstructions at Driveway No.2. The driveway is controlled by a stop sign for traffic leaving the proposed industrial warehouse development. A crosswalk across Driveway No. 2 connects sidewalks along quarry access road. The stop bar (line) is about 3 feet back from the crosswalk. Possible sight obstructions on the mauka and makai sides of Driveway No. 2 are due to trees that would be planted along the quarry access road. Buildings or other permanent structures would be recessed by a considerable distance from the quarry access road and would therefore not represent sight obstructions.

Figure SDA-11 shows the departure sight triangle for the left-turn maneuver from Driveway No. 2. The location of the observer in the departing vehicle is located 10 feet back from the stop bar.

The trees on the mauka side of Driveway No. 2 would be planted and maintained in such a way that they do not represent a sight obstruction for the recommended sight distance of 280 feet. Therefore sight distance for the left-turn maneuver is adequate.

Figure SDA-12 shows the departure sight triangle for the right-turn maneuver from Driveway No. 2. The location of the observer in the departing vehicle is located 10 feet back from the stop bar. The trees on the makai side of Driveway No. 2 would be planted and maintained in such a way that they do not represent a sight obstruction for the recommended sight distance of 240 feet. Therefore sight distance for the right-turn maneuver is adequate.

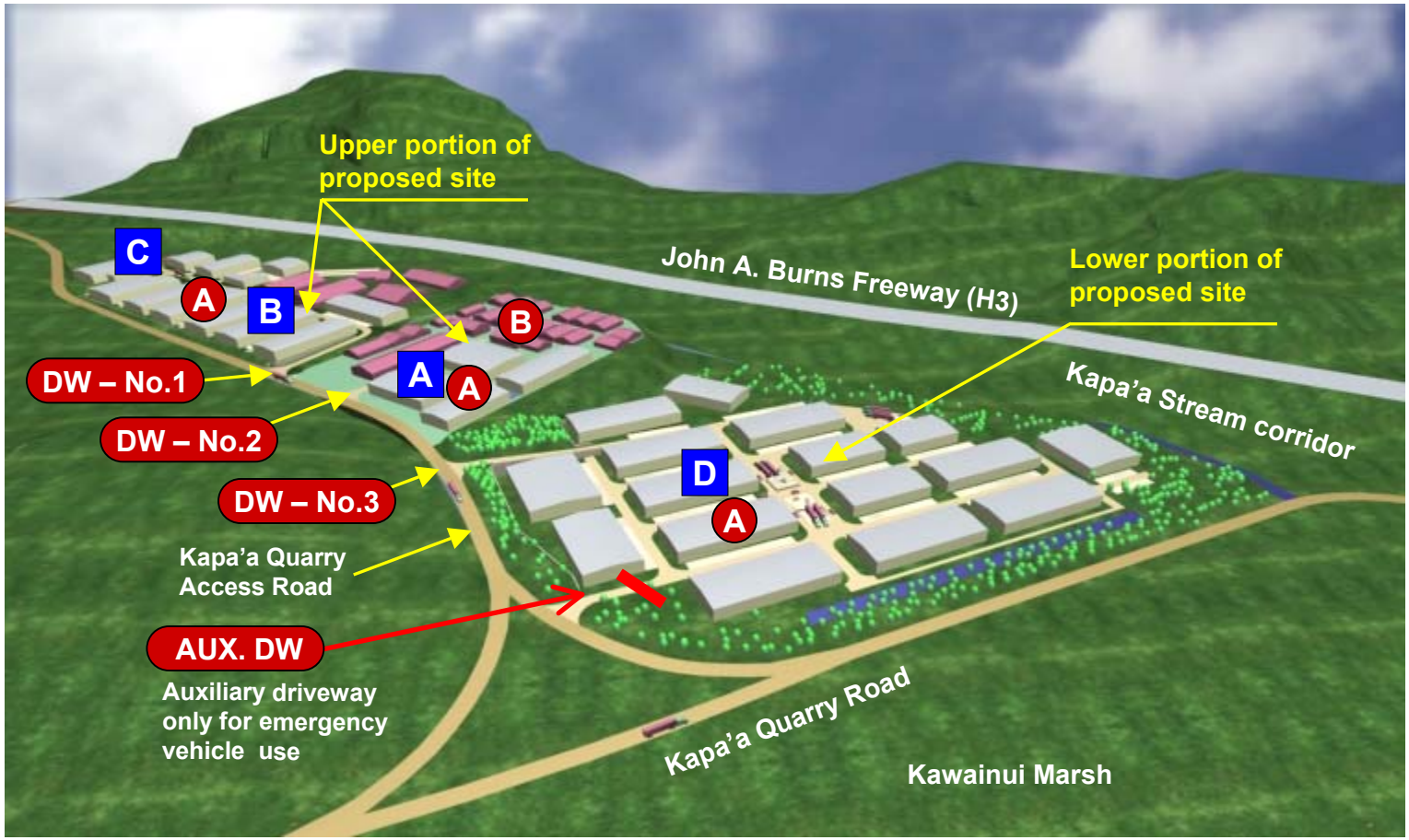
Figures SDA-13 and SDA-14 show the planned layout of and possible sight obstructions at Driveway No.3. The driveway is controlled by a stop sign for traffic leaving the proposed industrial warehouse development. A crosswalk across Driveway No. 3 connects sidewalks along quarry access road. The stop bar (line) is about 3 feet back from the crosswalk. Possible sight obstructions on the mauka and makai sides of Driveway No. 3 are due to trees that would be planted along the quarry access road as part of the dense vegetative buffer zone around the lower portion of the proposed site. Buildings or other permanent structures on the mauka side of Driveway No. 3 would be recessed from the quarry access road by a considerable distance. On the makai side of Driveway No. 3 there are no permanent structures close to the quarry access road that could represent a sight obstruction.

Figure SDA-15 shows the departure sight triangle for the left-turn maneuver from Driveway No. 3. The location of the observer in the departing vehicle is located 10 feet back from the stop bar. The trees on the mauka side of Driveway No. 3 would be planted and maintained in such a way that they do not represent a sight obstruction for the recommended sight distance of 280 feet. Therefore sight distance for the left-turn maneuver is adequate.

Figure SDA-16 shows the departure sight triangle for the right-turn maneuver from Driveway No. 3. The location of the observer in the departing vehicle is located 10 feet back from the stop bar. The trees on the makai side of Driveway No. 2 would be planted and maintained in such a way that they do not represent a sight obstruction for the recommended sight distance of 240 feet. Therefore sight distance for the right-turn maneuver is adequate.

Conclusions:

All sight distances for right-turn and left-turn maneuvers at the three driveways, Driveways No. 1, No. 2 and No. 3, would be adequate, considering the layout of the driveway, roadways as well as buildings, structures and vegetation adjacent to the driveways presented in this sight distance analysis.



A New Warehouses (GREY image; typical)

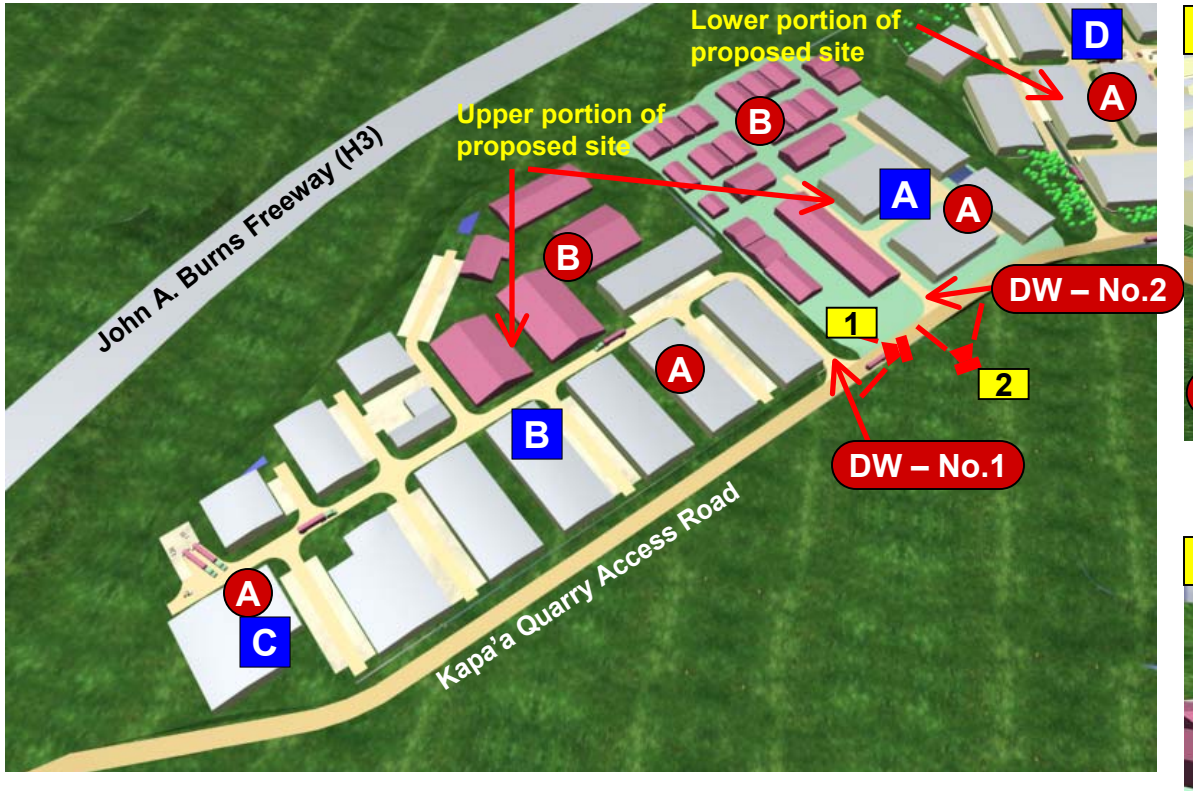
B Existing Warehouses (RED image; typical)

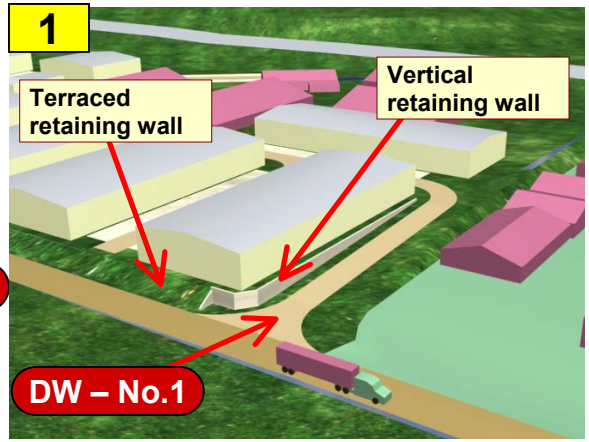
DW – No.x Driveways (DW) of proposed industrial development; numbers indicated

X Development phase of proposed development schedule

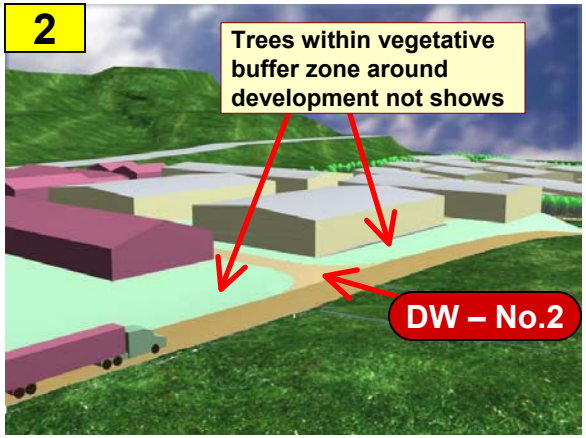
Marc M. Siah & Associates, Inc.
Consulting Civil Structural Environmental & Ocean Engineers
820 South Beretania Street, Suite 201, Honolulu, Hawaii 96813

Figure SDA-2 Overview of proposed site; driveway numbering for sightseeing analysis





Driveway No. 1: Details



Driveway No. 2: Details

A New Warehouses (GREY image; typical)

B Existing Warehouses (RED image; typical)

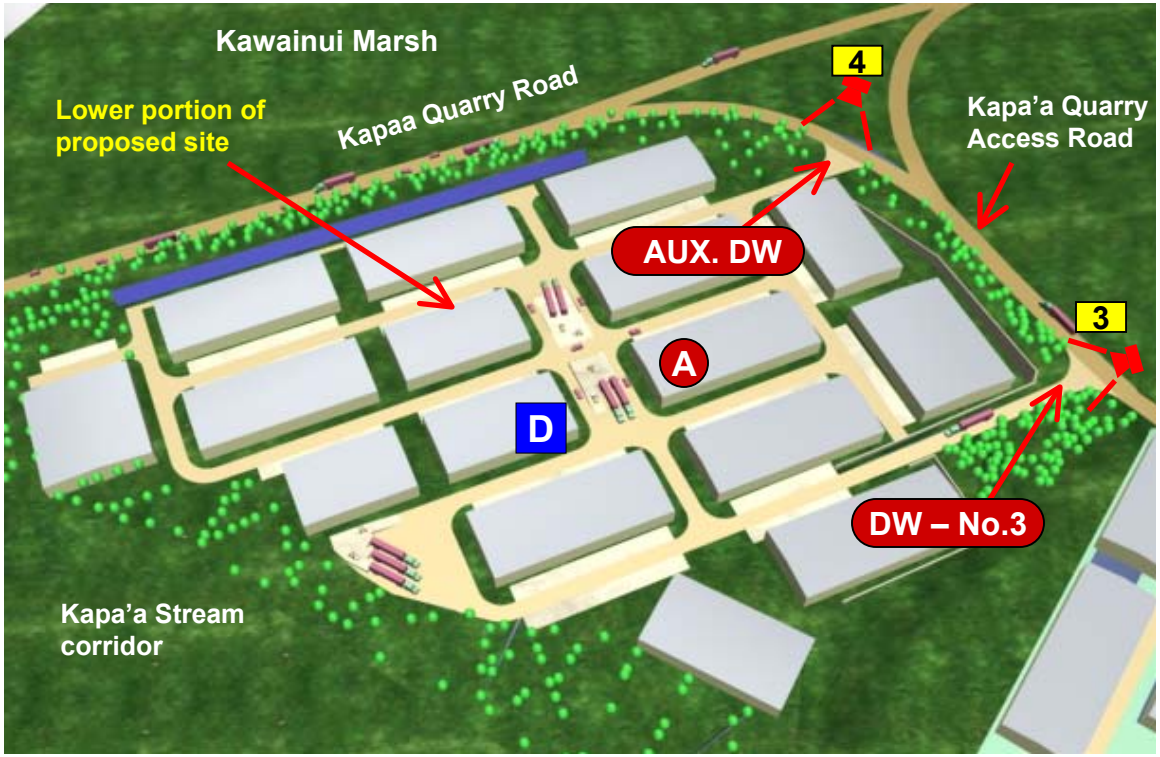
X Development phase of proposed development schedule

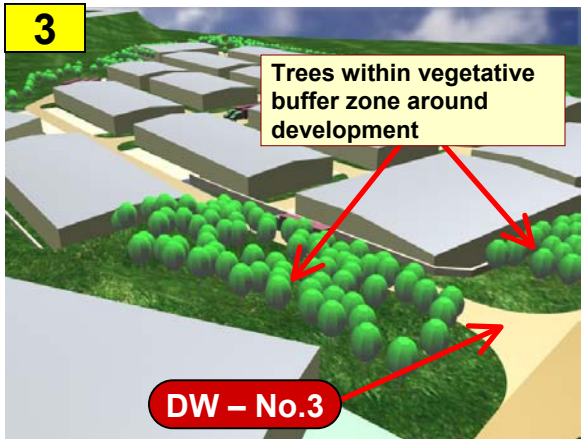
DW – No.x Driveways (DW) of proposed industrial development; numbers indicated

x Direction of view for corresponding picture

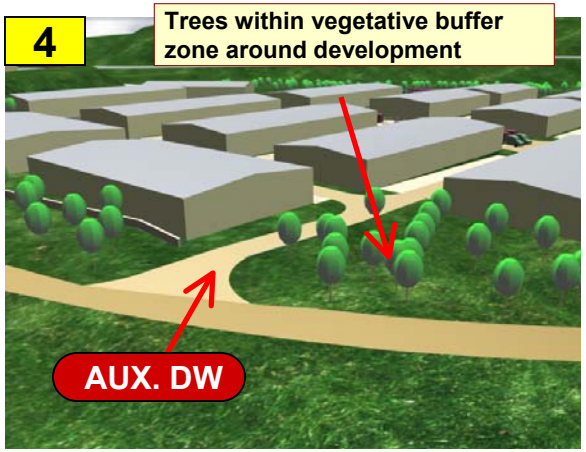
Marc M. Siah & Associates, Inc.
Consulting Civil Structural Environmental & Ocean Engineers
820 South Beretania Street, Suite 201, Honolulu, Hawaii 96813

Figure SDA-3 Driveways serving the upper portion of the proposed site





Driveway No. 3: Details



Auxiliary Driveway : Details, this driveway is only used for emergency vehicles and not for regular traffic

A **New Warehouse (GREY image; typical)**

X **Development phase of proposed development schedule**

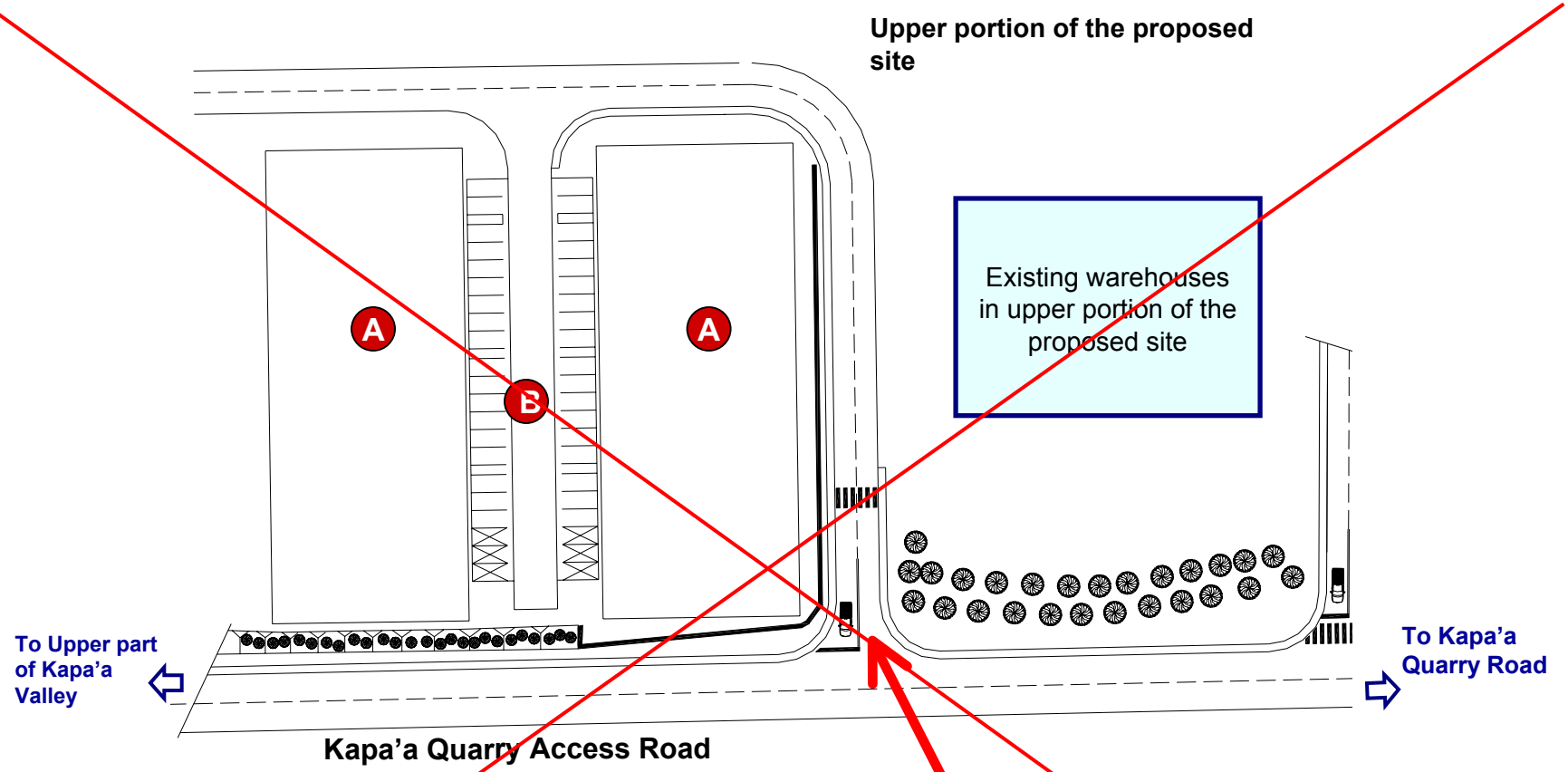
DW – No.x **Driveways (DW) of proposed industrial development; numbers indicated**

x **Direction of view for corresponding picture**

Marc M. Siah & Associates, Inc.

Consulting Civil Structural Environmental & Ocean Engineers
820 South Beretania Street, Suite 201, Honolulu, Hawaii 96813

Figure SDA-4 Driveways serving the lower portion of the proposed site



Driveway No. 1: Connecting Kapa'a Quarry Access Road to Development Phase B and C (in upper portion of the proposed site)

A Planned warehouses in upper portion of the proposed site

B Access roadway and parking spaces serving the warehouses

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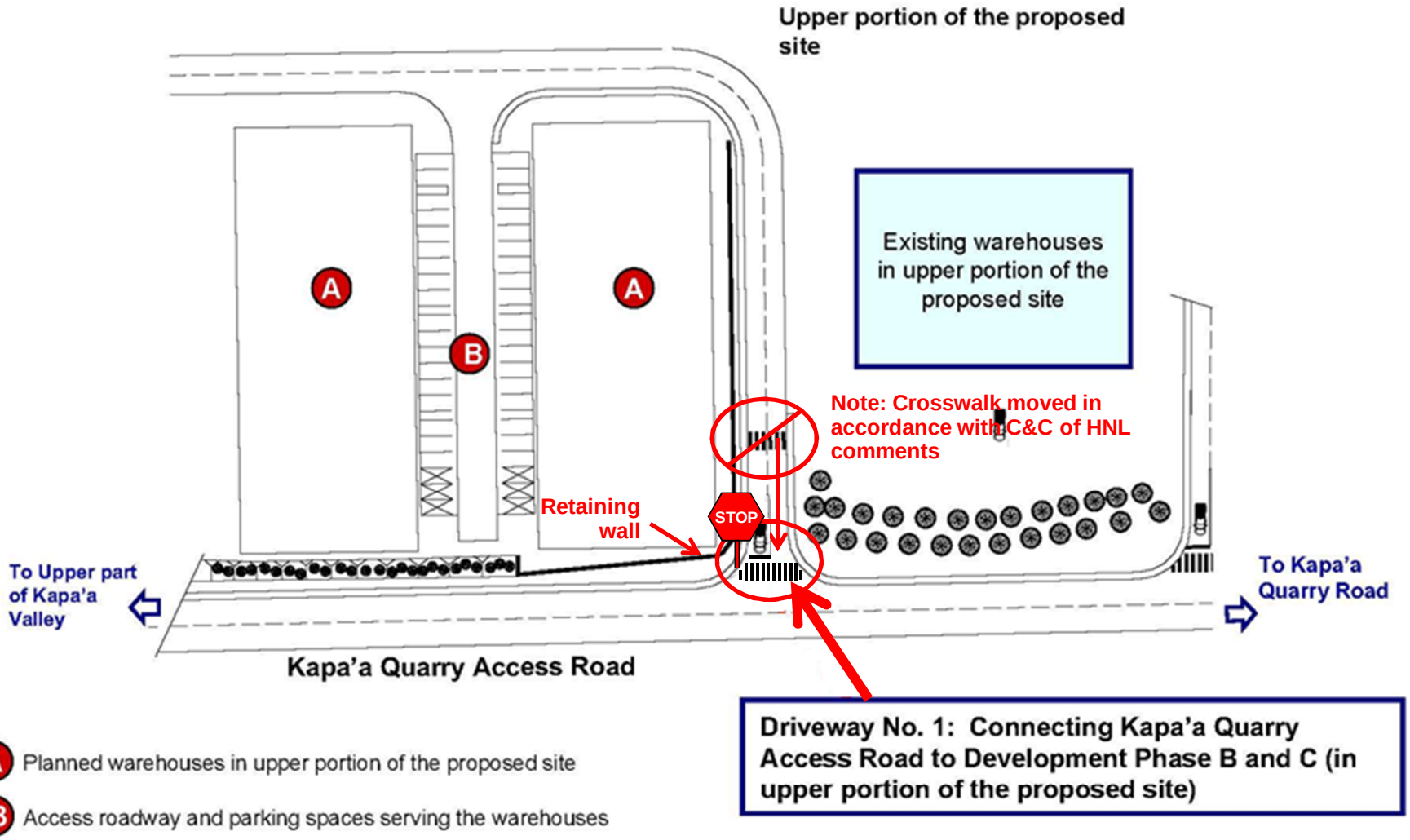
Figure SDA-5 Layout of Driveway No. 1



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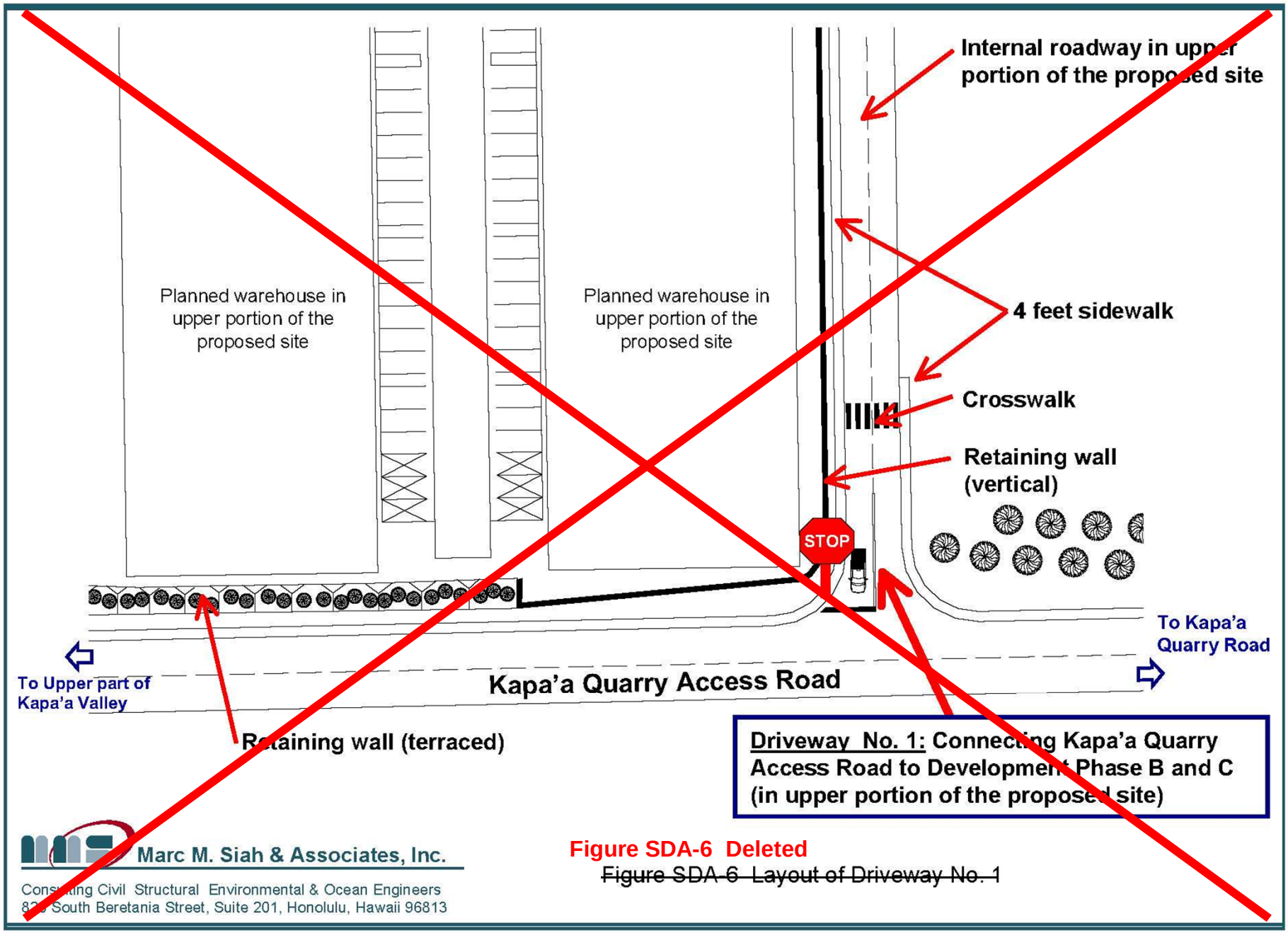
Revised Figure SDA-5 Revised Layout of Driveway No. 1

~~Figure SDA-5 Layout of Driveway No. 1~~



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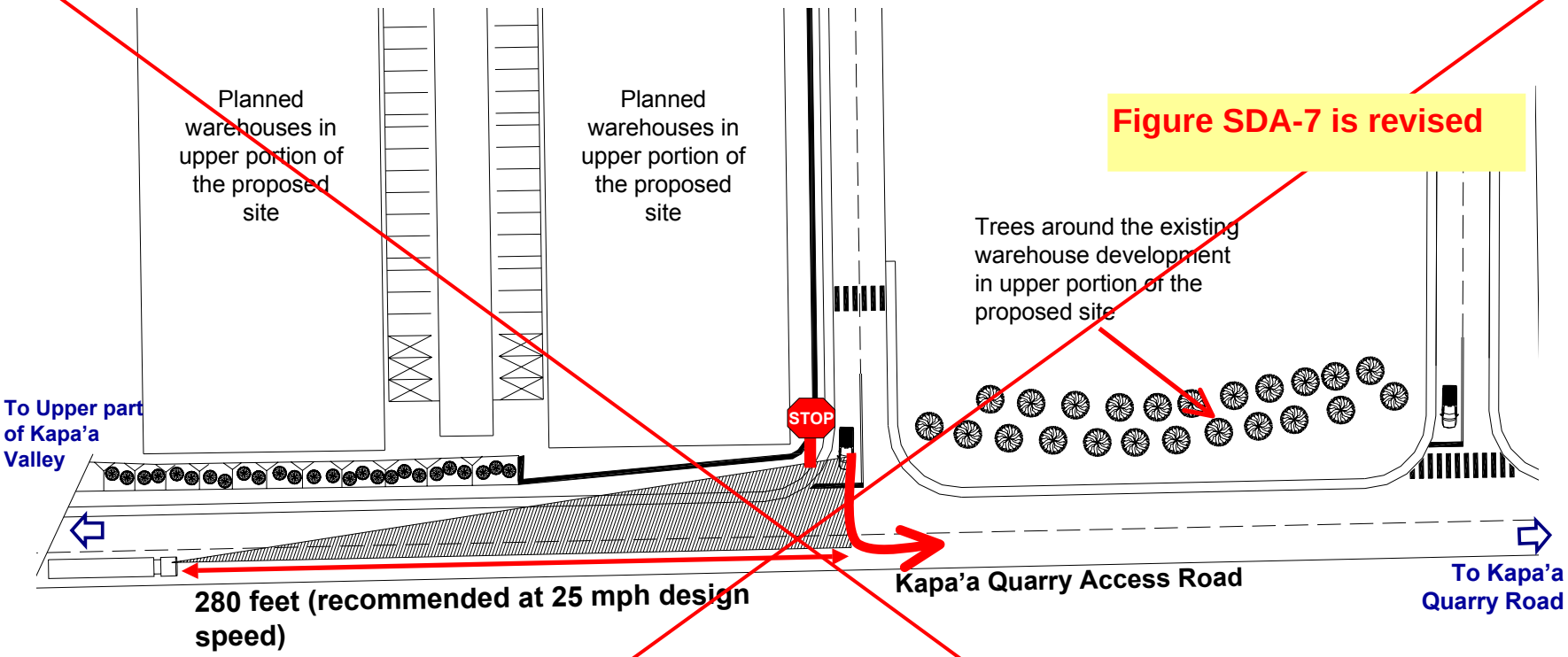
~~Figure SDA-6 Layout of Driveway No. 1~~



Recommended sight distance for left-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for left turn is **adequate**

Driveway No. 1: Sight Distance Analysis for proposed development– Left turn departure from driveway with stop sign control

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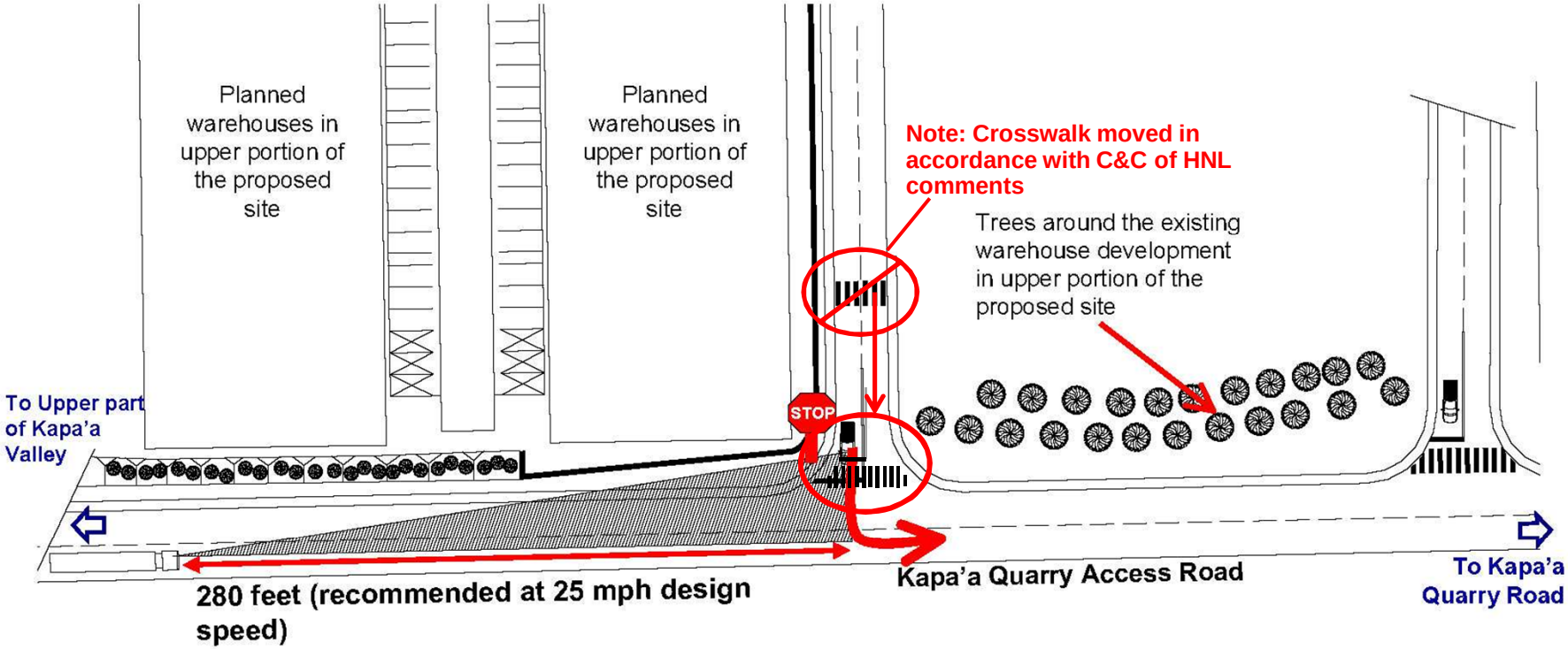
Figure SDA-7 Site Distance Analysis for Driveway No. 1; left turn departure from proposed site



Recommended sight distance for left-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for left turn is **adequate**

Driveway No. 1: Sight Distance Analysis for proposed development– Left turn departure from driveway with stop sign control

Revised Figure SDA-7 Sight Distance Analysis for Driveway No. 1; left turn departure from proposed site

~~Figure SDA-7 Site Distance Analysis for Driveway No. 1; left turn departure from proposed site~~

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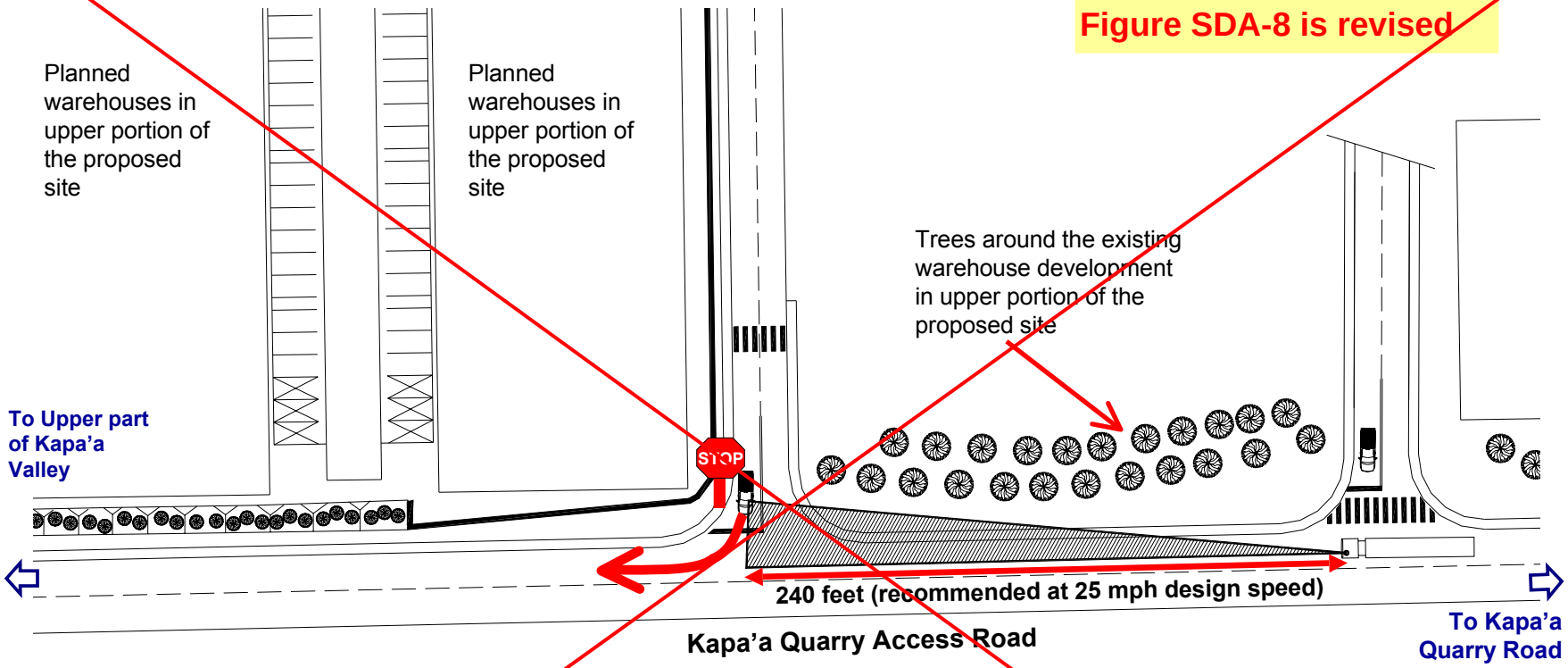

Recommended sight distance for right-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for right turn is **adequate**

Driveway No. 1: Sight Distance Analysis for proposed development– Right turn departure from driveway with stop sign control

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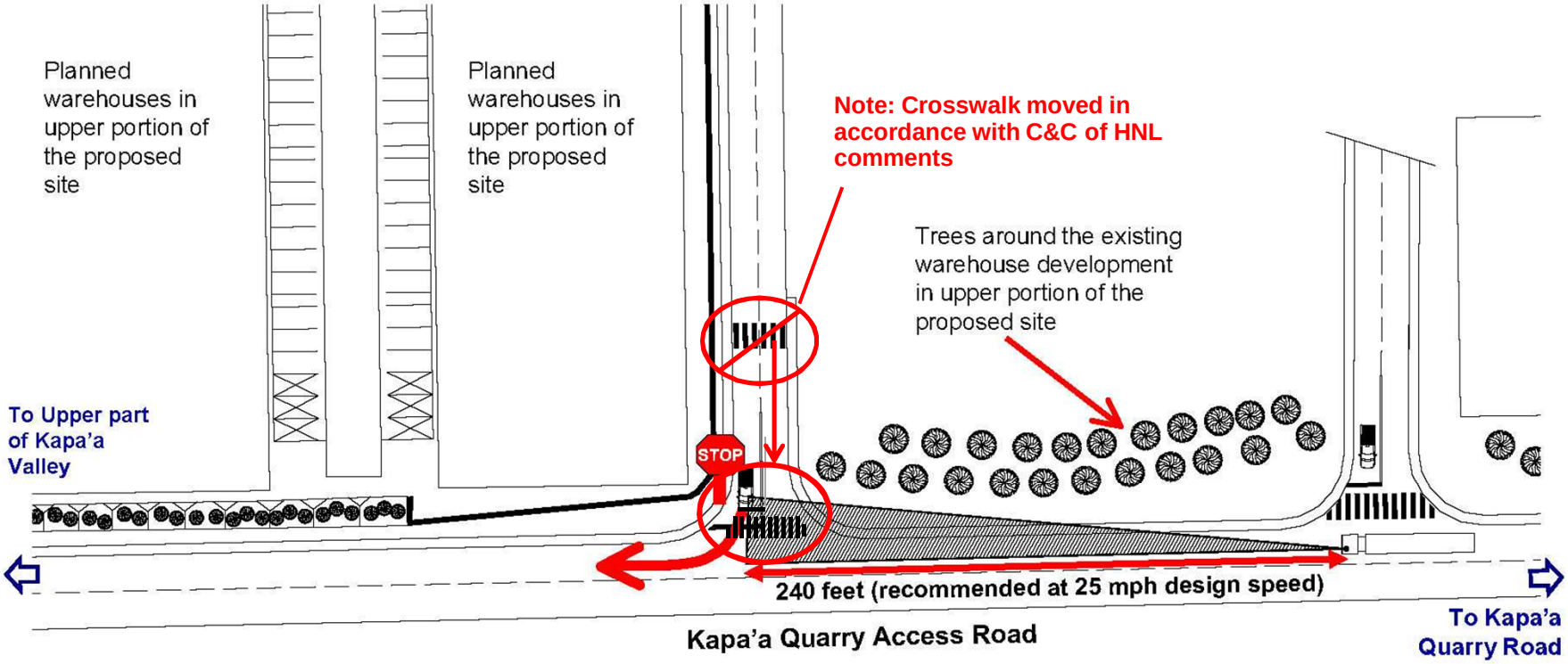
Figure SDA-8 Site Distance Analysis for Driveway No. 1; right turn departure from proposed site



Recommended sight distance for right-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for right turn is **adequate**

Driveway No. 1: Sight Distance Analysis for proposed development– Right turn departure from driveway with stop sign control

Revised Figure SDA-8 Sight Distance Analysis for Driveway No. 1; right turn departure from proposed site

~~Figure SDA-8 Site Distance Analysis for Driveway No. 1; right turn departure from proposed site~~

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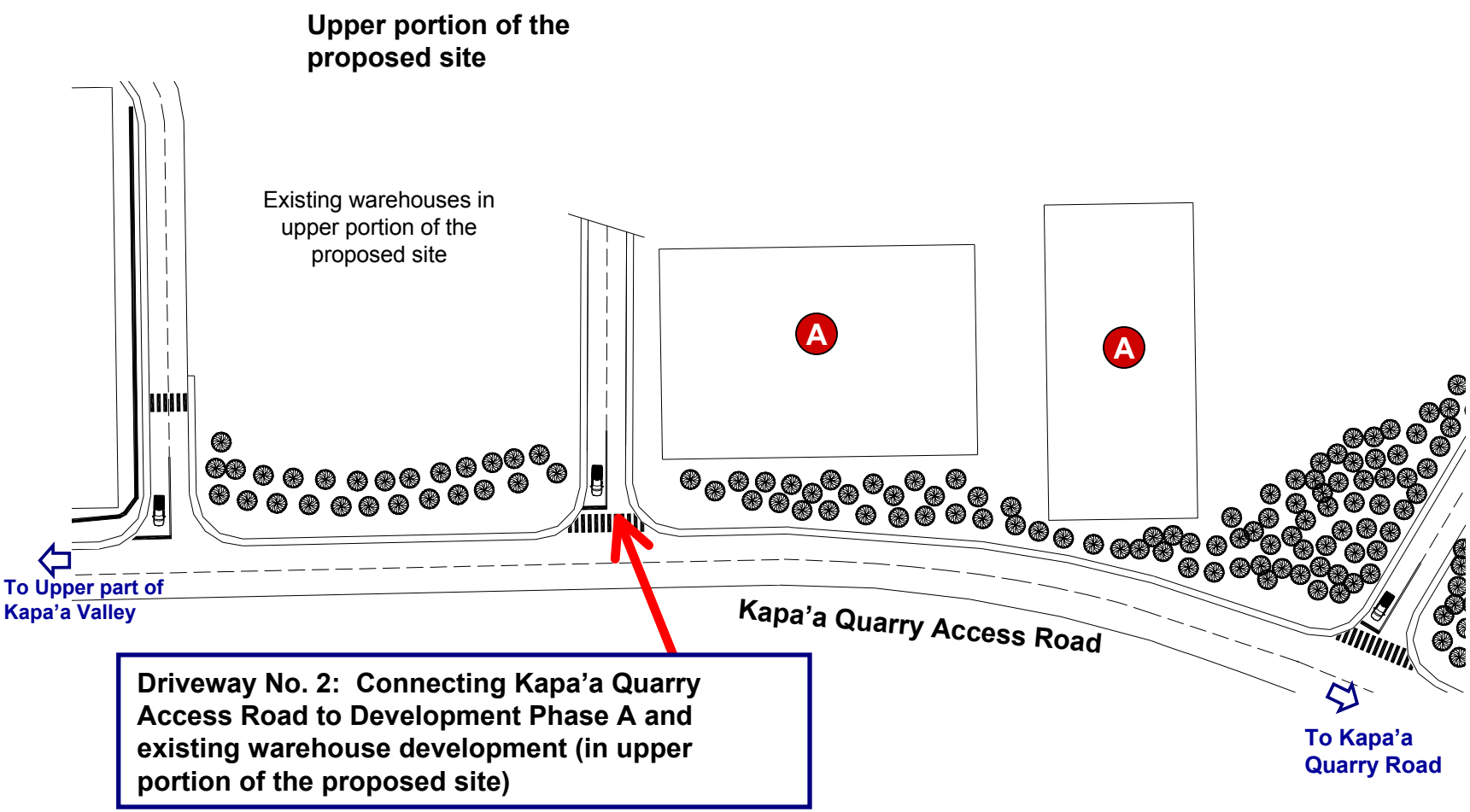

A Planned warehouses in upper portion of the proposed site

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Figure SDA-9 Layout of Driveway No. 2

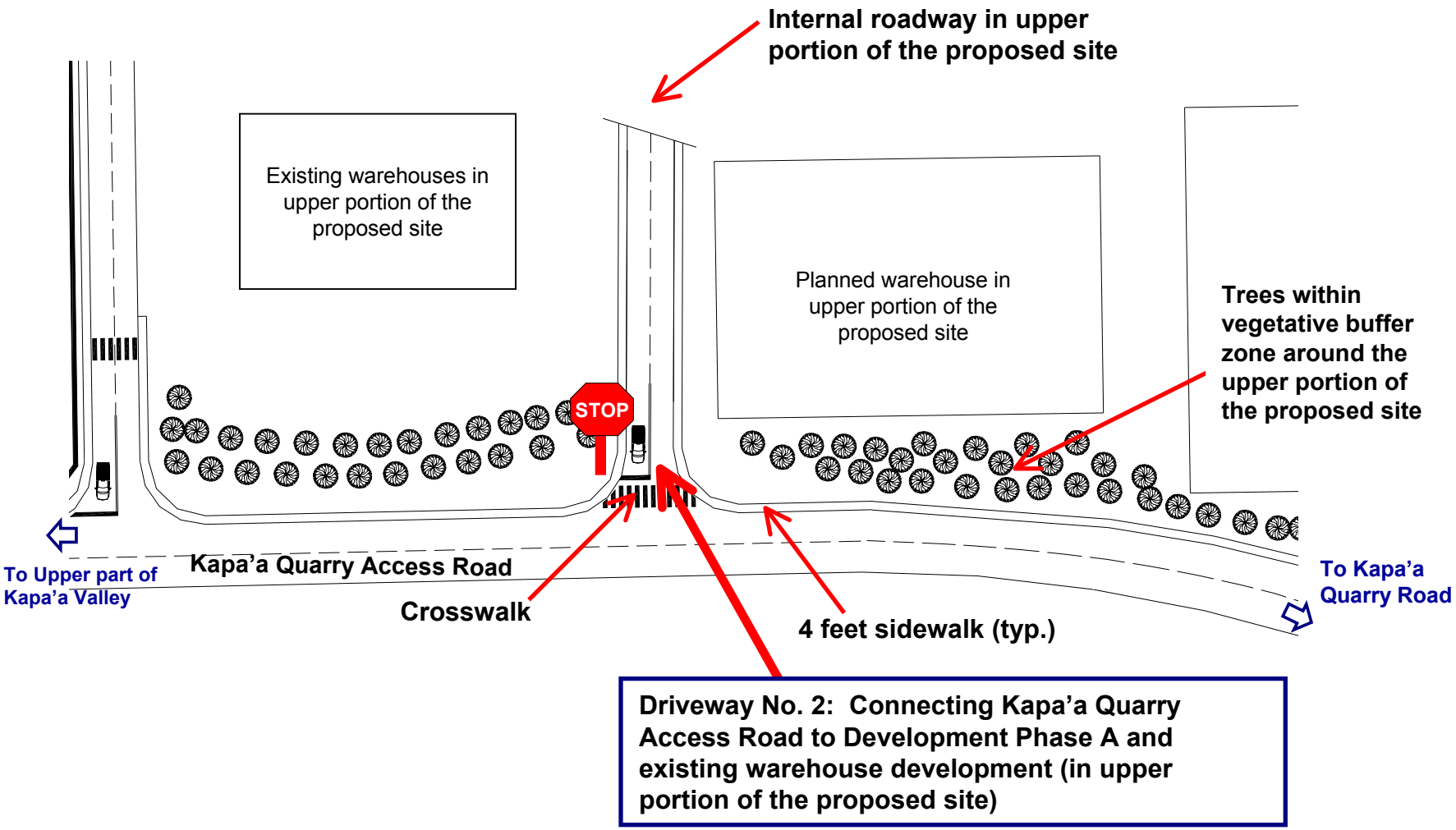

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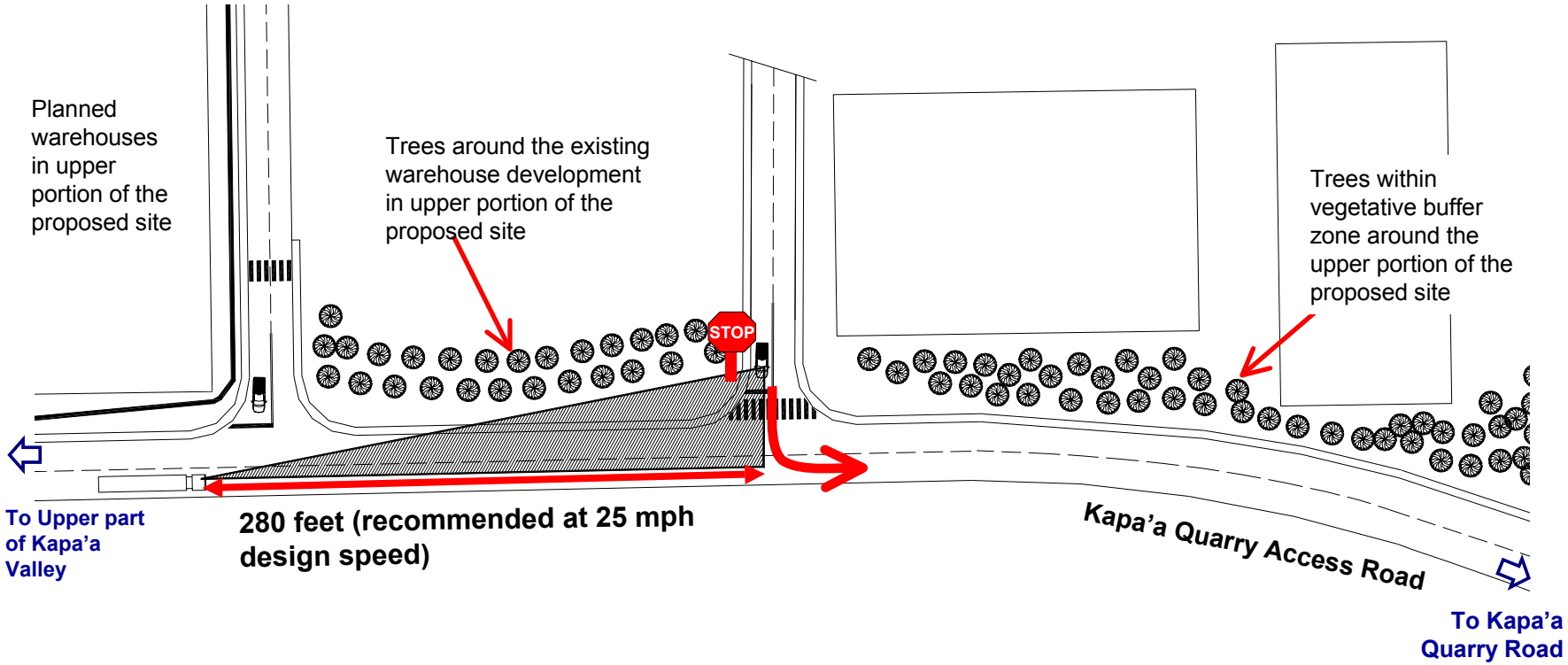
Figure SDA-10 Layout of Driveway No. 2



Recommended sight distance for left-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for left turn is **adequate**

Driveway No. 2: Sight Distance Analysis for proposed development - Left turn departure from driveway with stop sign control

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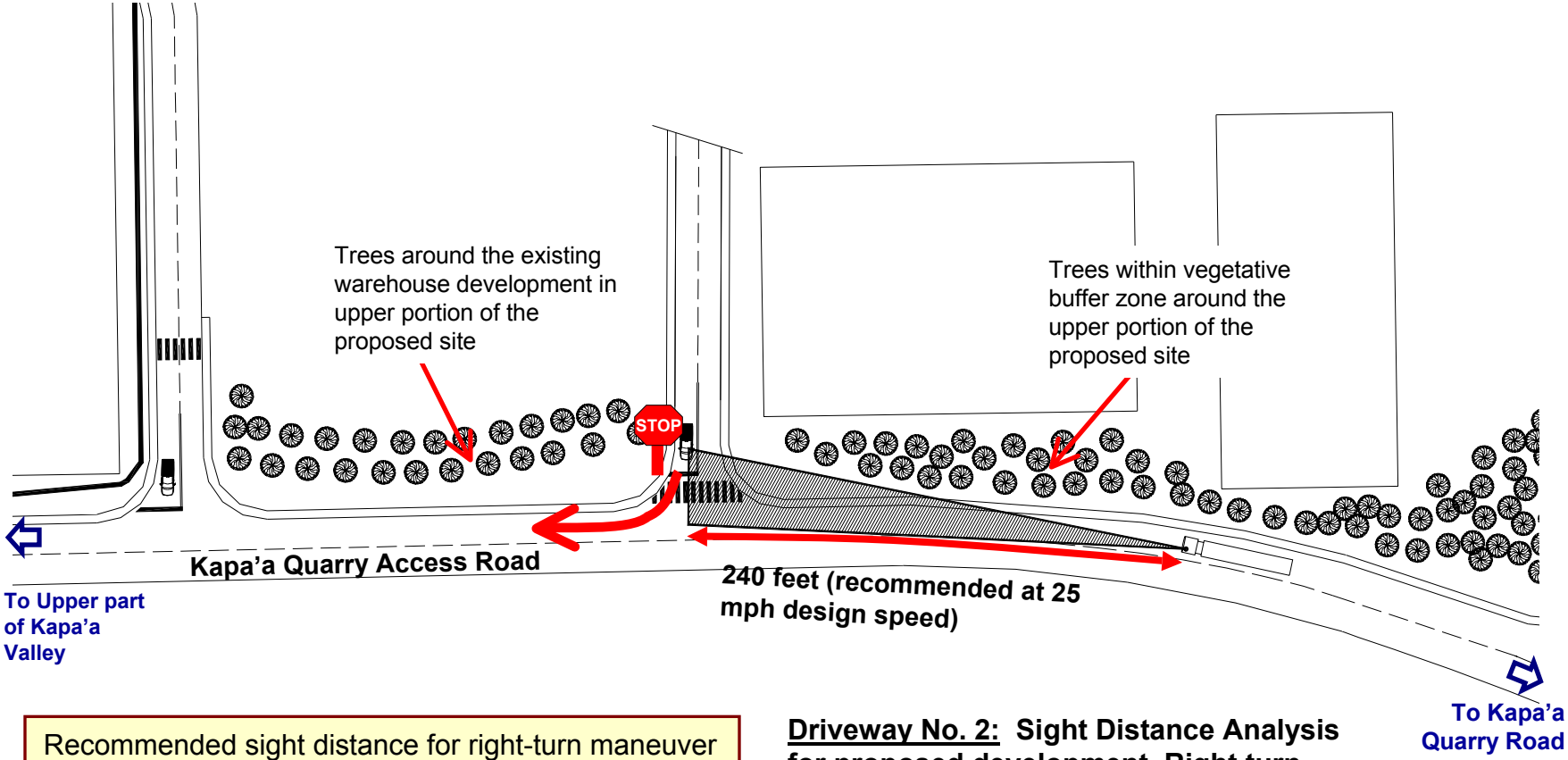
Figure SDA-11 Site Distance Analysis for Driveway No. 2; left turn departure from proposed site



Recommended sight distance for right-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for right turn is **adequate**

Driveway No. 2: Sight Distance Analysis for proposed development–Right turn departure from driveway with stop sign control

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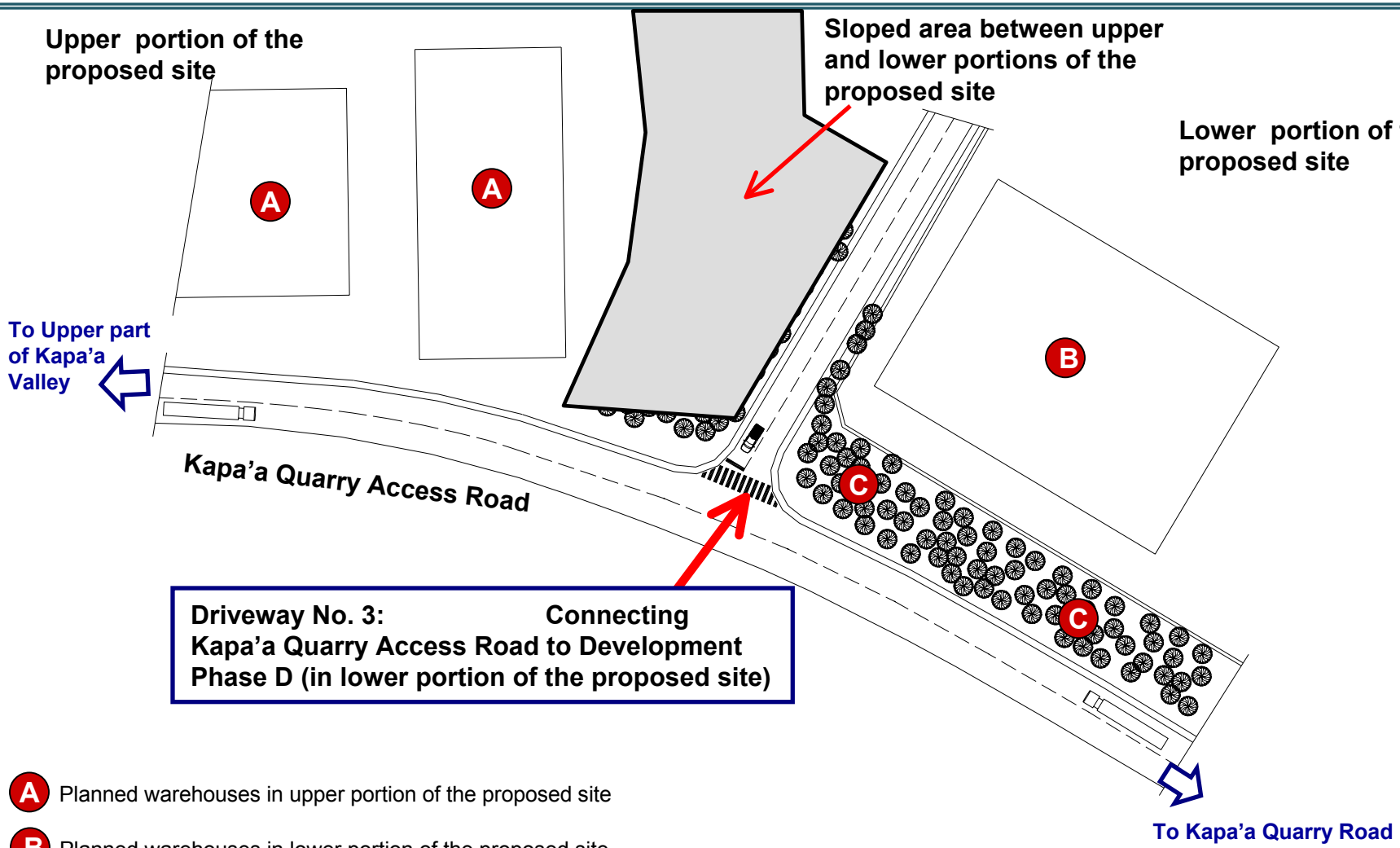
Figure SDA-12 Site Distance Analysis for Driveway No. 2; right turn departure from proposed site



A Planned warehouses in upper portion of the proposed site

B Planned warehouses in lower portion of the proposed site

C Trees belonging to vegetative buffer zone around lower portion of site

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Figure SDA-13 Layout of Driveway No. 3

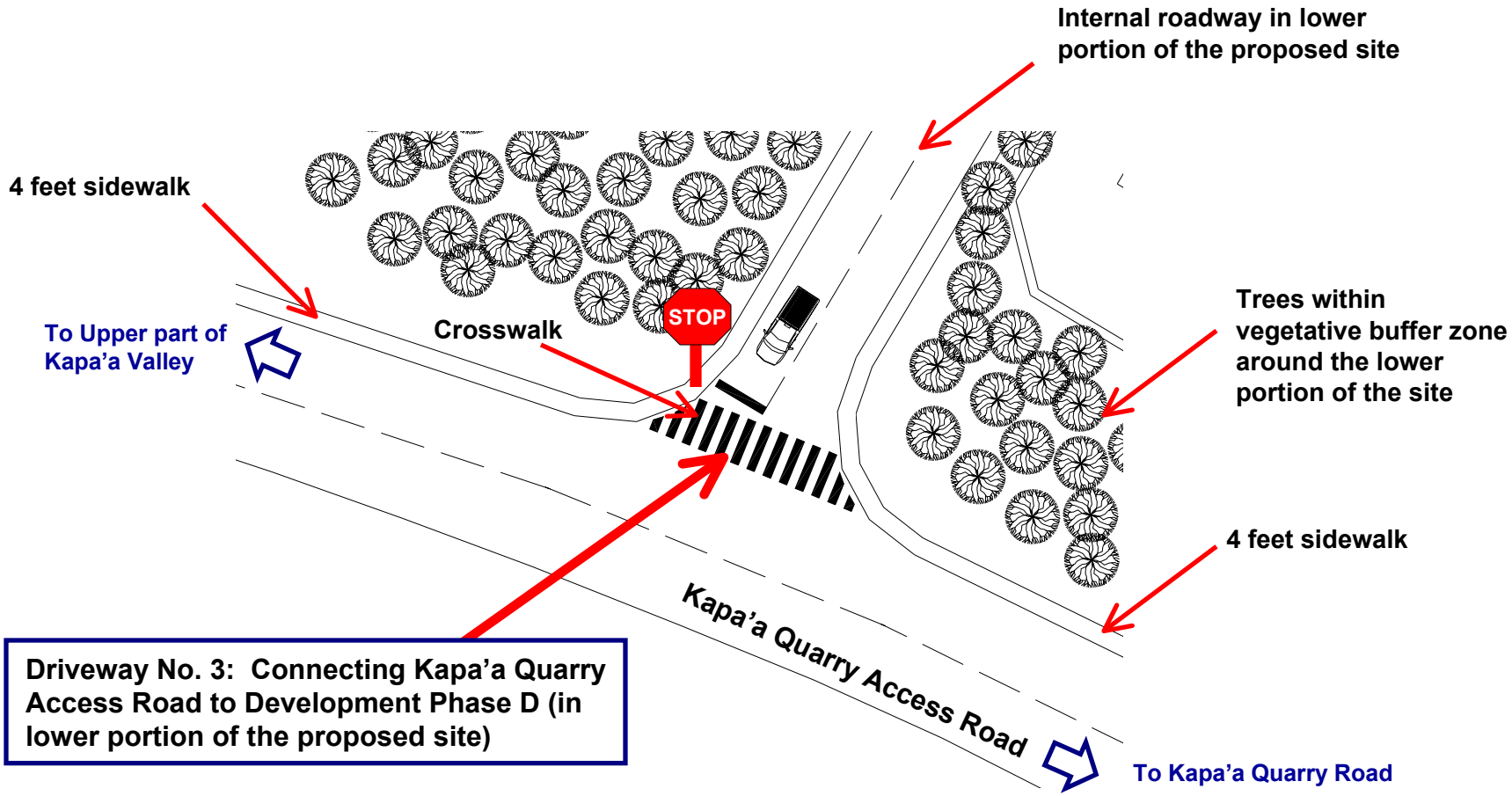

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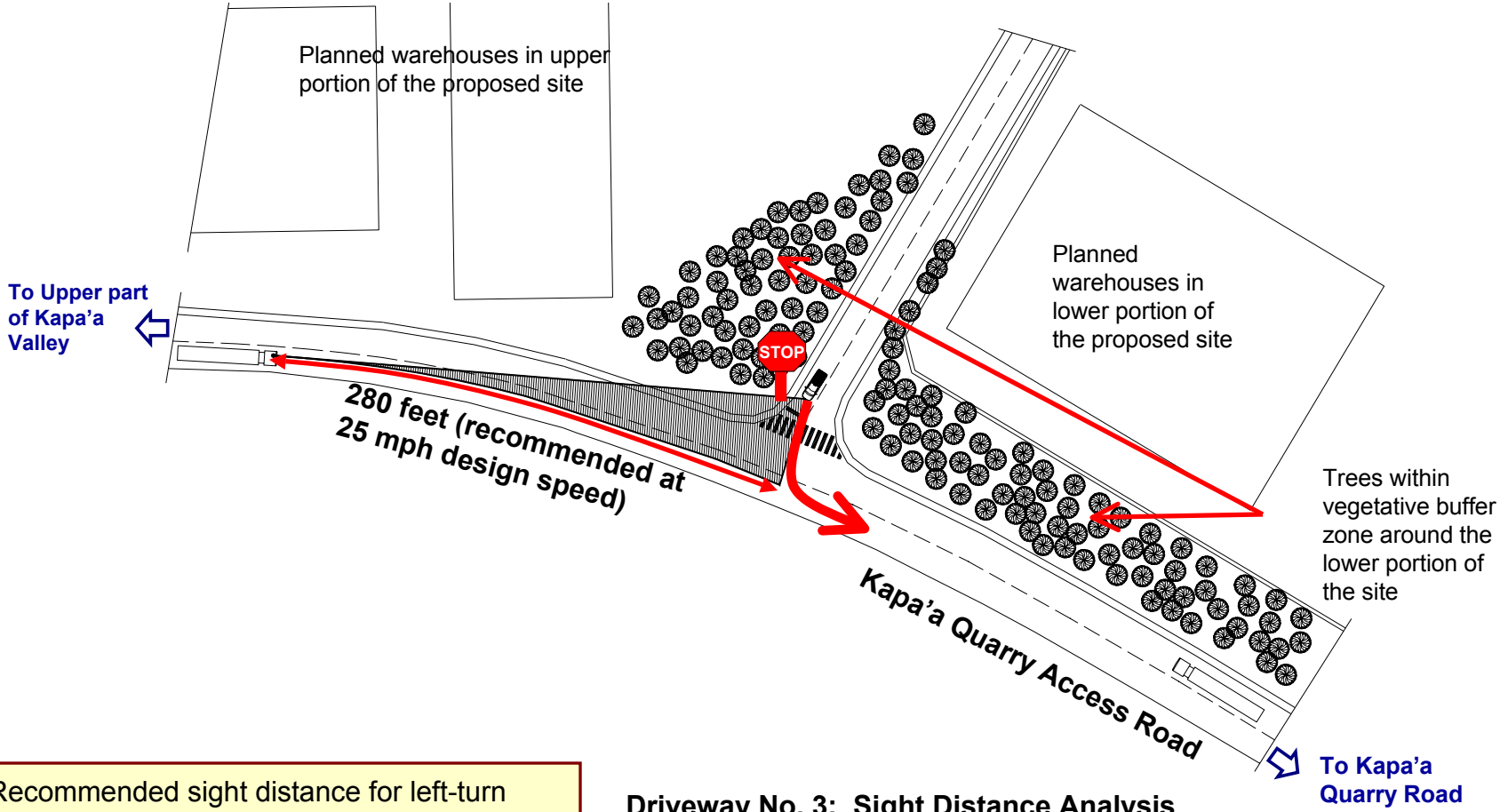
Figure SDA-14 Layout of Driveway No. 3



Recommended sight distance for left-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for left turn is **adequate**

Driveway No. 3: Sight Distance Analysis for proposed development– Left turn departure from driveway with stop sign control

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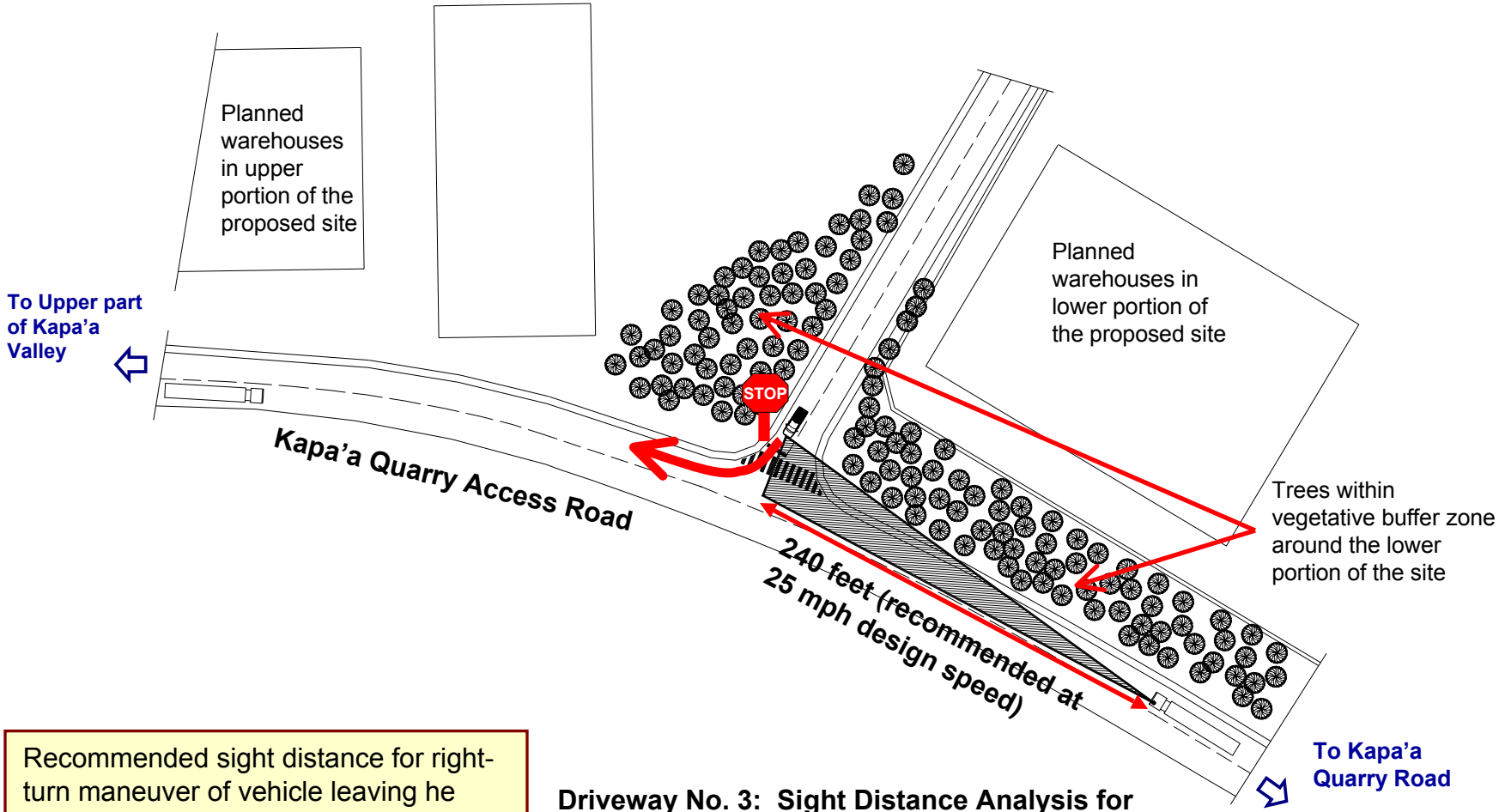
Figure SDA-15 Site Distance Analysis for Driveway No. 3; left turn departure from proposed site



Recommended sight distance for right-turn maneuver of vehicle leaving he proposed site is **free of obstructions**; Therefore sight distance for right turn is **adequate**

Driveway No. 3: Sight Distance Analysis for proposed development– Right turn departure from driveway with stop sign control

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Figure SDA-16 Site Distance Analysis for Driveway No. 3; right turn departure from proposed site

Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 7:

Water Resources Assessment for the Project Site

<u>Appendix 7 is identical to Appendix 7 of DEIS</u>

January 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
www.sustain-hi.com

APPENDIX 7

Draft Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Water Resources Investigation

Assessment of the existing water resources on the site

and of possible impacts of the proposed project on these resources

Prepared for

Kapaa I, LLC

Prepared by

Sustainable Design & Consulting LLC
www.sustain-HI.com

October 2010

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1. Introduction:

1.1. Project background:

The proposed Kapa'a Light Industrial Park (KLIP) would be built on three contiguous land parcels, TMK 4-2-15:001 (portion of), 006 and 008. The proposed development requires a zone change for two land parcels TMK 4-2-15:001 (portion of) and 006 from General Preservation (P-2) to Light Industrial (I-1). The land parcel in the center of the proposed site, TMK 4-2-15:008, is already zones as Intensive Industrial (I-2) and therefore does not need to be rezoned. The total area of the three land parcels is 79 acres, of which about 16 acres are developed and impervious land, used for an existing warehouse development of 283,000 square feet, and about 29 acres are developed, graded and pervious land, used for various industrial purposes. The proposed project site is divided into two portions, the upper and a lower portion of the site, with the upper portion, being an about level plateau having an approximately 30 -50 feet higher elevation than the lower portion, which is an area that slightly slopes towards the north. Under the proposed project the size of the developed land area would be 43 acres in which about 606,000 square feet of new warehouse space would be constructed.

Figure WRI-1 shows an aerial view of the project site with the upper and lower portions of the site indicated. As can be seen the upper portion of the site, which encompasses the two land parcels TMK 4-2-15:001 (portion of) and 008, is graded and has a number of warehouse structures. The lower portion of the project site does not presently have structures, but it is graded and accommodates certain commercial activities (e.g. Green Waste processing). Figure WRI-1 also indicates the study area for the water resources investigation for the proposed site. The study includes the development footprint of the proposed KLIP, areas in direct proximity to roadways which are adjacent to the site, areas in the Kapa'a Stream Corridor and area, within the three contiguous land parcels, next to the development footprint.

1.2. Methodology

The water resources investigation is conducted to determine the presence or absence of any waters or wetlands under the jurisdiction of the United States found within in the area affected by the project. Before conducting field investigations, federal and state documentation were reviewed, including Natural Resources Conservation Service (NRCS) and surface water and wetland Geographic Information System (GIS) data.

Since the project site is a former landfill for municipal waste and quarry tailing and overburden, the topology, therefore water resources have been significantly affected within the past couple

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Draft Environmental Impact Statement
Water Resources Investigation of Project Site

Figure WRI-1 Water Resources Investigation Area

of decades. Historical aerial photographs were obtained from the University of Hawaii at Manoa library system (map section) to assess to kind of changes the proposed project site have experienced over the past decades. Field investigations were conducted on September 27, 2010 to determine the presence or absence of streams, waters and wetlands in the study area, and in particular within the development footprint of the proposed industrial development. A general reconnaissance of the site was conducted, which involved walking the investigation area and taking photos of points of interest. A photographic documentation was prepared, which is the basis for the discussion in Section 3.

1.3. Kapa'a Stream Watershed and changing land use in Kapa'a valley

The water resources within the investigation site are part of the Kapa'a watershed area. The Kapa`a Stream watershed is an area of about 825 acres located in the Kapa'a valley. The Kapa`a Stream is the main drainage of the watershed to the Kawainui Marsh. The 1,000-acre Kawainui Marsh is the largest freshwater wetland in the State, habitat for four of Hawaii's endangered waterbirds. Based on several precipitation data and estimation methods (e.g. NOAA, local data and PRISM (parameter–elevation regressions on independent slopes model)) the estimated average yearly precipitation in the Kapa'a watershed is estimated within a range of 50 to 60 inch. The proposed project site covers approximately 6 % of the total watershed area. The project site is located in the lower reaches of the Kapa'a Valley. Over the past several decades the Kapa'a Valley, as well smaller portions of the marsh have been significantly altered by quarry operations with associated landfill operations. A series of aerial photos, Figures WRI-2 through WRI-7 portray the changes in land use and character of the Kapa'a Valley over the past six decades.

Figure WRI-2 shows the Kapa'a valley in 1952. While the initial Kapa`a quarry operations started several years before the date of this image the main land use in the lower reaches of Kapa'a valley remains to be agriculture. A road can be seen on a dam crossing the Kapa'a Valley and thus separating an approximately 35 acre farmland and wetland area in the lower reaches of the Kapa'a valley from the Kawainui Marsh.

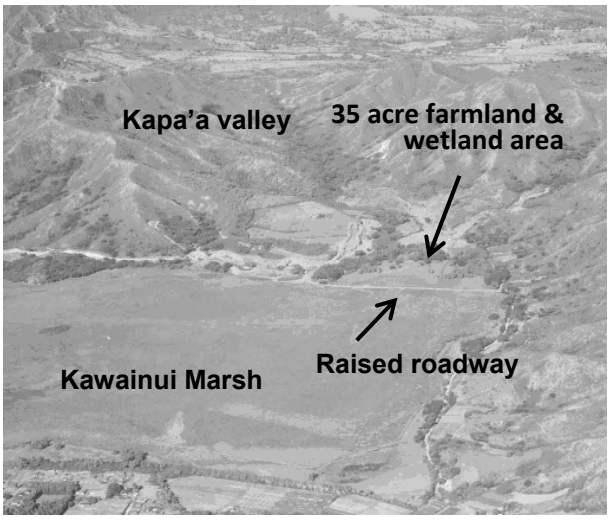


Figure WRI- 2 1952 Aerial Photo of Kapa'a Valley

Figure WRI-3 shows the Kapa'a Valley in 1965. The 35-acre enclosed area has now become a refuse dump. Overburden was used to cover the refuse. The landfill operations continued in the valley and previous agricultural land, stream channel and wetland area were covered with refuse and/or quarry tailings and overburden.

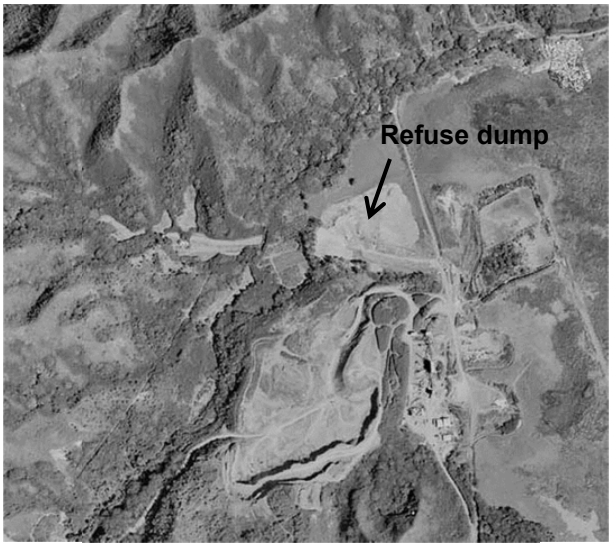


Figure WRI- 3 1965 Aerial Photo of Kapa'a Valley

Figure WRI-4 shows the Kapa'a Valley in 1976. The landfill operation in the 35 acre enclosed area are completed at this time and have resulted in about 25 acres of these 35 acre area to be covered; this about 25 acres area represents the lower portion of the proposed project site. This fill raised the land level an estimated 6 to 20 feet over about 23 of the 35 acres in this lower wetland area (DOH 2007). The photo also indicates that landfill operation have been carried out in the now upper portion of the proposed project site. Figure WRI-4 show that the work on the H3-freeway has begun.

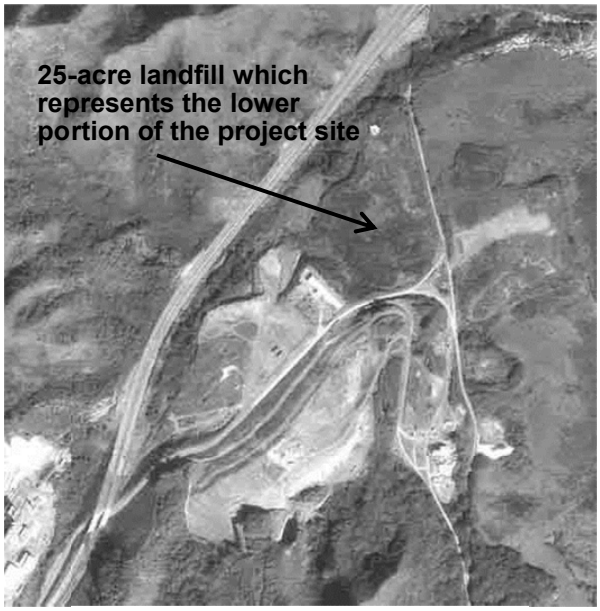


Figure WRI- 4 1976 Aerial Photo of lower reaches of the Kapa'a Valley

Figure WRI-5 shows the proposed project site in 1993. The landfill operation in the lower parts of the Kapa'a valley are now completed. The lower portion of the proposed site, which is the 25-acre landfill area, has a vegetation cover. The upper portion of the proposed project site, about 33 acres large, is shown as a plateau virtually devoid of vegetation and with several light industrial buildings. Since around 1975 light industrial buildings have been constructed within the upper portion of the site.

Figure WRI- 5 1993 Aerial Photo of lower reaches of the Kapa'a Valley

Figure WRI-6 shows the proposed project site in a recent aerial photo dated 2001. In this aerial photo of 2001 about 20 warehouses, 15 of which Quonset huts, are shown in the northern part of in the upper portion of the project site.

Figure WRI- 6 2001 Aerial Photo project site in the lower reaches of the Kapa'a Valley

Figure WRI-7 shows the project site in a recent aerial photo dated 2007. More warehouses are built in the upper portion of the project site. The more recent warehouses are larger and more advanced industrial buildings than the more basic Quonset huts and other buildings that date back 10 to 15 years. The upper portion of the proposed site has paved traffic areas between the buildings and as about 35 warehouse structures. The lower portion of the project site is virtually cleared from vegetation and shows selected industrial activities, such as Green Waste processing.

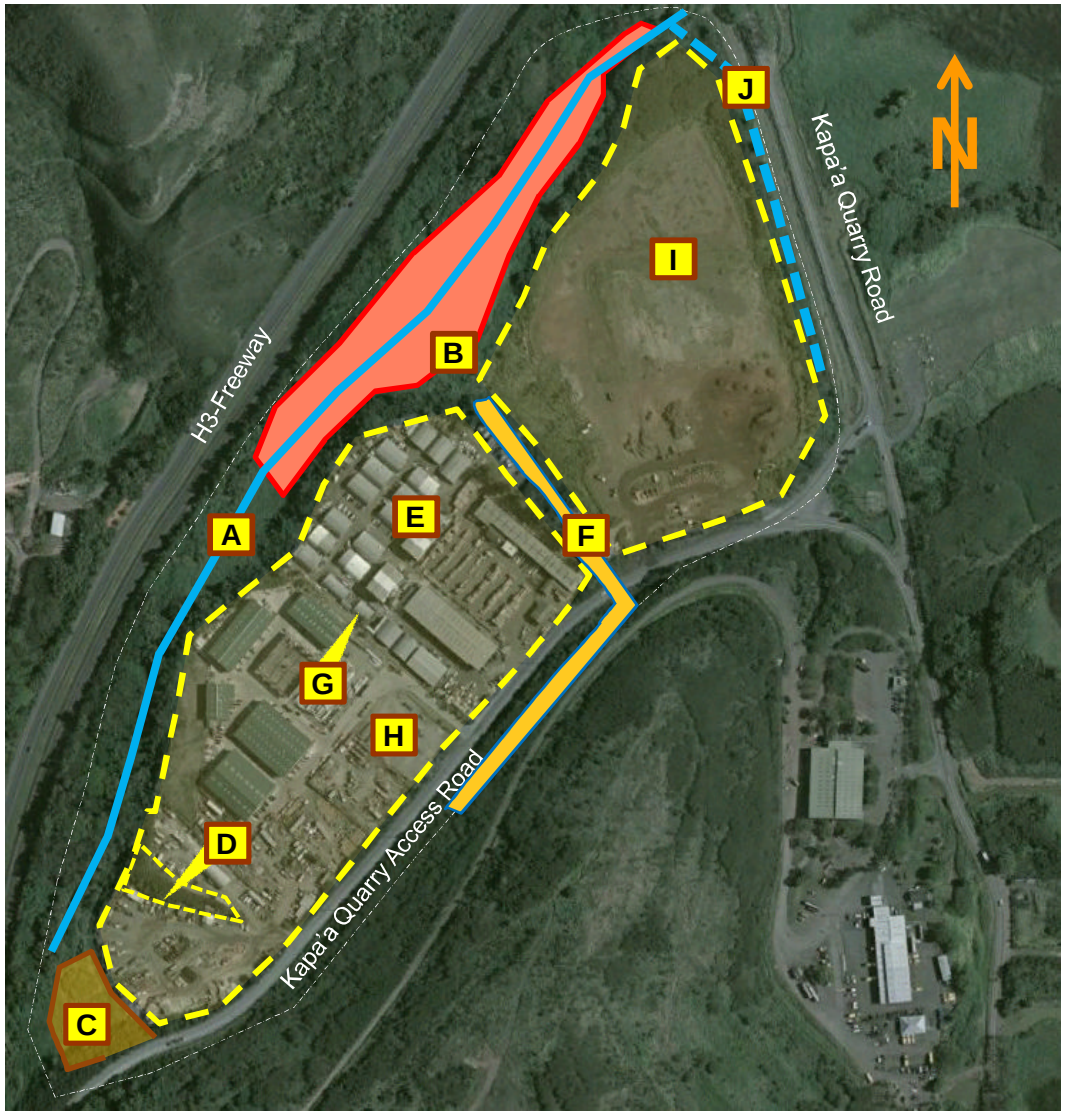
Figure WRI- 7 2007 Aerial Photo of the project site

As a conclusion, the Kapa'a Valley includes landfills associates with former quarry operations or refuse dumps. These landfill operation have significantly altered the appearance, topology and hydrology of the valley. For example, the streambed of the Kapa'a Stream, the main drainage of the Kapa'a watershed, has moved towards the north, as a result of the landfill in the lower portion of the project site . At the present no landfills are operated in the lower stretches of the Kapa'a valley.

1.4. Identified water features of interest on or in proximity of project site

Based on a literature review and previous site visits the following water resource features have been identified. These points of interest for the water resources investigation on the project site are displayed in Figure WRI-8 and are described in the following:

Feature of interest A: The **Kapa'a Stream** is the dominant water resource feature in the Kapa'a watershed. The Kapa'a Stream runs through the project water resources investigation area. While the Kapa'a Stream is not a perennial stream over the entire length through the watershed, the stream appears as a perennial stream throughout the entire length of the investigation area. While the stream is typically less than two feet in width in the upper stream section of the investigation area, the stream develops into a wider perennial



Definition of water resource features of interest identified and examined in the investigation:

A. Kapa'a Stream
B. 13-acres wetland area in the lower reaches of the Kapa'a Stream corridor
C. Drainage basin for runoff from the Kapa'a landfill.
D. Vegetated wedge
E. The water resources within existing industrial development in the upper portion of the project site.
F. Drainage of runoff through culvert and to percolation field on project site
G. Existing drainage swale in upper portion of project site
H. Eight acres of permeable area within development footprint
I. Lower portion of the site
J. Drainage canals along western side of Kapa'a Quarry Road

Figure WRI-8 : Definition of Water Resource Features of Interest

section right upstream of the drainage point to the Kawainui Marsh, which is also the end of the stream. All sections of the Kapa'a Stream are outside the development footprint of the proposed Kapa'a Light Industrial Park. Construction in conjunction with the development will not impact the streambed .

Feature of interest B: The entire **13-acres wetland area** in the lower reaches of the Kapa'a Stream corridor will likewise remain outside the development footprint of the project. The wetland area will not be altered, e.g. filled or drained or otherwise impacted, by the construction. This wetland area is the remaining part of the originally 35-acres large wetland area, which was separated from the Kawainui Marsh in the 1950s when the raised roadway was constructed in the early 1950s and separated this are from the Kawainui Marsh.

Feature of interest C: The area identified under feature "C" is a **drainage basin** that functions as flood control for runoff from the Kapa'a landfill. The drainage basin was a siltation basin for the quarry runoff. Today the area is open space with a thick vegetation cover. The area is south west of the boundary of the development footprint. Runoff that enters the area finally flows to the Kapa'a Stream, mostly as infiltrated groundwater. The runoff from the Kapa'a landfill enters the area "C" through an energy dissipation chute.

Feature of interest D: A natural feature within the development footprint of the project is a **vegetated wedge** that can be observed in the aerial photos. This triangular shaped vegetated area starts within the center section of the development and increases in width towards the edge of the development footprint. During an initial review of aerial photographs this vegetated strip was thought to indicate a water feature, such as a permanent of intermittent drainage swale.

Feature of interest E: The water resources, e.g. **drainage or other water features**, within the existing industrial development in the upper portion of the project site was examined for drainage features. The entire area has a continuous impervious surface, either structures or impervious pavement between the buildings.

Feature of interest F: A review of available site documentation indicated that an area to the south of the Kapa'a Quarry Access Road and the road itself drains into a **drainage swale** along the south side of the quarry access road. The runoff in the swale finally crosses the quarry access road and **flows through a culvert** underneath the road to **a percolation area** which is located between the upper and the lower portions of the project site, before the runoff finally flows to the Kapa'a Stream as underground flow.

Feature of interest G: While much of the runoff from the existing warehouse roofs and the paved areas between the warehouses drains over the edge of the paved area at multiple locations to Kapa'a Stream, there is **one existing drainage swale**, which receives runoff from several adjacent building rooftops and from the paved areas between the warehouses. The runoff in the swale is conveyed to a conventional detention pond, from where the runoff drains to the Kapa'a Stream.

Feature of interest H: There are about **eight acres** within development footprint that are **currently not paved**. Rainwater percolates rapidly into the fill, e.g. mostly gravel or coarse sand, and there are not surface drainage features visible.

Feature of interest I: The **lower portion of the site** consists of landfill area that was graded to create a slightly sloped area of about 22 acres. From earlier observations and available literature the topography of this area (e.g. landfill) has changed the stream bed of the Kapa'a Stream over time. No distinct major drainage swale could be identified and most of the drainage occurs through percolation of the rainwater into the ground. The entire area is not paved and not compacted to the degree that would attenuate rapid percolation of rainwater into the ground.

Feature of interest J: There are **drainage canals** on both side along the northern section of the **Kapa'a Quarry Road** starting at the model airplane in the south and ending at the confluence of the Kapa'a Stream into the marsh. The canal on the western side of the quarry road is within the land parcel TMK 4-2-15:006, directly adjacent but outside the proposed development footprint of the lower portion of the site.

2. Findings of the Field Investigation

During the field investigation on September 27, 2010 all water resource features of interests, with the exception of A and B, the Kapa'a Stream and the 13 acre wetland areas, respectively, were observed and a numerous photos were taken. These photos and the findings are presented and delineated in the following sections .

Comment: Kapa'a Stream and wet-land area (water features A and B): The sections of the Kapa'a Stream with are within the three contiguous land parcel of the project site and the 13-acre wetland area to the north of the lower portion of the project site were previously investigated in detail in the course of a feasibility design effort for a 13-acre bird habitat. The habitat and wetland restoration project was planned to approximately coincide with the delineated wetland area (Area B in Figure WRI-8). The objective of the bird habitat project was to restore the now densely vegetated wetland area to an open wetland area with shallow mud ponds to make the area a conducive habitat for endangered water birds. The feasibility study of the proposed wildlife habitat and wetland restoration project concluded that the removal of the dense wetland plant population might result in a degradation of water quality. The proposed wildlife habitat and wetland restoration project is presently discontinued and might be reevaluated in the future.

2.A. Kapa'a Stream

The Kapa'a Stream has a total length of approximately 1.8 miles, of which 0.7 miles are the lower reaches of the stream within the property of the developer. The stream is the primary drainage for the Kapa'a watershed area which measures some 825 acres (about 1.3 square miles). The stream has a baseflow of 0.8 and 1.2 cbf/sec, in the dry season (May to Oct.) and wet season (Nov. to April), respectively. The Kapa'a Stream is listed on the 2004 List of Impaired Impaired Waters in Hawaii prepared under Clean Water Act §303(d). The identified water quality in Kapa'a Stream as impaired by elevated turbidity, total suspended solids (TSS) as well as nutrients (TN, TP).

Kapa`a Stream flows to the Kawainui Marsh and beyond to the Oneawa Canal, Kailua Bay, and the Pacific Ocean. The streambed of the Kapa'a Stream as well as the water quality have been significantly affected over the past 60 years. Industrial activities such as major quarry operations refuse disposal landfill, deposition of quarry materials over wetlands and mid-valley stream course and the construction of a federal highway through the center of the valley have all

contributed to changing stream bed conditions and hydrology. It is doubtful that any significant length of the present streambed is in its original condition or location.

The development footprint of the proposed industrial park will not affect the streambed. The construction of the project , including grading or construction of structures are planned entirely outside the current and future streambed.

2.B. Wetland Area

A larger portion of the Kapa'a Stream corridor within the water resources investigation area is defined as "wetland". The Natural Resources Conservation Service (NRCS) has delineated 13 acres in this area as wetland. The location and extent of the delineated wetland area is illustrated in Figures WRI-9 and WRI-10, which show the original NRCS wetland delineation figure and the project site superimposed on the NRCS delineation, respectively. The NRCS wetland delineation is based on the definition of jurisdictional wetlands (by U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA)) as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR, Part 328.3).

The identification and delineation of jurisdictional wetlands is based on three parameters:

1. Hydrophytic vegetation – plants growing in water or on a substrate that is periodically deficient of oxygen as a result of excessive water content.
2. Hydric soils - soil that formed under saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.
3. Wetland hydrology - permanent or periodic inundation or soil saturation to the surface for sufficient duration during the growing season.

Figures WRI-11 and WRI-12 show two typical characteristics of the thick vegetation cover in the wetland area.

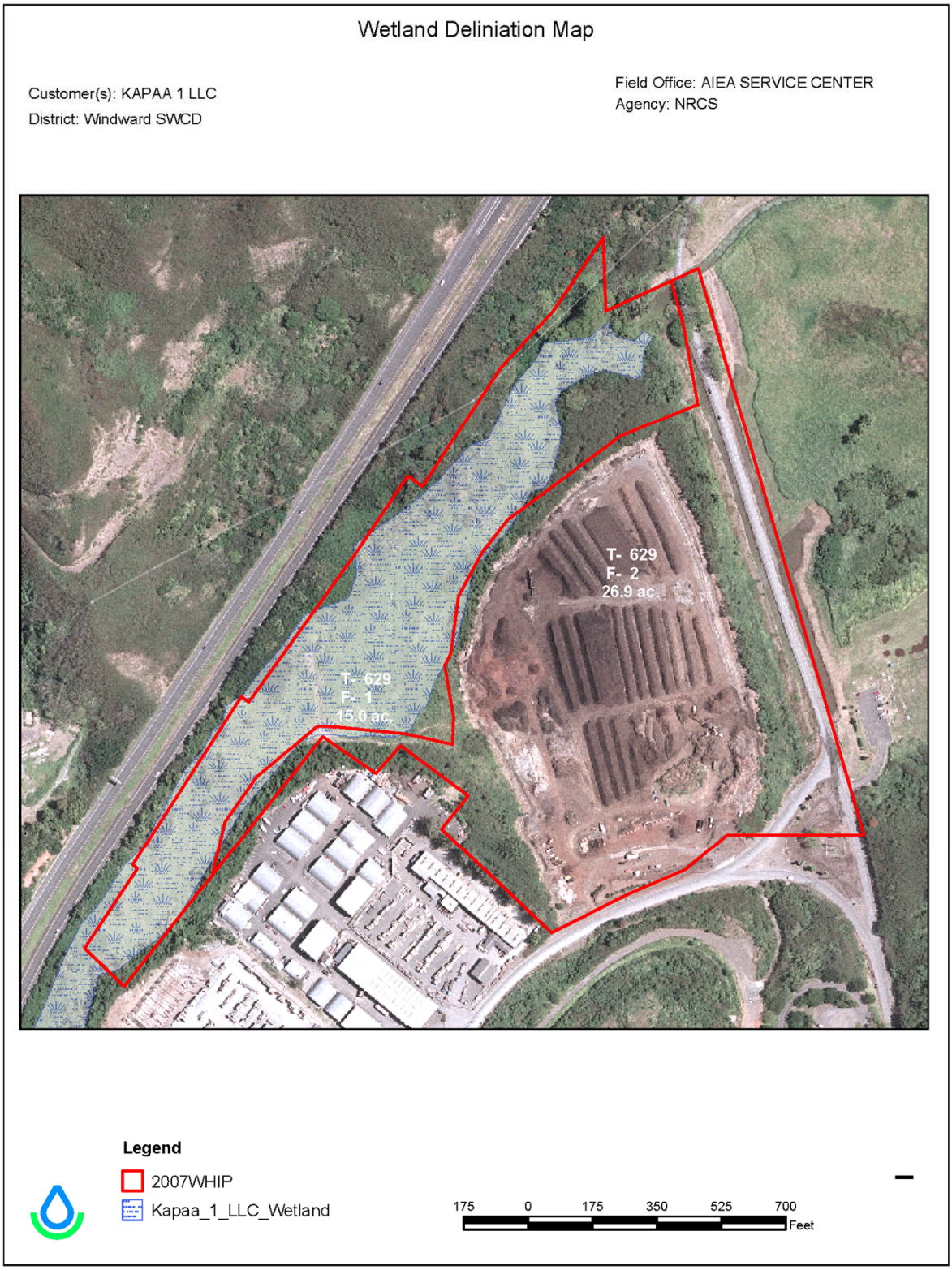


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Figure WRI-9 : NRCS Wetland delineation for lower reaches of Kapa's Stream

Figure WRI-10 : NRCS Wetland delineation with proposed project sites

Figure WRI-11 Typical Dense Vegetation Cover of California Grass in Wetland Area

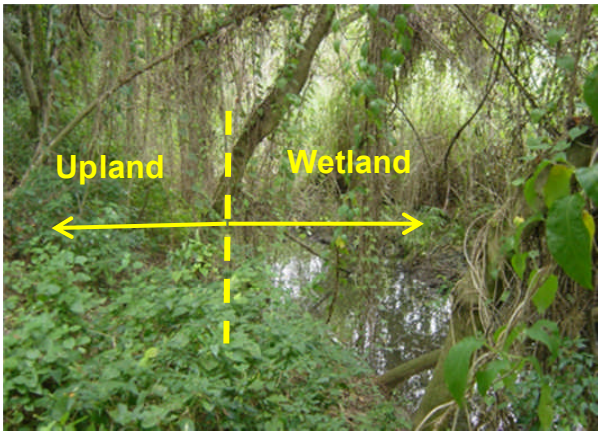

Figure WRI-12 Boundary of Wetland and Upland

The development footprint of the proposed industrial park will not affect the wetland area. The construction of the project, including grading or construction of structures are planned entirely outside the wetland boundaries.

2.C. Drainage Basin for Runoff from the Kapa'a Landfill.

The drainage basin is depicted in views 8 through 11 in Figure WRI-14. The camera position for these views is defined in Figure WRI-13. Please note that all Figures from WRI-13 through WRI-30 are presented at the end of this report.

The drainage basin is an approximately five acre large open area within the land parcel TMK 4-2-15:001 (portion of). This area was once a siltation basin for the Kapa'a Landfill runoff. The runoff from the landfill is conveyed through a concrete swale along the quarry access road (View 10) and enters the area through an energy dissipation chute (View 11). The runoff then discharges to the stream.

The development footprint of the proposed industrial park will not affect this drainage basin. The construction of the project, including grading or construction of structures are planned entirely outside the drainage basin. In the course of construction the now partly non stabilized slope between the development footprint and the basin will be stabilized in an appropriate form.

2.D. Vegetated Strip

Initial reviews of aerial photos suggested that the vegetated strip would indicate the presence of a water feature, e.g. a vegetated swale of ditch. Field investigation revealed that this vegetated area is an earth dike with a vegetation cover of varying width (e.g. brushes and small trees) rather than a swale or ditch. This area is depicted in views 1 through 7 in Figures WRI-14 and WRI-15. The camera positions and directions for these views are indicated in Figure WRI-13.

2.E. Existing Industrial Development in the Upper Portion of the Project Site.

The drainage conditions and soil conditions of the upper portion of the project site are depicted in views 21 through 24 and views 29 through 35, in Figures WRI-18, WRI-20 and WRI-21. Views 21 and 22, shown in Figure WRI-18, depict the older part of the existing warehouse development. The camera positions and directions for these views are indicated in Figure WRI-17.

The space between the warehouse structure is paved with concrete. Site drainage is through shallow swales in the pavement that convey the runoff to the edge of the pavement and to the open space beyond. View 23 shows the vegetated area just north of the warehouse development. Rainwater readily percolates into the ground and there are no drainage ditches or swales visible. View 24 show new construction activities. Drainage occurs through shallow swales in the roadways.

Views 33 through 36 in Figure WRI-21 show the drainage situation in the newer part of the existing warehouse development. The camera positions and directions for these views are indicated in Figure WRI-17. View 32 shows the shallow swales in the concrete pavement between the warehouses. View 35 shows the main roadway with shallow drainage swales in the concrete pavement. View 36 shows the entrance ramp that connects the upper portion of the project site with the quarry access road. Stromwater runoff occurs along the contoured drainage swale in the center of the road towards the drainage ditch along the quarry access road.

2.F. Drainage through Culvert and Percolation Field

The drainage of a small watershed basin south of the quarry access road enters the project site and percolates into the soil of the lower portion of the project site. Views 25 through 28 in Figure WRI-19 depict the runoff conveyance to the project site. The camera positions and directions for these views are indicated in Figure WRI-17.View 25 (looking to the west and away from the

marsh) shows the drainage ditch along the quarry access road, which receives the runoff from the small watershed area as well as the runoff from the quarry access road. View 26 shows the drainage ditch and the inlet structure for the ditch (looking to the eat and toward the marsh). View 27 is a close up view of the drain inlet structure, where the runoff from the ditch overflows into the basin. View 28 shows the inside of the inlet structure and the start of the 30-inch pipe culvert. Runoff would flow through this culvert underneath the quarry access road and to the percolation filed on the lower portion of the project site.

Views 43 through 46 in Figures WRI-23 and WRI-24 depict the infiltration situation of the runoff as it leaves the culvert on the project site. The camera positions and directions for these views are indicated in Figure WRI-22. View 43 shows the approximate location of the outlet of the 30-inch culvert. During the field investigation the vegetation around the outlet of the culvert was too dense to make a photo of the outlet of the culvert itself. View 44 shows the soil situation about 10-15 feet downhill from the culvert outlet. No traces of standing water of moist soil could be detected. View 45 indicates the location of the culvert outlet. The exposed soil on the left is land fill. The thick vegetated area to the right coincides with the foot of the slope that separates the lower and upper portion of the project site. The panoramic view 46 shows the situation downhill of the outlet of the culvert. No defined streambed is visible and there appears thick vegetation along the foot of the slope between upper and lower portions of the project site up to the Kapa'a Stream corridor.

2.G. Existing Drainage Swale in Upper Portion of Project Site

Views 29 through 32 in Figure WRI-20 show the only existing larger drainage swale in the upper portion of the project site. The camera positions and directions for these views are indicated in Figure WRI-17. The swale drains several roadway areas and several rooftops adjacent to the swale. Views 29 and 30 show the vegetated and concrete portions of the drainages swale, respectively. Views 31 and 32 depict the detention pond and the drainage structure of the detention pond, respectively.

2.H. Eight Acres of Permeable Area within Development Footprint

Besides warehouses with concrete pavement between them the upper portion features about eight acres of unpaved space that is currently used for equipment storage or as small baseyards. View 34 shows a typical exterior equipment storage which is not paved but has pervious ground cover of gravel and coarse sand. On these eight areas rainwater readily percolates into the ground and there are typically no drainage features.

2.I. Lower Portion of the Proposed Project Site

Views 41, 42 and 47 through 50 in Figure WRI-23 through WRI-26 show different images of the lower portion of the project site. The camera positions and directions for these views are indicated in Figure WRI-20.

Views 41 and 42 show the entire lower portion of the project site. As can be seen there are different operations, e.g. Green Waste processing, conducted on this approximately 25-acre site. View 47 shows the berm of the landfill area above the Kapa'a Stream corridor. The landfill area is between 5 and 15 feet higher than the stream corridor. View 48 shows a panoramic view of the lower portion of the site. Since soil (e.g. Green Waste and gravel) is constantly moved there are no defined ditches or swales. View 49 depicts the typical surface soil condition of gravel and coarse sand. Rainwater readily percolates into the ground. View 50 shows the typical 3-4 foot high earth berm that surrounds the lower portion of the project site.

2.J. Drainage canals along western side of Kapa'a Quarry Road

The drainage canal segment lies along the western side of Kapa'a Quarry Road between the intersection with the quarry access road and the confluence point with the Kapa'a Stream. Views 60 through 68 in Figure WRI-28, WRI-29 and WRI-30 show different images of the canal section. The camera positions and directions for these views are indicated in Figure WRI-27.

Views 60 and 61 show the shoulders of the quarry access road just upstream of the canal. There is no apparent drainage ditch along the north side of the access road, which would convey surface runoff from the roadway to the canal. View 62 shows the south end of the canal. View 63 shows the canal in midsection looking north. There is virtually no shoulder between the quarry road and the canal. The canal surface is about four feet below the road elevation. On the western side of the canal (on the left of the photo) is a 25 feet wide level strip which has a 15 feet dirt maintenance road. Beyond the level strip is a vegetated 8–10 feet earth berm with bushes and small trees.

View 63 shows the drainage ditch in a close-up photo. During the investigation there was no free water surface visible and the surface is made up of a dense vegetation cover. At places grass is seen growing in the middle of the canal. Probing of the surface revealed that the canal contained only wet mud and little free water.

View 65 shows the canal looking south. The quarry road is on the left and a 25 feet wide level strip on the right of the canal. View 66 shows the canal as one approaches the confluence with the Kapa'a Stream, which is a short distance past the large trees.

Views 67 and 68 show the confluence of drainage canal and Kapa'a Stream. As indicated the entire surface of the canal and most of the surface of the Kapa'a Stream is covered with vegetation.

3. Discussion and Conclusion of Water Resource Investigation

The proposed Kapa'a Light Industrial Park would be developed on three contiguous land parcels, TMK 4-2-15:001 (portion of), 006 and 008. The three land parcels have a total area of 77.4 acres. Of these 77.4 acres total land area of approximately 43 acres would be used for industrial development, including the 22.4 acres that are presently already zoned for intensive industrial land use. The area covered by this water resource investigation comprises all of the three continuous land parcels and, in addition, some water features in close proximity of the three land parcels.

As discusses in the sections before, there are several significant water resources, which are shown in the following list:

Table 3-1 Indication of significant water resources within or adjacent of the project sites

No.	Description significant water resource identified for propose project	Identifier in report	Inside three land parcels TMK 4-2-15:001, 006, 008	Inside or affected by development footprint of project
1	Lower reaches of the Kapa'a Stream	A	Yes	No
2	13 acre wetland area	B	Yes	No
3	Drainage basin for runoff from the Kapa'a landfill.	C	Yes	No
4	Drainage swale along and culvert under quarry access road	F	No	No
5	Percolation field for runoff from culvert	F	Yes	Yes **
6	Drainage canals along western side of Kapa'a Quarry Road	J	Yes	No

*Note: statement "Yes**" indicates that the percolation fields will not be inside the graded area of the site. The percolation field would be located within an area that would be restored with native or adaptive plants; the restored habits is located within the project areas for which LEED certification is sought.*

Other water related features on or adjacent to the proposed site are not significant.

As the list above indicates, all of these significant water resources, with the exception of No. 4 in Table 3.1 e.g. the percolation field of the runoff leaving the 30-ich culvert under the quarry access road, are located outside the development footprint of the proposed industrial development and therefore these water resources would not be affected by construction activities, such as stream alterations, grading or deposition of soil.

The one significant water resource feature that would be affected by the proposed industrial development, is the percolation area of the stormwater runoff that enters the lower portion of the site through a 30-inch pipe culvert underneath the quarry access road. The field investigation has detected no permanent stream downstream of the outlet of the culvert inside the lower portion of the site. It appears that water would readily percolate into the ground and that a surface runoff would be only a short distance if sufficient runoff quantity were present in a storm event. The existing percolation area is outside the current graded land within the lower portion of the site. Planned construction of the proposed project within the lower portion of the site would be outside the existing percolation area. If the layout of the proposed development would call for grading and fill that affected the existing percolation field it is recommended that the existing culvert be extended northwards towards the Kapa'a Stream corridor where the percolation could be readily occur and where runoff would continue to flow into the Kapa'a Stream.

In the sustainable design approach (Appendix 4) the existing percolation area would be inside or next to the "habitat restoration" limits, e.g. the sloped area between the lower and upper portion of the site which will remain open and vegetated area and would be restored with native or adaptive. The stormwater runoff entering the site through the 30-inch culvert would therefore be distributed on vegetated land and this would continue the present infiltration of stormwater into the ground and subsequent underground flow of stormwater towards the Kapa'a Stream.

As a final conclusion, the proposed industrial development would therefore not negatively affect any waters or wetland areas under the jurisdiction of the United States .

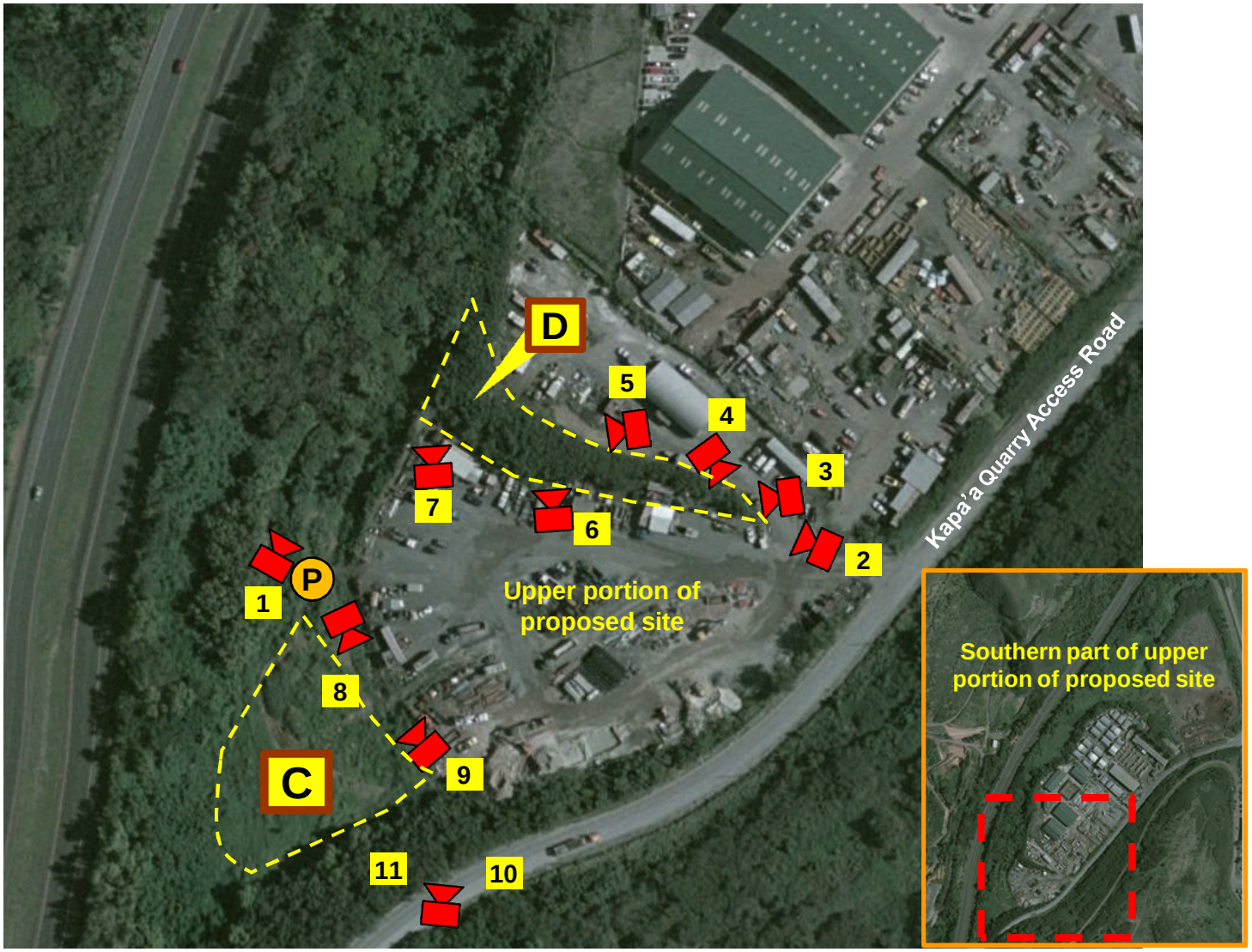

Figure WRI-13 Definition of Views 1 through 11 in Upper Portion of Site

View 1: in Figure WRI-13 : Panoramic picture of pen space between landfilled site and Kapa'a Stream Corridor

View 2 in Figure WRI-13 : Vegetated strip on earth berm on site; start of the berm

View 3 in Figure WRI-13 Vegetated strip on earth berm on site; entry section of berm

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Figure WRI-14 Display of Views 1 through 3

View 4 in Figure WRI-13 : Vegetated strip on earth berm on site; beginning portion from north side

View 5 in Figure WRI-13 : Vegetated strip on earth berm on site; middle portion from north side

View 6 in Figure WRI-13 : Vegetated strip on earth berm on site; middle portion from south side

View 7 in Figure WRI-13 : Vegetated strip on earth berm on site; end of berm at edge of landfill

View 8 in Figure WRI-13 : Earth dike between the drainage basin and upper portion of the project site; drainage basin is to the right.

View 9 in Figure WRI-3 : Earth dike between the drainage basin and upper portion of the project site; drainage basin is to the right

View 10 in Figure WRI-13 : Drain inlet t is at the yellow pole

View 11 in Figure WRI-13 : View down the energy dissipation chute of the drain inlet, drainage occurs towards the drainage basin in the background

Figure WRI-16 Display of Views 8 through 11

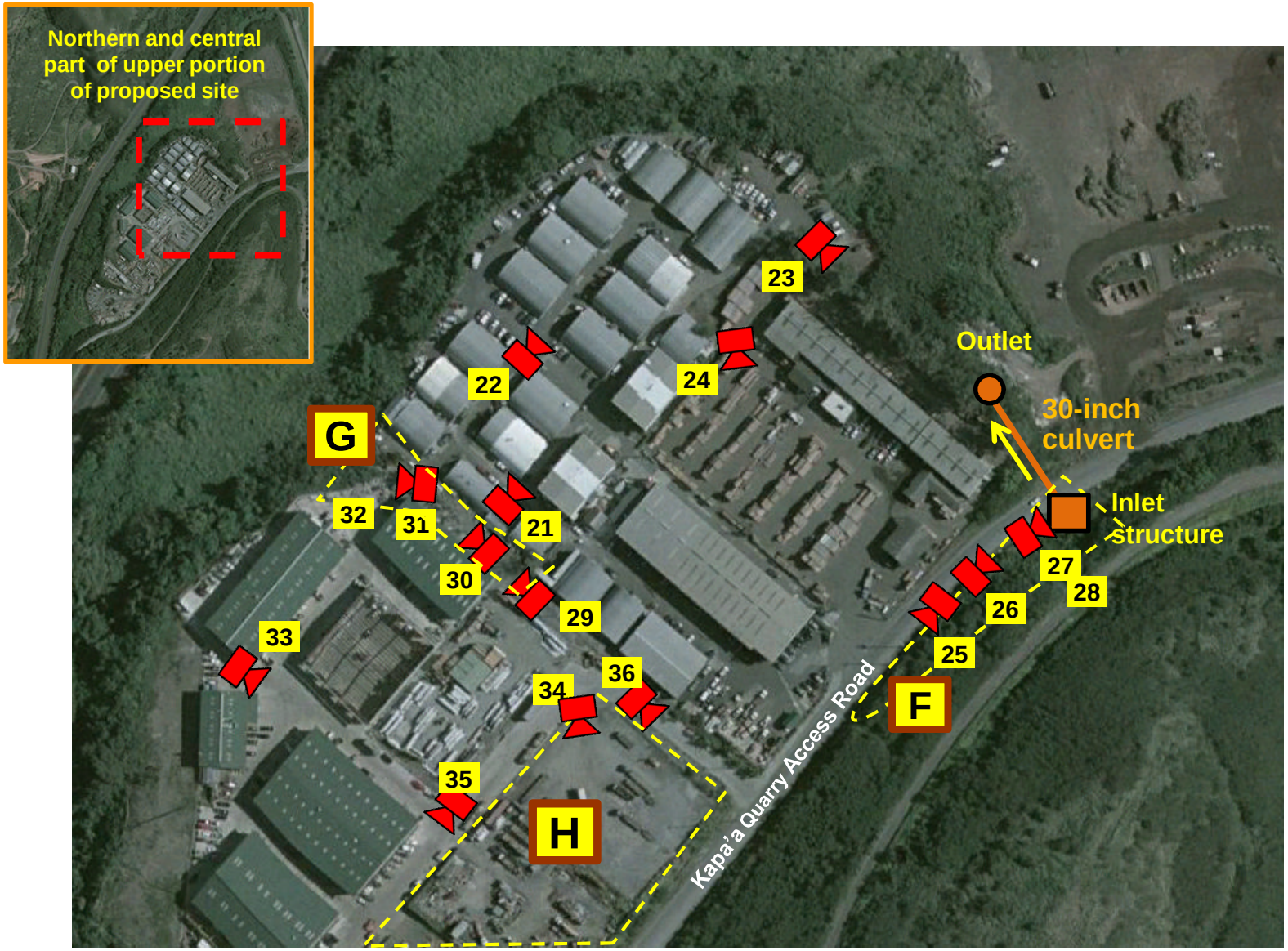

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Figure WRI-17 Definition of Views 21 through 36 in Upper Portion of Site

View 21 in Figure WRI-17: Existing warehouse development, impervious pavement of internal roadways

View 22 in Figure WRI-17 : Existing warehouse development, impervious pavement of internal roadways

View 23 in Figure WRI-17 : Vegetated buffer zone between the upper and lower portions of the project site; gravel and vegetated area

View 24 in Figure WRI-17 : Areas within the existing industrial development; new structures and buildings being added

View 25 in Figure WRI-17 : Drainage ditch along the south side of quarry access road; road drainage is towards this vegetated ditch

View 26 in Figure WRI-17 : Drainage ditch drains into the inlet structure of culvert (at yellow posts); red arrow indicates flow through of culvert under the road

View 27 in Figure WRI-17 : Inlet structure for the 30-inch culvert; ditch along road drains into culvert

View 28 in Figure WRI-17 : View down into the inlet structure of culvert; culvert inlet is at left

View 29 in Figure WRI-17: Drainage swale that conveys runoff from roads and adjacent rooftop to a detention basin; grass swale section

View 30 in Figure WRI-17 : Drainage swale that conveys runoff from roads and adjacent rooftop to a detention basin; concrete swale section

View 31 in Figure WRI-17 : Detention pond at the end of the concrete drainage swale

View 32 in Figure WRI-17 : Detention pond at the end of the concrete drainage swale, discharge structure - stand pipe with oveflow

View 33 in Figure WRI-17 : Drainage situation inside the existing warehouse development (pavement contours funnel runoff to the drain inlets)

View 34 in Figure WRI-17 : The open areas within the existing industrial development are not paved with concrete, but have a gravel surface

View 35 in Figure WRI-17 : Drainage situation inside the existing warehouse development (pavement contours funnel runoff to the drain inlets)

View 36 in Figure WRI-17 : The main entry road to the upper portion of the site; drainage occurs through contoured shallow swale in pavement towards the quarry access road

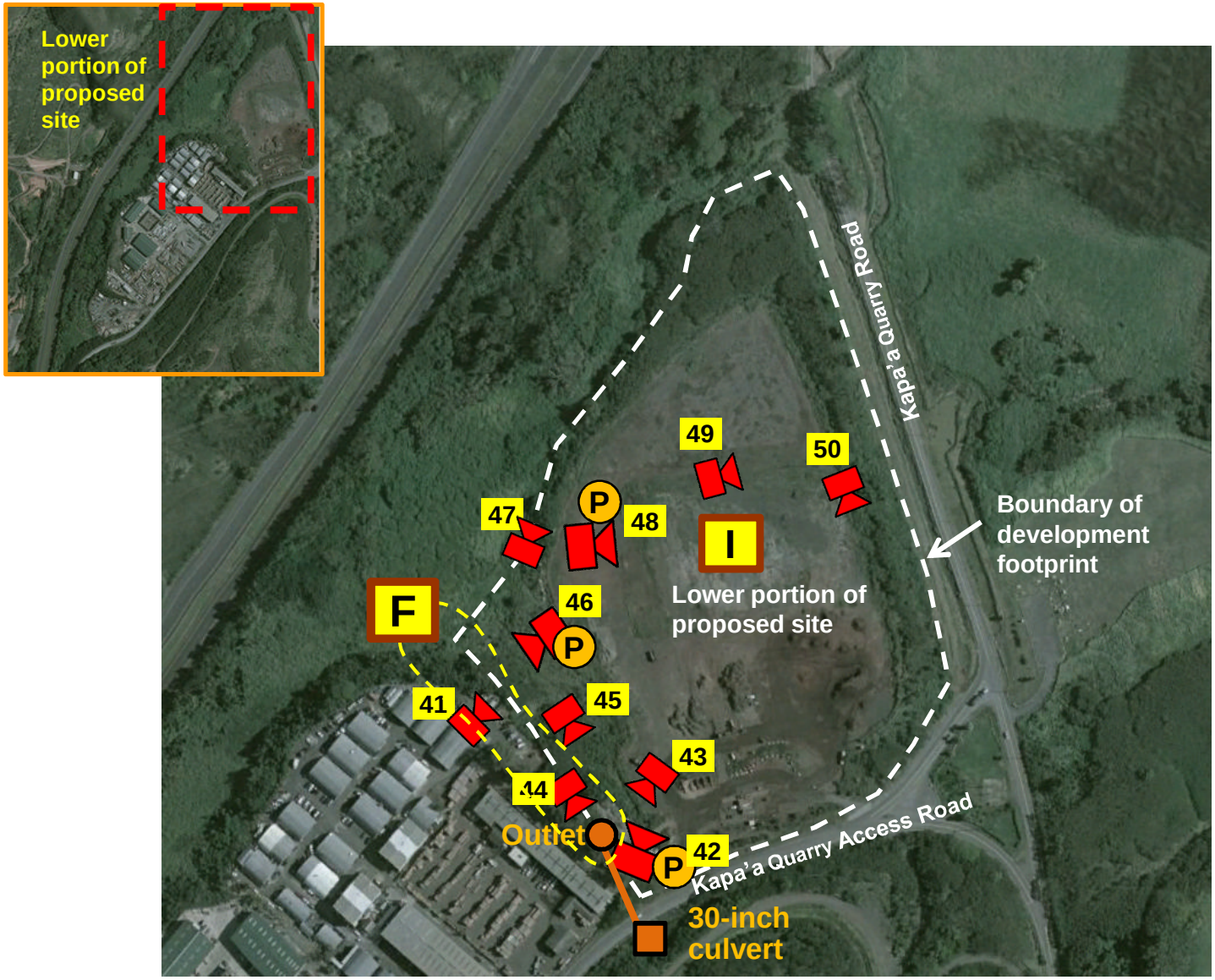

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Figure WRI-22 Definition of Views 41 through 50 in Lower Portion of Site

View 42 in Figure WRI-22: Panoramic picture of lower portion of proposed site

View 41 in Figure WRI-22 : Overview of lower portion of the proposed site

View 43 in Figure WRI-22 : View of vegetated buffer between upper and lower portion of site: the outlet of the 30-inch culvert is orange arrow

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Figure WRI-23 Display of Views 41 through 43

View 46 in Figure WRI-22 : Panoramic picture of foot of sloped vegetative buffer between upper and lower portion of site

View 44 in Figure WRI-22 : Outlet of 30-inch culvert; the outlet of the pipe is covered by thick vegetation; no traces of standing water or moisture in soil could be detected

View 45 in Figure WRI-22 : Vegetated ditch at the foot of the sloped buffer between upper and lower portion of site; arrows shows outlet of 30-inch culvert

View 48 in Figure WRI-22 : Panoramic picture of the lower portion of site; land is mostly flat and slightly sloped

View 47 in Figure WRI-22 : Edge of the landfill area; left is the Kapa'a Stream corridor

View 49 in Figure WRI-22 : Typical soil surface in the lower portion of the site; surface is mostly gravel with sparse vegetation, no surface stream features, ditches or larger swales were detected

View 50 in Figure WRI-22 : Condition at the boundary of the lower portion at the Kapa'a Quarry Road; an earth berm is containing the site

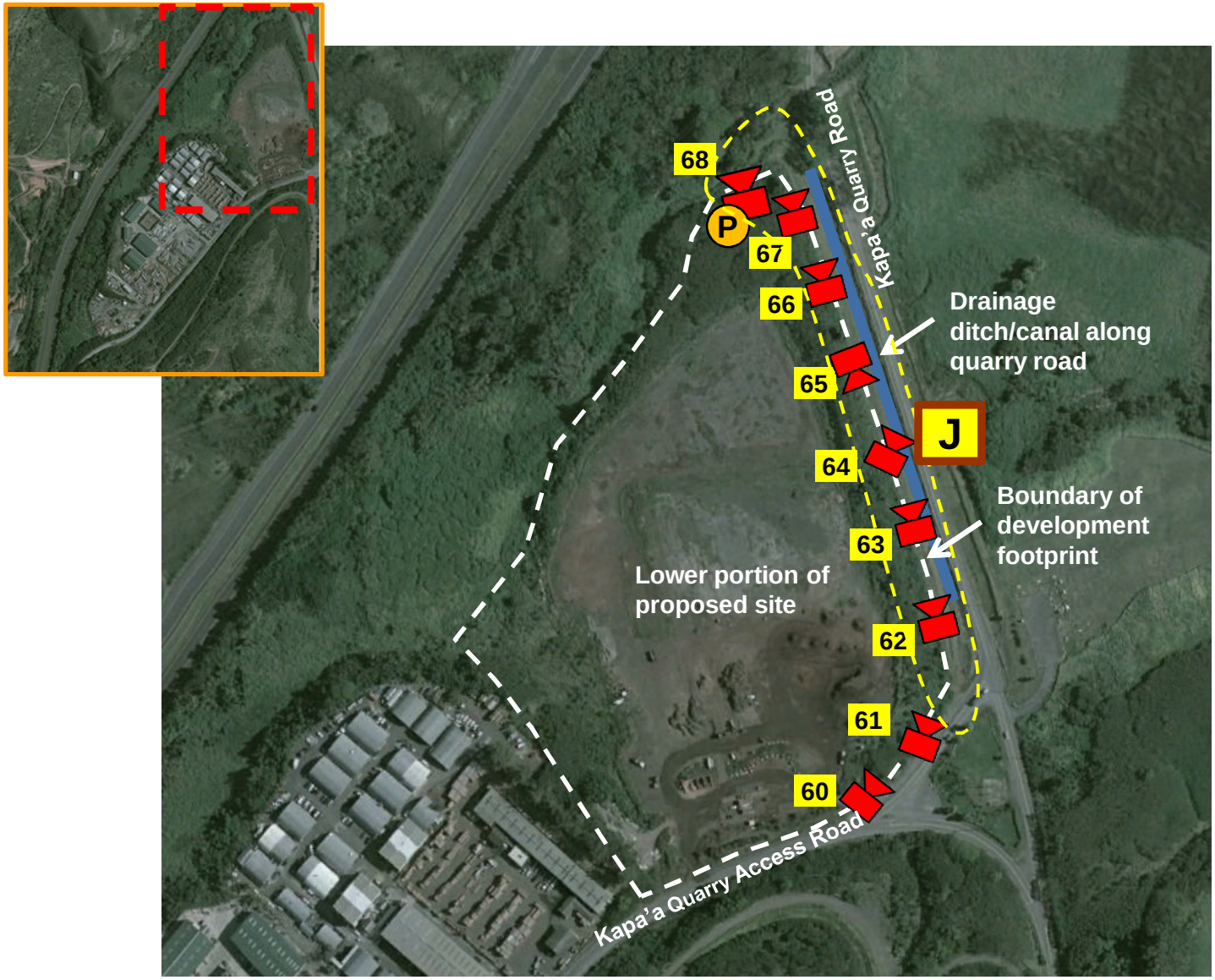

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Figure WRI-27 Definition of Views 60 through 68 of Drainage Canal Along Kapa'a Quarry Road

View 60 in Figure WRI-27: Drainage situation at proposed site in lower section of the quarry access road; ahead is intersection with quarry road

View 61 in Figure WRI-27: The soil condition at the intersection of quarry road and quarry access road; no distinct ditch or gully on the side of the proposed site

View 62 in Figure WRI-27: Drainage ditch /canal along the quarry road; start of canal close to yellow pole

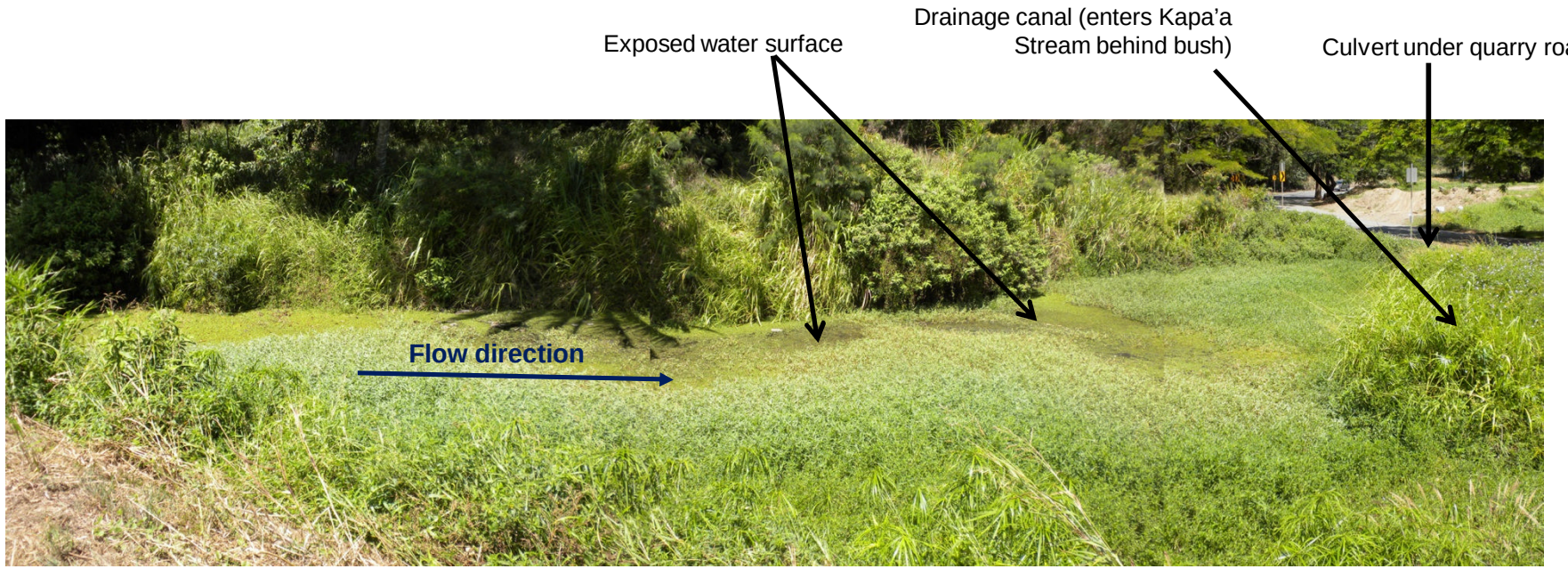
View 63 in Figure WRI-27: Drainage ditch /canal along the quarry road; looking north

View 64 in Figure WRI-27: Drainage ditch /canal along the quarry road; during site visit there was no free water surface; ditch was filled with mud covered by algae

View 65 in Figure WRI-27 : Drainage ditch /canal along the quarry road; looking south

View 65 in Figure WRI-27: Drainage ditch /canal along the quarry road; confluence of drainage canal and Kapa'a Stream close to trees

View 67 in Figure WRI-27 : Confluence of drainage canal and Kapa'a Stream; the canal is indicated with blue dashed line; during the investigation the canal does not show free water surface



View 68 in Figure WRI-27: Panoramic picture of the lower perennial stretch of Kapa'a Stream; the culvert through which the stream flows into the Kawainui Marsh is indicated on the right.

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Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 8:

Visual Impact Assessment Study

<u>Appendix 8 contains changes from Appendix 8 of DEIS</u>

September 2011

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APPENDIX 8

Final Environmental Impact Statement

for the proposed

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Visual Impact Analysis

Assessment of the anticipated impact of the proposed project on important viewplanes around the Kawainui Marsh

A discussion of photographic documentation of existing views and Virtual Reality (VR) 3D renderings for anticipated future views

Prepared for

Kapaa I, LLC

Prepared by

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September 2011

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Additions to the DEIS:

This Visual Impact Analysis, presented with the FEIS, is appended with a discussion and analysis of one additional viewplane that was added to the Visual Impact Analysis presented with the DEIS. Comments submitted by stakeholders prompted a reevaluation of the selected view planes around the Kawainui Marsh. It was found that views from Viewplane F, which are views from the Kawainui Neighborhood Park, should be analyzed to also include areas adjacent to this popular public park.

It was found that the Kawainui Neighborhood Park is essentially used in two functions: (1) use of the park and lawn (grassy area) for different activities and events and (2) as the northern access to the path along the flood control levee. The governing views associated with two functions are referred to as sub-viewplanes F-1 (for park function (1)) and F-2 (for park function (2)).

While for visual impact analysis for the DEIS no future anticipated views were generated for Sub-viewplane F, new simulated views are produced and presented for this visual impact analysis (only for Sub-viewplane F-2 since views of the Sub-viewplane F-1 do not have direct lines of sight to the proposed project site).

1. Existing Viewplanes

Viewplanes that are relevant for the assessment of the visual impact of the project consist of accessible locations along roads, public parks as well as at special sites, which afford a special aesthetic, cultural or mental significance. For viewplanes to be of significance they must be accessible to and frequented by the public, either within the daily routine, for recreation or for the purpose of spiritual or cultural experience. For example, an important view across of the Kawainui Marsh, which has been cited frequently is from the Kailua Road, where motorists traveling mauka or makai can enjoy the beauty of the marsh with a full panoramic view.

2. Assessment of Existing Views

For this visual impact assessment study eight significant viewplanes were identified. The viewplanes are shown in Figure VIA-1 and are discussed in the following relative to possible visual impacts from the proposed project and the need of more detailed analysis.

Viewplane A: This viewplane indicates views that are available from the vicinity of the Pahukini Heiau. Figure VIA-2 shows the view that is available in Viewplane A. The Pahukini Heiau, a culturally important place, is located about 1,600 feet due south sof the existing warehouse development (upper portion of the site). The closest distance between the Heiau and development in the upper portion and the lower portions of the site would be 1,000 and

2,300 feet, respectively. Both the upper and the lower portions of the project site are not visible from the Heiau. The entire project site, e.g lower and upper portion, is hidden from views by a thick screen of bushes and small trees. Therefore it was determined that the proposed project will not negatively impact viewplane A.

View plane B: This viewplane indicates views that are available from the H3-Freeway while passing the site travelling makai (towards the ocean). Figure VIA-2 shows the view that is available in Viewplane B. It should be noted that the photo representing Viewplane B was taken from a moving car at a location approximately at the start of the deceleration lane of the Mokapu Boulevard off-ramp, therefore at a location where motorists are typically travelling at higher speeds and might not notice the view of the proposed development in the same fashion as an observer that is at rest. Viewpane B represents the closest view that a motorist can have from the H3-Freeway to the project site. At the location where the photo was taken, the thick vegetation buffer (e.g. trees and thick bushes) that normally fringes the H3-Freeway on the south side is interrupted, thus providing a view on the project site. The distance of the location of the viewplane to the centers of the lower and upper portions of the project site is 1,800 and 3,500 feet, respectively. As can be seen in figure VIA 3, the viewplane B will be affected by the proposed project and therefore this viewplane was analyzed in more detail in Section 3 of this visual impacts analysis.

Viewplane C: This viewplane indicates views that are available from Mokapu Boulevard and H3-Freeway off-ramp, at the location that approximately coincides with merging of the off-ramp and the Mokapu Boulevard. The distance of the location of the viewplane to the centers of the lower and upper portions of the project site is 2,500 and 4,000 feet, respectively. Figure VIA-4 shows a panoramic view of the Kawainui Marsh (including the proposed project site). Figure VIA-5 shows a more a more detailed view of the project site. The location of Viewplane C was selected as the station on Mokapu Blvd., where the H3-Freeway off-ramp merges with Mokapu Blvd. Motorists who drive on Mokapu Blvd. can get their first visual impression from the project site at this location, while traveling east (from Kaneohe to Kailua). While traveling east and before reaching this point motorists do not get a view of the project site since the site is hidden from direct line of sight by obstructions, such as bushes and small trees along the south side of Mokapu Boulevard. Similarly, motorists who exit the H3-Freeway at the Mokapu Blvd. exit are getting a view from the project at about this point before they merge into Mokaopu Boulevard. As can be seen in figure VIA 4 and VIA-5, Viewplane C will be affected by the proposed project and therefore this viewplane was analyzed in more detail in Section 3 of this visual impacts analysis.

Viewplane D: This viewplane indicates views that are available from the Model Airplane Park which is located directly opposite of the project across the quarry road on the side of the Kawainui Marsh. Figure VIA-6 shows the view that characterizes Viewplane D. The selected location of the camera for Viewplane D was chosen in approximately the center of

the grassy area of the park. The distance of the location of the viewplane to the eastern buffer zone around the lower portion of the project site and the center of the upper portions of the project site is 550 and 2,500 feet, respectively. The Model Airplane Park is the closest viewplane to the proposed project and is therefore visually directly affected by the project. The visual impact of the proposed project on this viewplane was analyzed in more detail in Section 3.

Viewplane E: This viewplane indicates views that are available from Kalaheo Hight School. The distance of the location of the viewplane to the centers of the lower and upper portions of the project site is 4,000 and 5,500 feet, respectively. Figure VIA-7 illustrates the views that are available in Viewplane E. Kalaheo High School is located on the northern side of Mokapu Boulevard at the intersection with Kapa'a Quarry Road. The school encompasses about 15 buildings, parking areas, one athletic field and one tennis court. Buildings A,B,C,E,F and M offer direct line of sights of the Koolau mountain range and some sections of the Kawainui Marsh. While walking the school grounds it could be determined that the athletic field and Building E have the most exposed sights in the direction of the proposed project. As can be seen in Figure VIA-7 the project site remains hidden from direct line of sight for the school grounds. Therefore it is anticipated that the proposed project will not negatively impact Viewplane E, thus Viewplane E was not further analyzed.

Viewplane F: This viewplane indicates views that are available from the Kawainui Neighborhood Park at the end of Kaha Street in Kailua and the adjacent area. The distances of the location of the viewplane to the centers of the lower and upper portions of the project site are approximately 4,400 and 5,600, respectively. Viewplane F incorporates two sub-viewplanes, F-1 and F-2, which can be characterized by two different functions of the park.

Figure VIA-8.A shows views that ~~is available in~~ characterize Viewplane F, e.g. sub-viewplanes F-1 and F-2. Sub-viewplane F-1 represents the views from the parking lot and grassy area south of the parking lot. This grassy area is used by residents for games, get-togethers and physical exercising. Since ~~The~~ the park is surrounded by taller trees and bushes the proposed project is hidden from direct line of sight by ~~the~~ a vegetative buffer. Therefore it was determined that the proposed project will not negatively impact Sub-viewplane F-1, thus Sub-viewplane F-1 was not further analyzed. Sub-viewplane F-2 represents views from the path along the flood control levee. The path can be accessed through the Kawainui Neighborhood Park. A site visit on a weekend in July 2011 suggested that the portion of the path along the flood control levee, which is close the Kawainui Neighborhood Park, is extensively used by residents. The proposed project site is visible from Sub-viewplane F-2.

Figure VIA-8.B defines location of cameras for existing views of sub-viewplanes F-1 and F-2. Six photos and two panoramic views are showing the existing views of sub-viewplanes F-1 and F2. Figure VIA-8.C shows for following views: [1] Sub-viewplane F-1: Figure shows the view from the large grassy area of the park towards the proposed project site. As can be seen there are no direct lines of sight to the proposed project site, since mature trees are blocking the sight. [2] Sub-viewplane F-1: Figure shows the beautifully landscaped area between the parking lot and the Oneawa Drainage Canal. A paved walkway connects the parking area with the trail head of the path along the flood control levee. [3] Sub-viewplane F-1: Figure shows several locations along the paved walkway where the observer can view the marsh through openings in the bushes. [4] Sub-viewplane F-2: Figure shows the southern end of the Oneawa Drainage canal; the path along the flood control levee starts here and winds toward the left, e.g. the south. [5] Sub-viewplane F-2: shows a view towards the south, across the marsh; [6] Sub-viewplane F-2: shows a view towards the project site about 1,200 feet south of the trail head.

Figure VIA-8.D shows two existing panoramic views for Subviewplane F-2 from the flood control levee over the Kawainui Marsh and in the direction of the proposed project site.

The visual impact of the proposed project on Sub-viewplane F-2 was analyzed in more detail in Section 3 of this visual impacts analysis.

Viewplane G: This viewplane indicates views that are available from the Kawainui Marsh from Kailua Road at the height of the flood control levee. The distance of the location of the viewplane to the project site is 7,500 feet (~1.4 miles). Figure VIA- 9 shows the panoramic view that is available to motorists traveling mauka or makai on Kailua Road. The viewplane provides an important visual experience of the open marsh in front of the impressive background of smaller and larger mountains of the Koolau range. As the eye sweeps over the marsh one can detect several structural features at the western edge of the marsh, such as the Mokapu Boulevard overpass over H3 and the two larger buildings of the Kailua Refuse Transfer Station at the Kapa'a Quarry Road. The existing warehouse development in the upper portion of the site is not visible with the naked eye. It cannot be ruled out if and how that the proposed warehouse development in the lower portion of the project site might affect the viewplane. Therefore the visual impact of the proposed project on Viewplane G was analyzed in more detail in Section 3 of this visual impacts analysis.

Viewplane H: This viewplane indicates views that are available from the grounds of the Ulupo Heiau State monument that overlooks the Kawainui Marsh. The Ulupo Heiau is a culturalluy significant place and is listed on the National and Hawaii Registers of Historic Places. The distance of the Heiau to the project site is approximately 7,000feet (~1.3 miles). Figure VIA-10 shows two typical views from the vicinity of the Heiau across the marsh in direction of the

project site. Both views in Figure VIA-10 suggest that the proposed project site cannot be directly seen from the Heiau, since the direct line if sight towards the project site is obstructed by trees. Therefore it was determined that the proposed project will not negatively impact Viewplane H, thus Viewplane H was not further analyzed.

3. Assessment of Future Visual Impacts by the Proposed Project

The analysis of the seven viewplanes documented by photographic panoramic and single views suggests that only Viewplanes B, C,D and G would be affected by the proposed project. These viewplanes are analyzed by using renderings of virtual models of the project, which represent the same views and are superimposed on the existing views.

A 3D-CAD model was created for the planned lower portion of the proposed site to simulate the visual impact of the proposed development from differ viewplanes. The 3D-CAD model was then rendered with virtual cameras using the same locations, headings and focal lenses as the digital cameras with which the original photos were taken. The settings of virtual lighting were similar to the natural lighting of the photos representing the existing viewplanes. The virtual renderings are therefore producing the same perspective images as the project would provide after construction.

The objects in the 3D-CAD model, which are the true dimensional spatial representations of warehouse structures, vegetation (e.g. trees in the buffer zones) and roadways were assigned colors that would match the actual visual impact. The selection of colors surfaces rather than photorealistic materials for the rendering of the 3D-CAD model facilitates identification of the proposed development against the existing background images, particularly for views from longer distances to the project. The selection of photorealistic materials for the 3D-objects is better for close-up views. One of the eight viewplanes, Viewplane D (Model Ariplane park) , has shorter distance views on the project, where a more photorealistic representation is more suitable than a shaded model . For Viewplane D photorealistic representations of the trees in the buffer zone were used to provide a more realist view.

All x,y,z dimensions of structures and other objects within the development, such as warehouses, roadways, loading docks, parking lots, vehicles, trees were taken from the concept deign documents. All CAD models of trees placed inside the buffer zones surrounding the site and within the site have near uniform dimension, with some variation. The height of trees was taken as a range from 20 to 25 feet, which would represent a typical size of a fast growing tree after about 5 years of planting (as required to satisfy the credit heat island effect – non-roof of the LEED certification approach).

Figure VIA-11 shows a rendering of the virtual model for the proposed industrial development in the lower portion of the site. The rendering of the virtual model is here superimposed on an

oblique Google-Earth aerial image using the same heading and height above ground. The virtual model uses solid colors that closely match the anticipated color scheme of the warehouse structures, the pavement, the vegetated area as well as the trees. The extent of the development in the upper portion of the proposed site is indicated with a red border. As indicated before, no 3D-CAD model was rendered for the upper portion of the site, since it is assumed that visual impact by new construction in the upper portion would be minimal or absent.

The final renderings of the virtual model for viewplanes B, C, D, and H were then merged with the photographic images of the existing viewplane to produce hybrid images of anticipated future views. The resulting hybrid images for viewplanes B, C, D, and H are presented and discussed in the following.

3.1 Simulation of Future Views in Viewplane B

Anticipated future views in Viewplane B are simulated by superimposing the rendering of the virtual model on the existing Viewplane B. Figure VIA-12 defines the extent of the virtual model within the proposed site, which is limited to the lower portion of the site. Figure VIA-12 indicates that the upper portion of the proposed site will not affect the views in the viewplane (indicated by an orange boundary).

Figure VIA-13 shows the anticipated future views resulting from the proposed project. As can be seen warehouse structures within the lower portion of the site are partially hidden behind the tress of the vegetated buffer around the site as well as behind trees panted within the development footprint. The earth berm of the vegetated buffer along the eastern boundary of the lower portion of the project site starts outside the maintenance road for the drainage canal.

The proposed visual impact mitigation measures include vegetated buffer zones around all four sides of the development as well as trees planted within the development footprint and the choice of shades of colors for the roofs and walls of the warehouses that help reducing the visual impact. While the warehouse structures are noticeable, the visual impact the trees and selected color shades for the structures create an effective visual impact mitigating and mitigate the visual appearance of warehouse structures.

The areas between the lower and upper portion of the site has presently some numbers of trees and bushes. The existing trees at the eastern boundary of the upper portion of the site are hiding parts of the upper portion . The project will increase the effectiveness of the screen of existing trees by adding similar trees, thus improving the visual screening. Figure VIA-13 shows several trees that are added to the screen of trees at the eastern boundary of the upper portion of the site.

3.2 Simulation of Future Views in Viewplane C

Anticipated future views in Viewplane C are simulated by superimposing the virtual model on the existing Viewplane C. Figure VIA-14 shows the extent of the virtual model within the proposed site, which is limited to the lower portion of the site. Figure VIA-14 suggests that the upper portion of the proposed site will not affect the views in the viewplane (indicated by an orange boundary).

Figure VIA-15 shows the anticipated future views resulting from the proposed project. As can be seen warehouse structures within the lower portion of the site are partially hidden behind the tress of the vegetated buffer around the site as well as behind trees planted within the development footprint. It should be noted that the 3D-model is rendered in a generic color scheme and not texture mapped. This selection of rendering materials results in a less photorealistic impact as it exaggerates the future development, thus resulting in a visual impact that will be more noticeable than the actual visual impact will be. The more noticeable appearance of the virtual rending helps to distinguish the extent of the proposed development.

As described in the sustainable development approach trees within the development are used for visual impact mitigation as well as for mitigation of heat island effect, direct heat gain of the structures and sound impact. In Figure VIA-15 trees in the area between the upper and lower portion of the site are added to the image to simulate improved visual impact mitigation by using the same type of trees, which are presently planted in this area.

As can be seen the proposed development affect the Viewplane C to a certain extent. The visual impact of the development is, however, is effectively mitigated by the vegetated buffer zone along the quarry road, trees inside the development footprint as well as the color scheme of the warehouse roofs and building skins. As discussed in the sustainable development approach the selection of the color scheme of the warehouse structures must contend with two conflicting design objectives. A darker green color is more favorable to achieve effective visual impact mitigation, while a very bright color for the building exterior walls, preferably a white and reflective color, would be preferable to mitigate heat island effect and increase the thermal performance of the building skin gain of the building envelope. A viable compromise will be selected to optimized color scheme for the roof and the exterior walls.

3.3 Simulation of Future Views in Viewplane D

Anticipated future views in Viewplane D are simulated by superimposing the virtual model on the existing Viewplane D. Figure VIA-16 shows the extent of the virtual model within the proposed site, which is limited to the lower portion of the site. Figure VIA-16 suggests that the

upper portion of the proposed site will not affect the views in the viewplane (indicated by an orange boundary).

Figure VIA-16 indicates the camera position as in the eastern part of the model park. The view in this viewplane is the closest of all viewplanes to the proposed project site. The elevation of the camera is below the elevation of the nearest warehouse. As can be seen the image covers only a part of warehouse development in the lower portion of the site.

Figure VIA-17 shows the simulation of the anticipated future views . The representation of the future view suggests that most of the warehouses will be hidden behind the trees of the vegetative buffer along the quarry road. The warehouses appear as bright objects behind the trees of the buffer zone. The earth dike is represented by an inclined green plane on which the trees are standing. The darker rings below the trees are the shades of the trees generated by the virtual lighting. The trees in the background are within the sloped area between the lower and upper portions of the site.

As was stated before shaded rendering was preferred for long distance views since the shaded model emphasizes the virtual model rendering superimposed on the on existing views. Viewplane D, however, is a close-up view of the project site and therefore texture mapping and photorealistic images can help to get a more realistic impression of the view. Figure VIA-18 shows the hybrid image, which simulates the future view in Viewplane D, by means of adding a layer of textured and photorealistic tree images. The heights of the photorealistic trees are in the same range as the segmented tree objects in the shaded model. As noted before the heights of the shaded objects representing trees in the buffer and within the developments range between 20 and 25 feet. Image 1 in Figure VIA-18 suggests that the vegetative buffer can effectively mitigate the visual impact of the development. It should be noted that the actual buffer would have smaller bushes in addition to trees and thus the buffer would offer en even more effective visual screen.

3.4 Simulation of Future Views in Viewplane F

As discussed in Section 2, the proposed project will not result in visual impact for Sub-viewplane F-1, since mature trees and bushes provide a tall and thick vegetative buffer around the grassy area of the park and obstruct the line of sight to the proposed site.

Anticipated future views of Sub-viewplane F-2 are simulated by superimposing the virtual model on the existing Viewplane F-2. Figure VIA-18/Add A shows the location of the cameras of the two panoramic views and one detailed view, which are used for this analysis. Figure VIA-18/Add B shows a comparison between the existing and future views (with the Detailed View 5) of the site from a point of the path along the flood control levee. In the future view buildings of the

proposed industrial development would be partially visible behind the vegetative buffer zones of the lower and upper portions of the proposed site. In the future view several tall trees are added to the line of tall trees at the eastern site perimeter of the upper portion of the site, which reduces the visibility of the upper portion of the site from the existing conditions. Figure VIA-18/Add C shows the anticipated future views for the two panoramic view that are defined in Figure VIA-18/Add A:

3.5 Simulation of Future Views in Viewplane G

Anticipated future views in Viewplane G are simulated by superimposing the virtual model on the existing Viewplane G. Figure VIA-19 shows the extent of the virtual model within the proposed site, which is limited to the lower portion of the site. Figure VIA-19 suggests that the upper portion of the proposed site will not affect the views in the viewplane (indicated by an orange boundary).

Figure VIA-19 indicates the portion of the proposed site that will not affect the views in the viewplane (indicated by an orange boundary). Figure VIA-19 shows a line of sight obstruction which is created close to the proposed site by existing structures of the Kailua Refuse Transfer Station and the surrounding trees and earth dikes. These obstructions hide the entire upper portion as well as a smaller part of the lower portion of the site. The parts of the lower portion which are hidden include the sloped area between the lower and upper portions of the site. Therefore the resulting visual impact footprint of the project would be limited.

Figure VIA-20 shows the simulation of the anticipated future views. The inspection of the rendering of the virtual model suggests that the warehouse structures within the lower portion of the proposed site are completely hidden behind the tress of the buffer zone along the quarry road and quarry access road. Therefore the impact of the proposed project on the viewplane would be minimal.

4. Conclusions and Recommendations

The visual impact analysis has identified eight viewplanes representing publicly accessible locations around the Kawainui Marsh, which have the potential of being affected by visual impact by the proposed project:

A. The grounds of Pahukini Heiau
B. The H3-Freeway at the start of the Mokapu Blvd. off-ramp
C. The H3-offramp at the lane merge with Mokapu Blvd.
D. Model Airplane Park
E. Grounds of Kalaheo High School
F. Kawainui Neighborhood Park at end of Kaha Street
G. Southern end of the flood control levee
H. Grounds of Ulupo Heiau

An analysis of the existing views in these eight viewplanes suggest that only four viewplanes, B, C, D and G might be noticeably affected by the proposed project. In Viewplanes A, E, F and H no parts of the proposed project would be detectable to the casual observer. The simulation of anticipated future views in viewplanes B, C and D suggest that the proposed project will be visible and that the visual impact need to be effectively mitigated. The simulation of anticipated future views in Viewplane G indicates that there would be a minimal visual impact, which would be unnoticeable for the casual observer.

The conclusions of the visual impact analysis is summarized in Table 4.1

Table 4.1 Summary of Visual Impact Assessment of eight viewplanes

Viewplane	How viewplane is affected by proposed project	Visual impact mitigation measures
A. The grounds of Pahukini Heiau	The viewplane is NOT affected; the project site is not visible from the grounds of the Heiau	The proposed project is hidden behind a broad buffer of trees and bushes around the grounds of the Heiau.
B. From H3-Freeway at the start of the Mokapu Blvd. off-ramp	The project site is visible; the lower portion of the project site is visible, the upper portion is almost completely hidden by existing treeline. The view is not a continuous visual experience of the project but short lateral visual impressions from vehicles travelling at higher speed through temporary clearings in the vegetation buffer along the H3-Freeway.	Filling in several openings in the thick vegetation buffer on the south side of the freeway would obstruct views on the project. The vegetative buffer around the lower portion and the trees next to warehouses are effective visual mitigation. Filling in the existing treeline at the eastern side of the upper portion is recommended mitigation.
C. H3-offramp at the lane merge with Mokapu Blvd.	The project site is visible; the lower portion of the site is visible, the upper portion is almost completely hidden by existing treeline. Viewpane offers lateral views from travelling motorists, but at speeds that are lower than in Viewplane B.	The vegetative buffer around the lower portion and the trees next to warehouses are effective visual mitigation. Filling in existing treeline at the eastern side of the upper portion is recommended mitigation.
D. Model Airplane Park	The project site is prominently visible, since this viewplane offers the closest views on the project; the warehouses closest to the quarry road would be visible, the upper portion is almost completely hidden by existing treeline. .	The vegetative buffer at the eastern side (with larger trees) of the lower portion of the site, along the quarry road provides an effective means to shield most of the warehouses structures from the view.
E. Grounds of Kalaheo High School	The viewplane is NOT affected; the project is not visible from the grounds of the high school	Visual mitigation not required
F. Kawainui Neighborhood Park at end of Kaha Street and surrounding area; Note that Viewplane F comprises two sub-viewplanes F-1 and F-2	Viewplane F is divided into two sub-viewplanes, F-1 and F-2, where these views represent views from the large grassy area of the park and views from the portion of the path along the levee that is close to the park, respectively. Sub-viewplane F-1 does not have direct lines of sight to the proposed project; e.g. the proposed project is not	• Visual mitigation not required for sub-viewplane F-1. • Visual impact mitigation measures are recommended for sub-viewplane F-2: The vegetative buffer around the lower portion and the trees next to warehouses are effective visual

Table 4.1 Summary of Visual Impact Assessment of eight viewplanes

Viewplane	How viewplane is affected by proposed project	Visual impact mitigation measures
	visible from the grassy area of the neighborhood park. The grassy area of the park is surrounded in the west by a thick screen of high and mature trees, which completely hides direct views on the marsh and in direction of the project. Sub-viewplane F-2 offers direct lines of sight to the proposed project.	mitigation. Filling in existing treeline at the eastern side of the upper portion is recommended mitigation.
G. Southern end of the flood control levee	The viewplane is minimally affected; the lower portion would be hidden behind the vegetative buffer; all of the upper portion of the site and all of the areas of the lower portion with higher elevation are outside of the direct line of sight.	Vegetative buffer around the lower portion of the site will be effective visual impact mitigation and will shield all warehouse structures.
H. Grounds of Ulupo Heiau	The viewplane is NOT affected; the project is not visible from the grounds of the Heiau	Visual mitigation not required

The results of the visualization analysis using virtual reality images super-imposed on actual photographic images of the project site suggest that the visual impact of the proposed development in would be nearly exclusively due to the development in the lower portion of the project site.

The proposed visual impact mitigation measures include vegetated buffer zones around all sides of the lower portion of the site. The vegetative buffer along the quarry road, consisting of a continuous 8-12 feet high earth dike with larger trees and bushes will provide effective visual impact mitigation from all views from the eastern direction, particularly from close-distance views of the Model Airplane park and the adjacent Kapa'a Quarry Road. Trees planted within the development such as those planted on the eastern side of warehouses will add to the visual impact mitigation, particularly for downward views on the project site from the H3-Freeway and Mokapu Boulevard such as in viewplanes B and C.

The areas between the lower and upper parts of the project site will be restored with native or adaptive plants, as part of the sustainable design approach, and additional trees will be planted to provide effective visual impact mitigation. The existing treeline at the top of the sloped areas between lower and upper portions of the side would be augmented by trees similar to the existing trees to fill in a few spaces of light tree cover. These measures will effectively hide the entire upper portion of the development from the identified viewplanes.

The selection of darker shades of green for the roofs and walls of warehouses improves visual impact mitigation; however, darker colors for roof and building walls can deteriorate the thermal performance of buildings and the heat island effect of roofs. A good compromise of darker and lighter shades of green will be determined in the detailed design phase to optimize both thermal performance and visual impact. Added external layers of insulation of the roofs might be considered in conjunction with selecting darker green roof colors, so that good thermal performance of cool roofs could be achieved.

Summarizing, the visual impact of the proposed project should not cause a significant degradation of relevant viewplanes around the Kawainui Marsh. In fact, of the eight identified viewplanes around the Kawainui Marsh, which include heavily travelled roadway, school grounds, a public park, two culturally important sites, e.g. heiaus, and a broad vista of the Kawainui marsh, only three are affected. In all these three cases where viewplane would be affected, the proposed visual impact mitigation measures could significantly reduce the extent of the visual impact.

5. Figures:

The following pages show 26 Figures (full page figures, landscape format) which are referred to in the preceding discussion

Definition of viewplanes:

- **A** Panoramic view from Pahukini Heiau
- **B** View from the H3-Freeway; at the beginning of the offramp
- **C** Panoramic view from the H3-offramp at the lane merge with Mokapu Blvd.
- **D** View from the grounds of the Model Airplane park
- **E** Views from the grounds of Kalaheo High School
- **F** View from the Kawainui Neighborhood Park and panoramic view from path on flood control levee
- **G** Panoramic view from the southern end of the flood control levee
- **H** Views from the viewing area of the Ulupo Heiau

Legend:

Location of camera and approximate sweep of panoramic view; in the example view is to the right with a sweeping angel of approx. 135 degree

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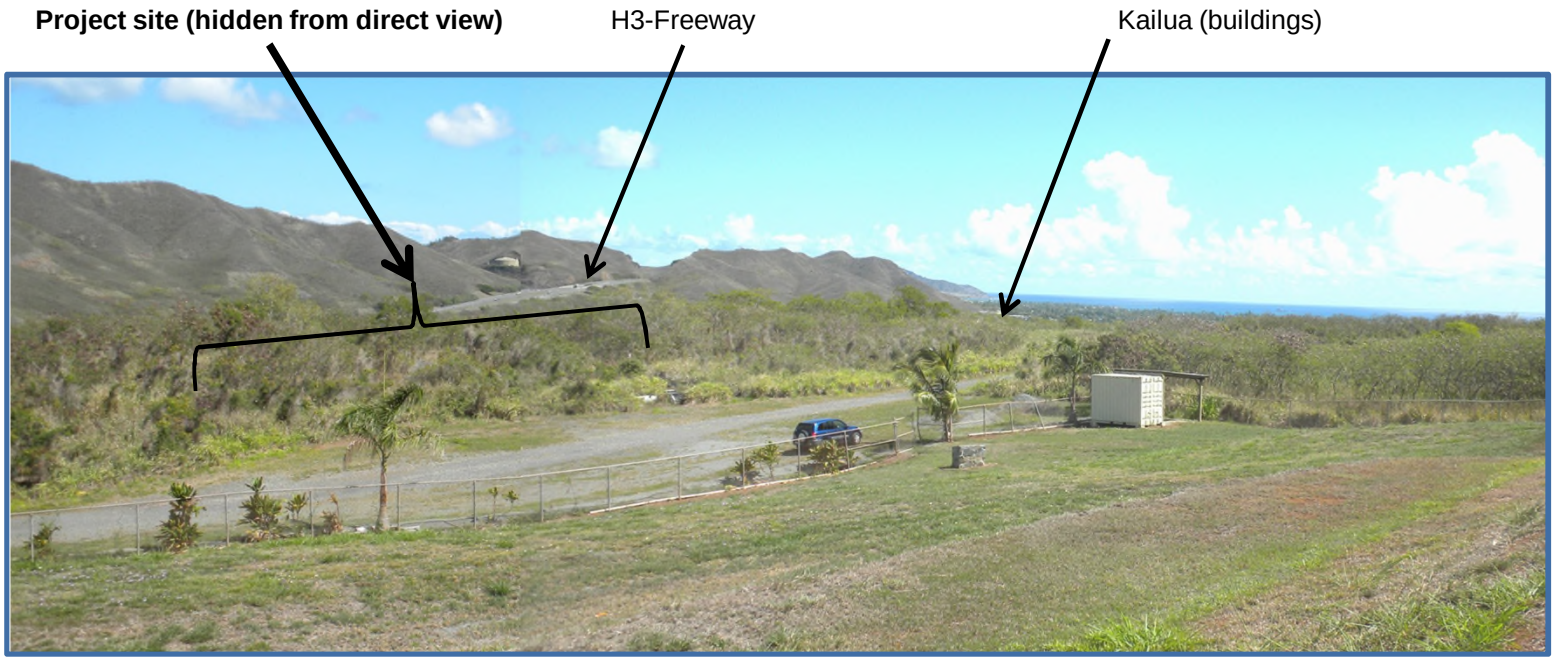
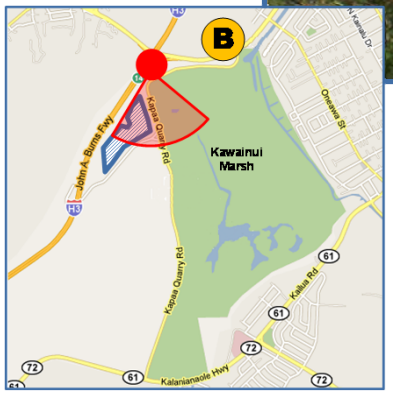
Figure VIA-1:
Definition of viewplanes A though H



A Panoramic view; from the Pahukini Heiau towards the project site. The location of the camera is below and directly adjacent, jet outside the sacred Heiau grounds. The project site is hidden by trees and brushes from direct view from the Heiau. (the bracket indicates the length of the existing warehouse development AND the proposed expansion).

Figure VIA-2:
Existing Viewplane A



B View from the H3-freeway driving makai (towards the ocean). View is towards the project site. The Photo was taken at the start of the deceleration lane of the off-ramp. The photo was taken from a moving vehicle because stopping is not allowed at that point.

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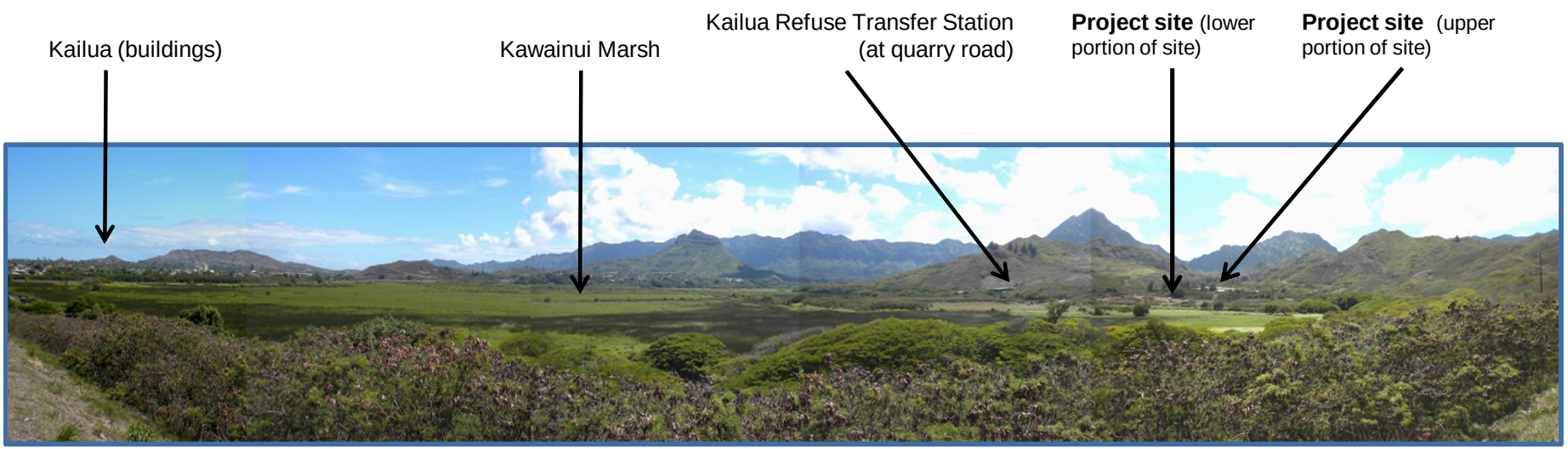
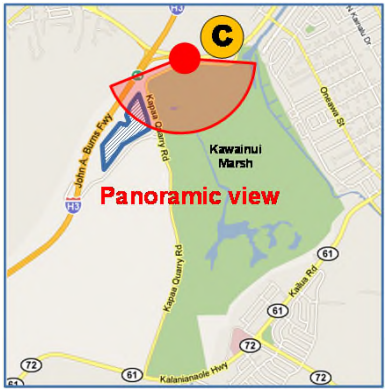
Figure VIA-3:
Existing Viewplane B





C

Panoramic view from the H3-offramp (at the lane merge with Mokapu Blvd.) towards the project site. The view provides a wide panoramic view of the Kawainui Marsh.

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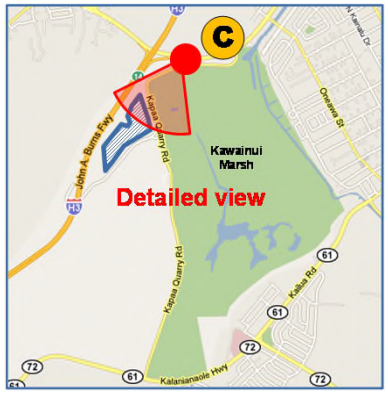
Figure VIA-4:
Existing Viewplane C – Panoramic View

Kailua Refuse Transfer Station (at quarry road); two buildings

Existing warehouses on upper portion of site (white buildings)

Project site (proposed lower portion of site)

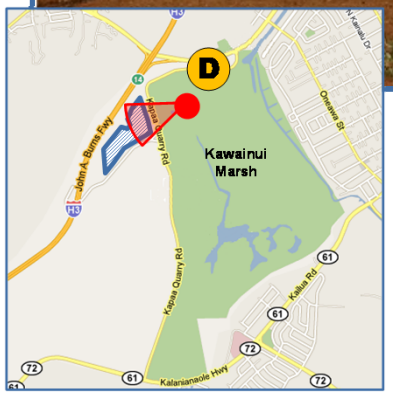


C More **detailed view** of the project site from the H3-Freeway off-ramp. (the bracket indicates the length of proposed development in the lower portion of the project).

Figure VIA-5:
Existing Viewplane C – Detailed View

Existing warehouses in upper portion of site (white buildings)

Project site (lower portion of site)



D View from the eastern side of the Model Airplane Park looking west towards the project site. The cars in the foreground parked on the parking lot of the Model Airplane Park.

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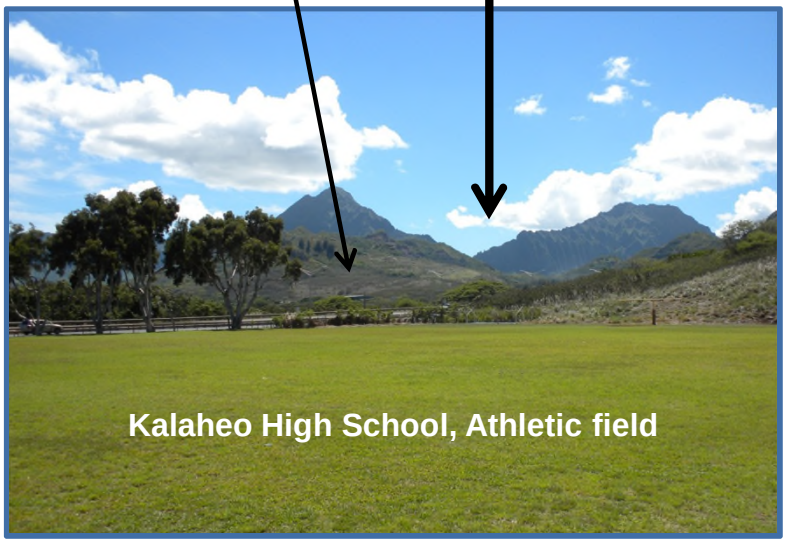
Figure VIA-6:
Existing Viewplane D – Close-up View

Kailua Refuse Transfer Station
(at quarry road)

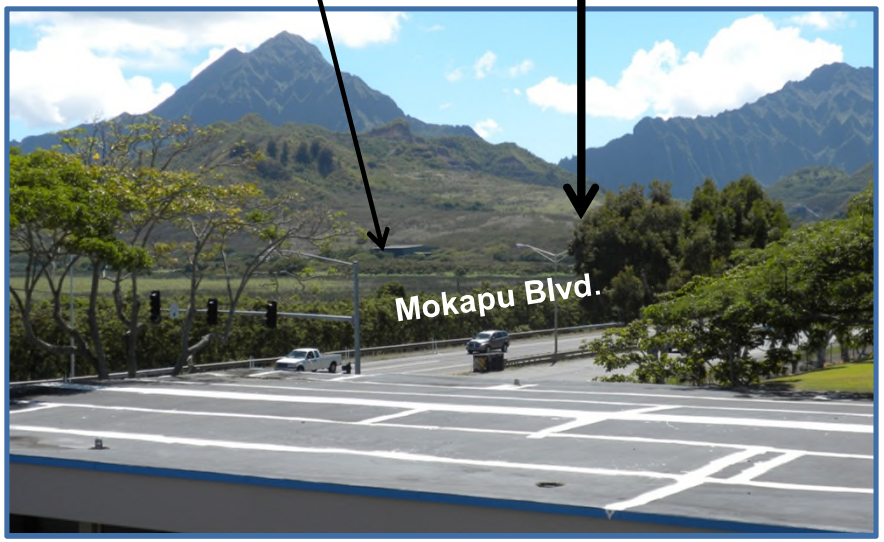
Project site (hidden from direct view)



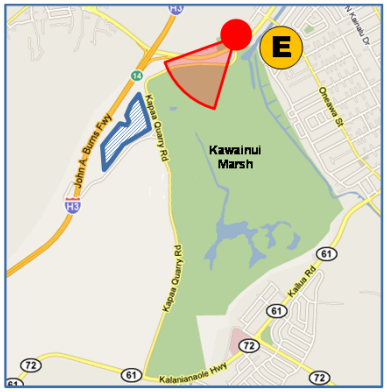
View from Kalaheo school grounds; view from athletic field towards the project site

Kailua Refuse Transfer Station
(at quarry road)

Project site (hidden from direct view)



View from Kalaheo school grounds; view from building A (at ground floor); Bldg. A offers best view towards the project site



E Two views from the grounds of Kalaheo High School. The locations of the cameras are on the athletic field and from the ground floor of Building E, both locations are at the western part of the school campus. On both views the project site is hidden by trees and brushes from direct view from the school grounds. .

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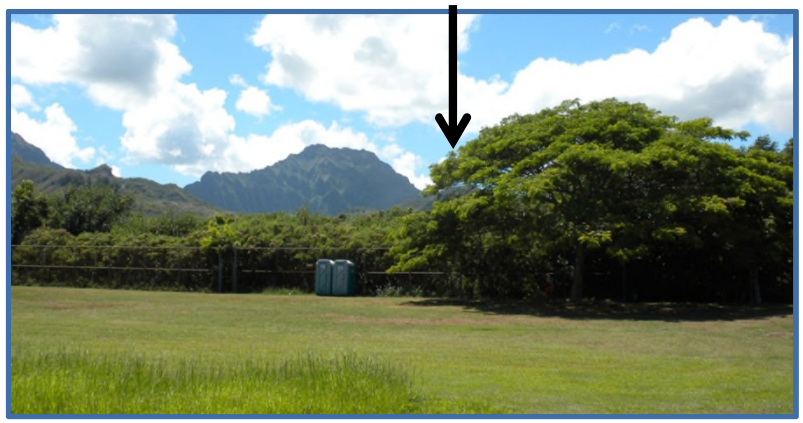
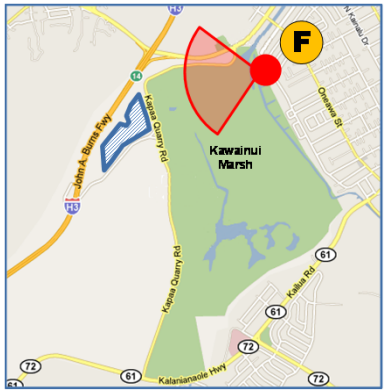
Figure VIA-7:
Existing Viewplane E

Project site (hidden from direct view)



Sub-viewplane F-1: Views from the grounds of the **Kawainui Neighborhood Park** (at the end of Kaha Street, Kailua).



F Viewplane F:

Viewplan F incorporates two sub-viewplanes, F-1 and F-2
Sub-viewplane F-1 represents views from the grounds of the Kawainui Neighborhood Park
Sub-viewplane F-2 represents views from the path along the flood control levee (which terminates at the Kawainui Neighborhood Park)

Project site

Sub-viewplane F-2: Views from the path along the flood control levee.

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Figure VIA-8.A:
Existing Viewplane F-1 and F-2

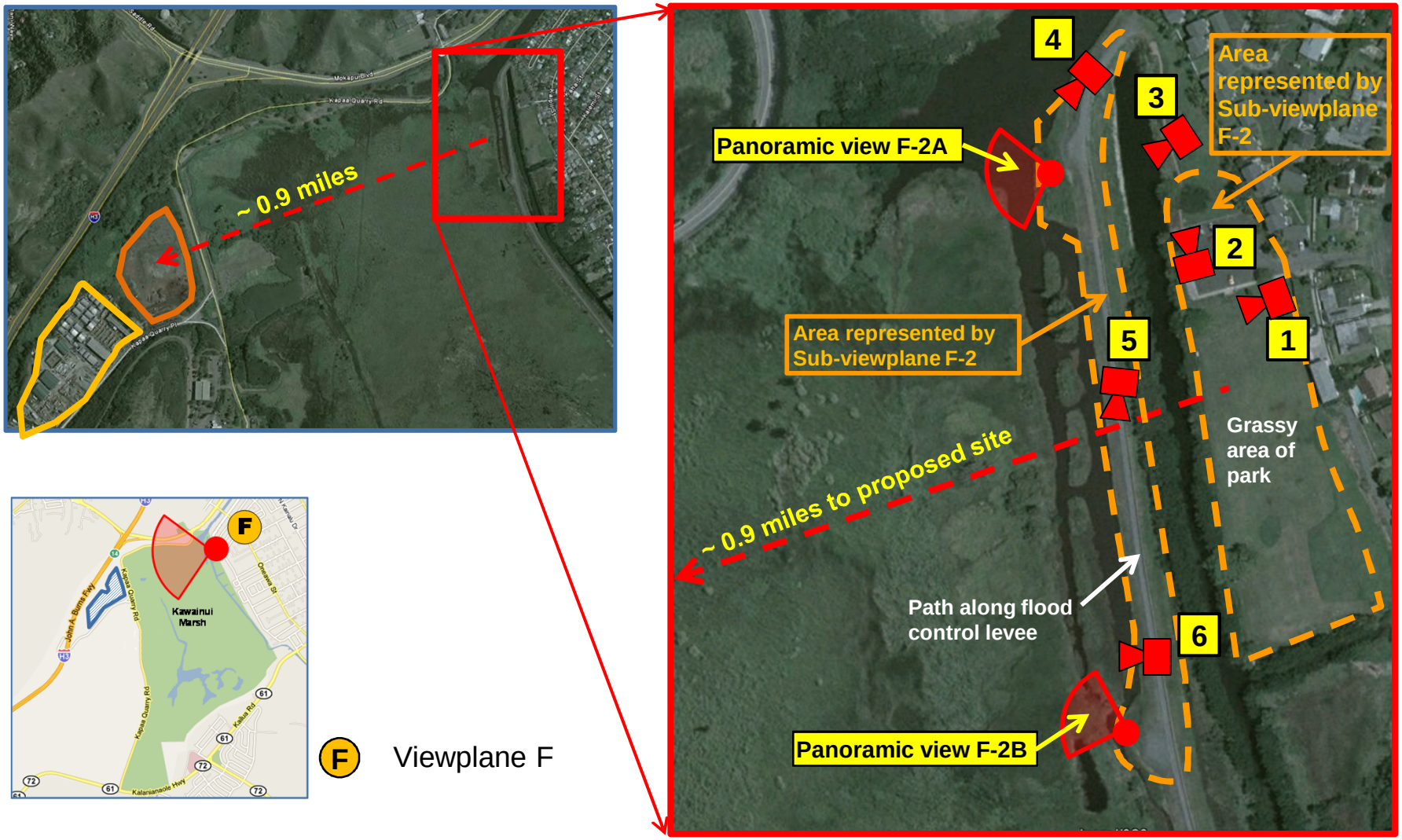

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Figure VIA-8.B: Definition of the Sub-viewplanes F-1 and F-2 for existing views

1 **Sub-viewplane F-1:** View from the Kawaiinui Neighborhood Park toward the proposed site; shows the grassy area

2 **Sub-viewplane F-1 :** View inside the Kawaiinui Neighborhood Park toward the railhead of path along the flood control

3 **Transition between sub-viewplanes F-1 and F-2:** View from inside Kawaiinui Neighborhood Park towards the propose site

4 **Sub-viewplane F-2 :** View from the northern end of the path along the flood control levee toward the proposed site

5 **Sub-viewplane F-2 :** View along the flood control levee toward the south

6 **Sub-viewplane F-2 :** View from the path along the flood control levee toward the proposed site

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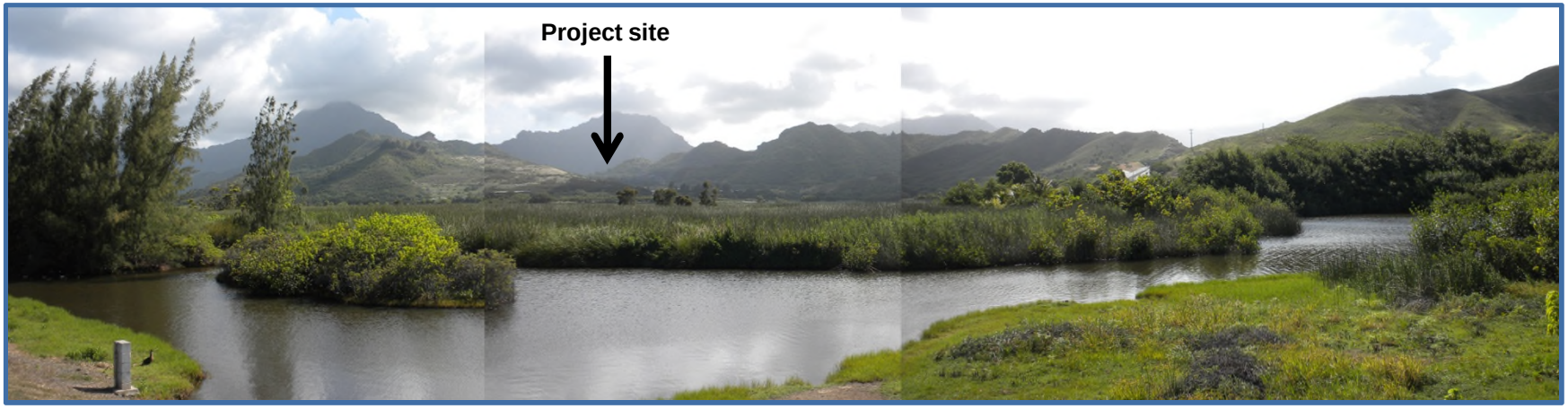
Figure VIA-8.C: Existing views from sub-viewplanes F-1 and F-2

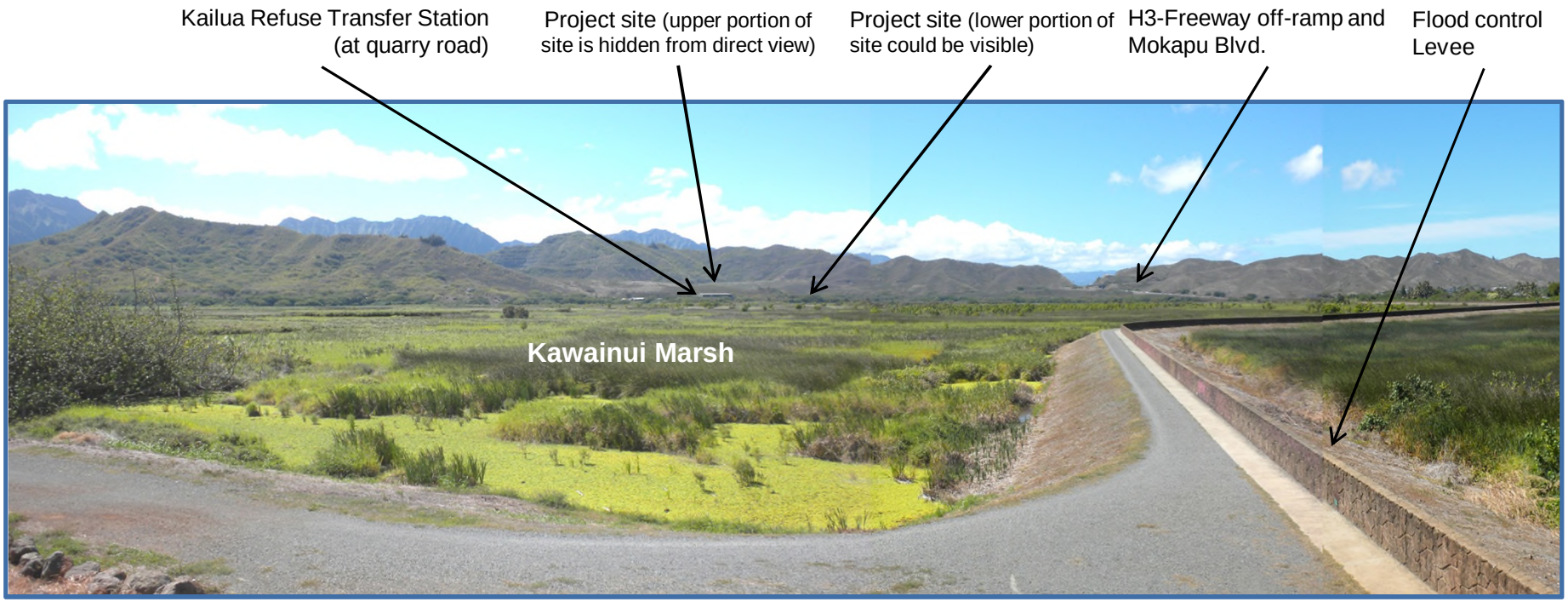


Panoramic view F-2A Sub-viewplane F-2: Existing panoramic View F2-A taken from the path along flood control levee toward the proposed site

Panoramic view F-2B Sub-viewplane F-2: Existing panoramic View F2-B taken from the path along flood control levee toward the proposed site

This Figure is added to the content of the DEIS

Figure VIA-8.D: Existing views from Sub-viewplane F-2



G Panoramic view; from the southern end of the flood control levee, which protects Kailua neighborhoods from floods in the marsh. The start of the flood control levee is adjacent to Kailua Road. This series of photos were taken from an observation point adjacent to a small parking lot off Kailua Road. The project side is not directly noticeable since it is located behind trees, to the right of the tall building of the Kailua Refuse Transfer Station.

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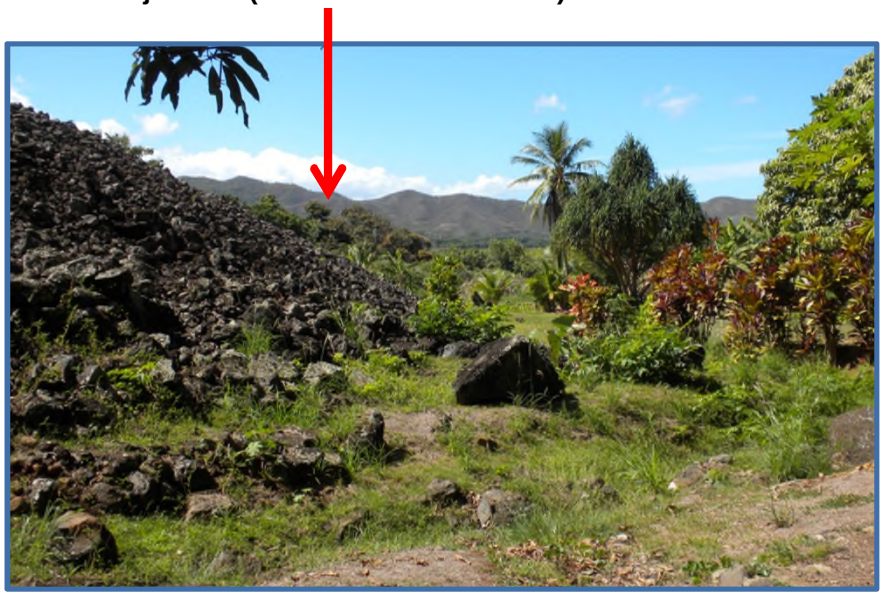
Figure VIA-9:
Existing Viewplane G

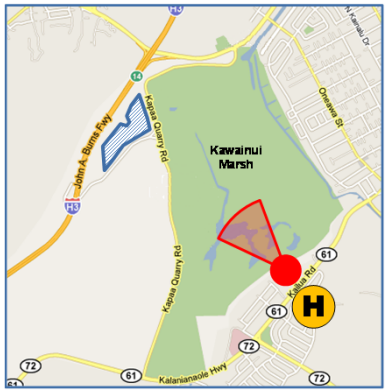
Project site (hidden from direct view)



View 1:

Project site (hidden from direct view)

View 2:



H

Views from the grounds of the Ulupo Heiau State Monument. This Heiau is a culturally significant site. The two views show as follows:

View 1: The photo was take at the eastern side of the heiau. The view across the marsh shows the project site being hidden from direct view by the heiau and by trees in the back.

View 2: The photo was take close the viewing area, where information displays are located. The photo was take at a height of approximately 9 feet above the ground to view above the rocks of the heiau; this view, being therefore not a typical view of a visitor of the heiau, does not have a direct view of the project.

Figure VIA-10:
Existing Viewplane H

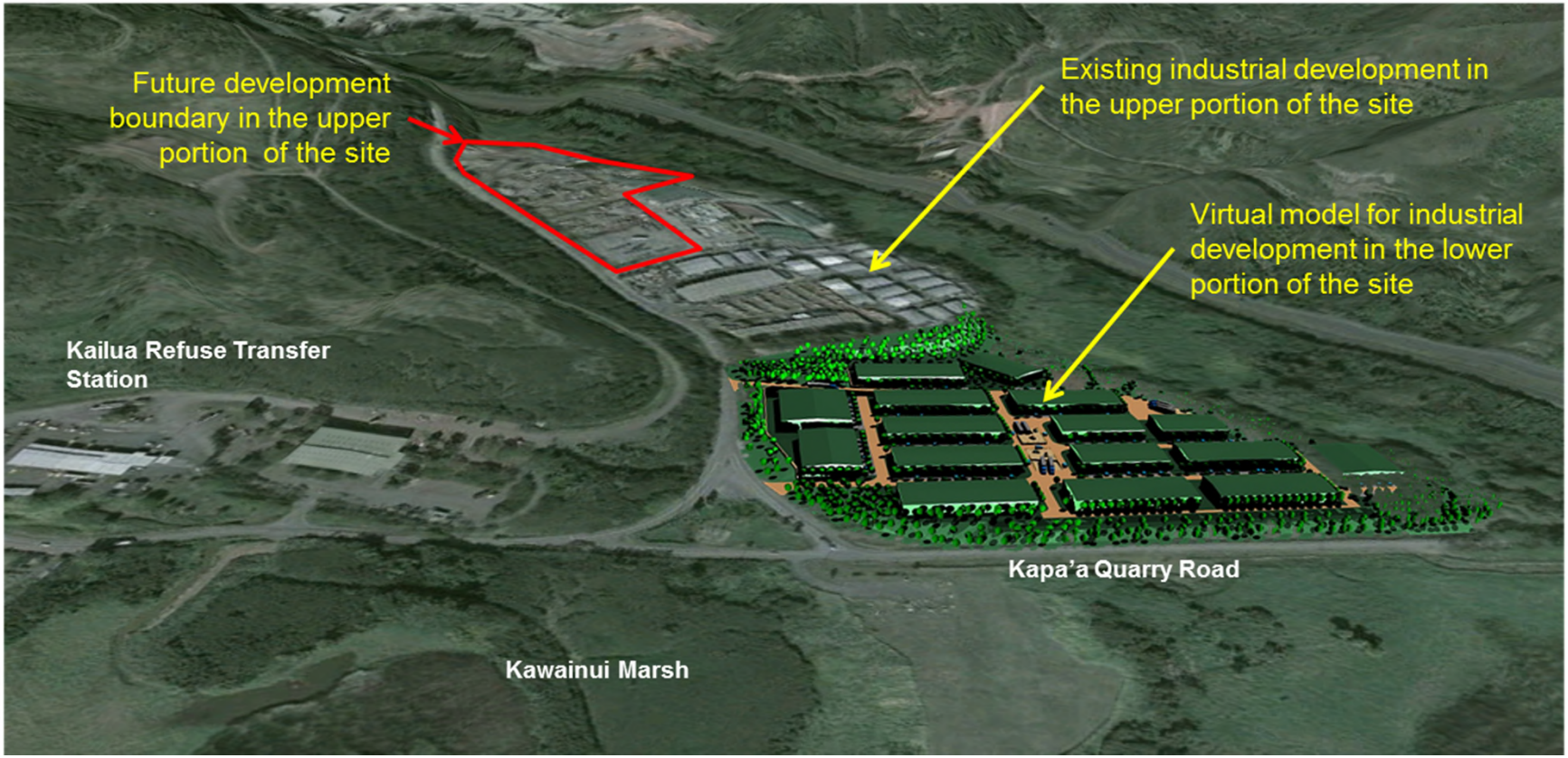


Figure VIA-11:
Definition of the virtual model of the proposed development in lower portion of the site

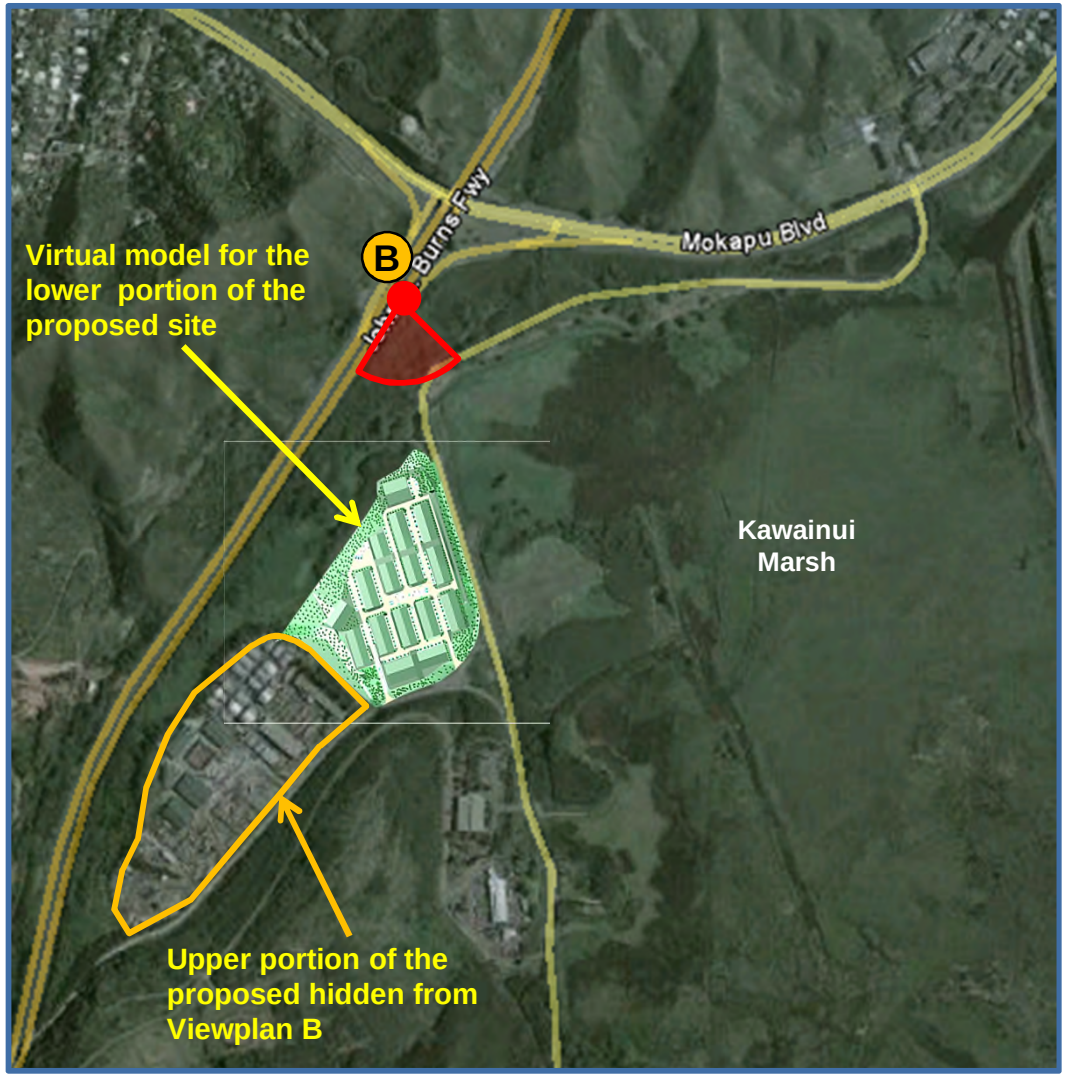


Figure VIA-12: Definition of the Viewplane B for simulated future view

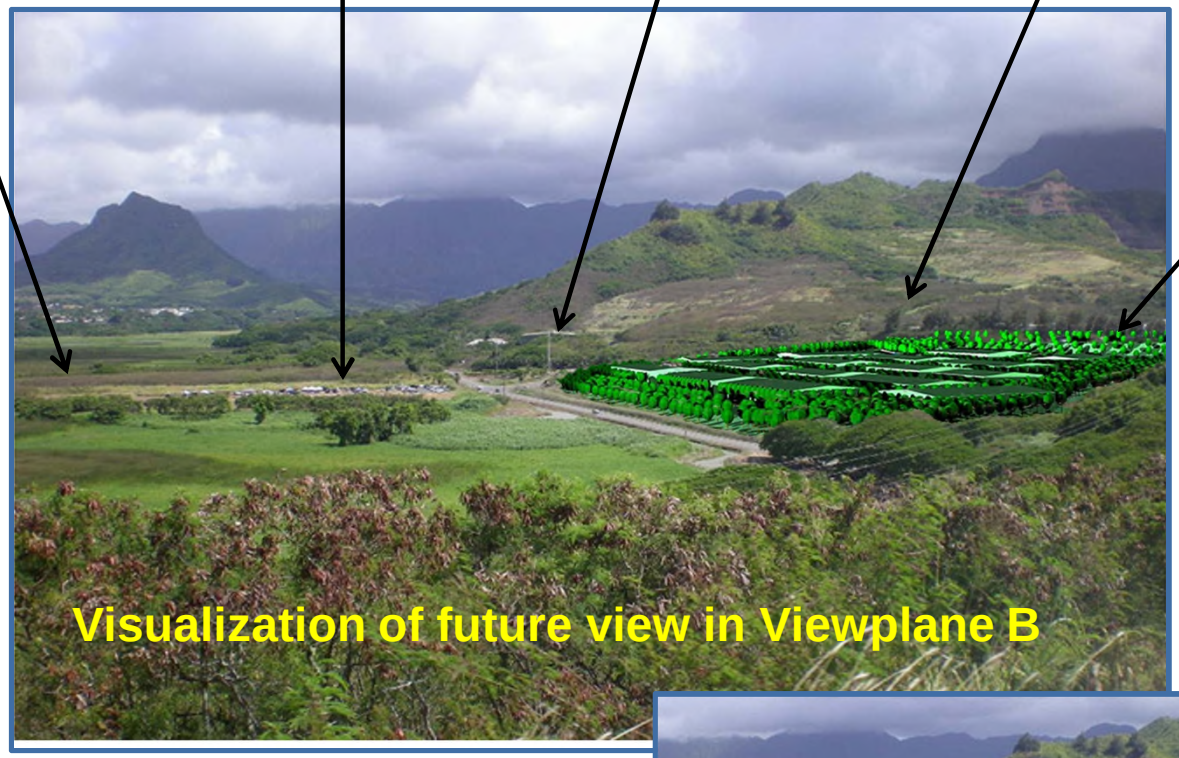
Kawainui Marsh

Model Airplane Park

Kailua Refuse Transfer Station (at quarry road)

Project site (lower portion of site)

Project site (warehouses in upper portion of site are hidden behind a line of existing and yet to be planted trees)



B View from the H3-freeway driving makai (towards the ocean). View is towards the project site. The warehouses in the lower portion of the site are simulated with a rendering of the virtual 3D-model. The proposed mitigation measures include vegetated buffer zones around all four sides of the development as well as trees planted within the development footprint and the choice of shades of colors for the roofs and walls of the warehouses that help reducing the visual impact.

Figure VIA-13: Simulating future view of Viewplane B with virtual model

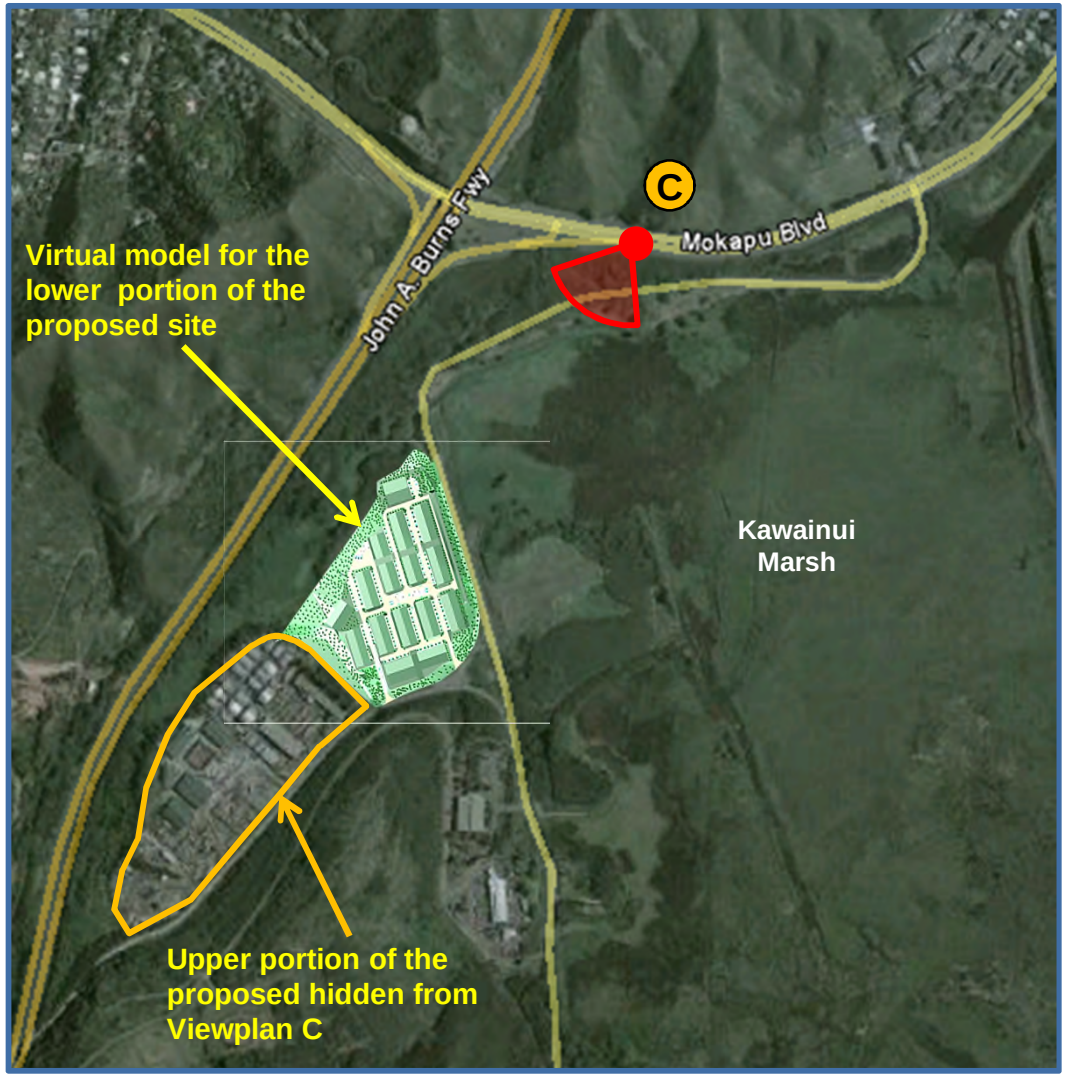
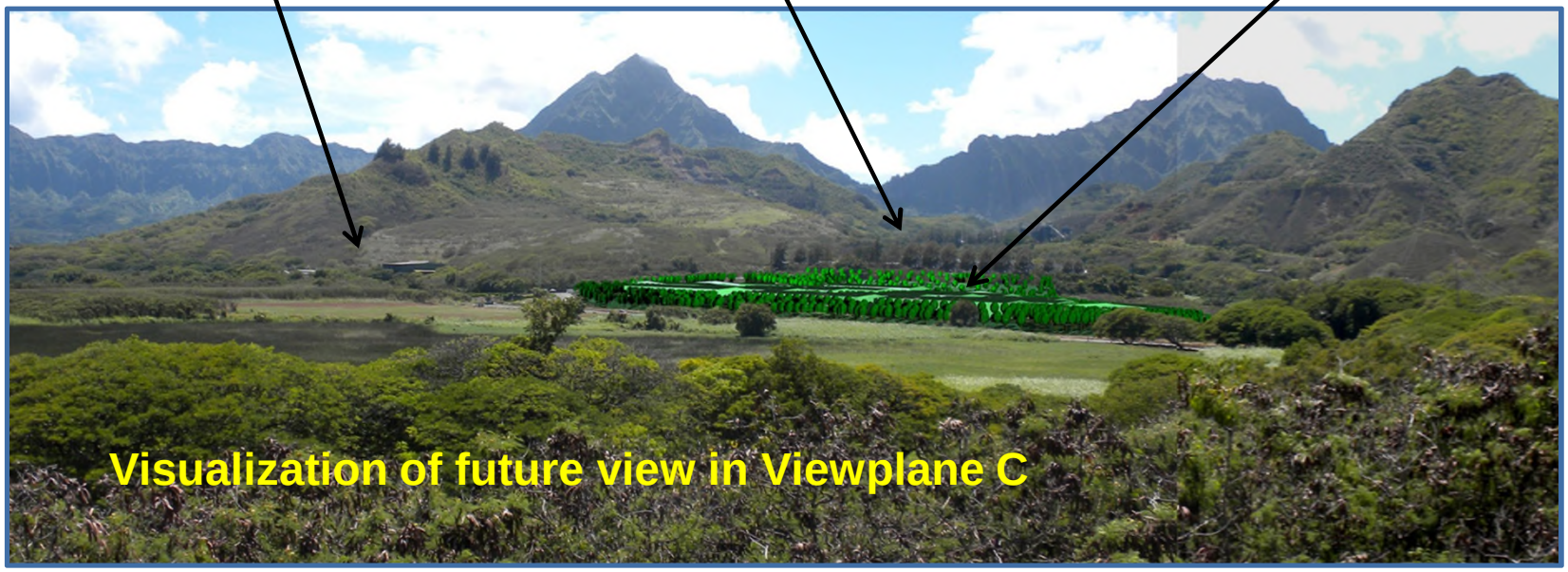


Figure VIA-14: Definition of the Viewplane C (detailed view) for simulated future view

Kailua Refuse Transfer Station (at quarry road); two buildings

Existing warehouses on upper portion of site (hidden behind trees)

Virtual model of proposed warehouse development in lower portion of site



B View from the H3-freeway off-ramp driving makai (towards the ocean). View is towards the project site. The warehouses in the lower portion of the site are simulated with a rendering of the virtual 3D-model. The proposed mitigation measures include vegetated buffer zones around all four sides of the development as well as trees planted within the development footprint and the choice of shades of colors for the roofs and walls of the warehouses that help reducing the visual impact.

Figure VIA-15: Simulating future view of Viewplane C with virtual model

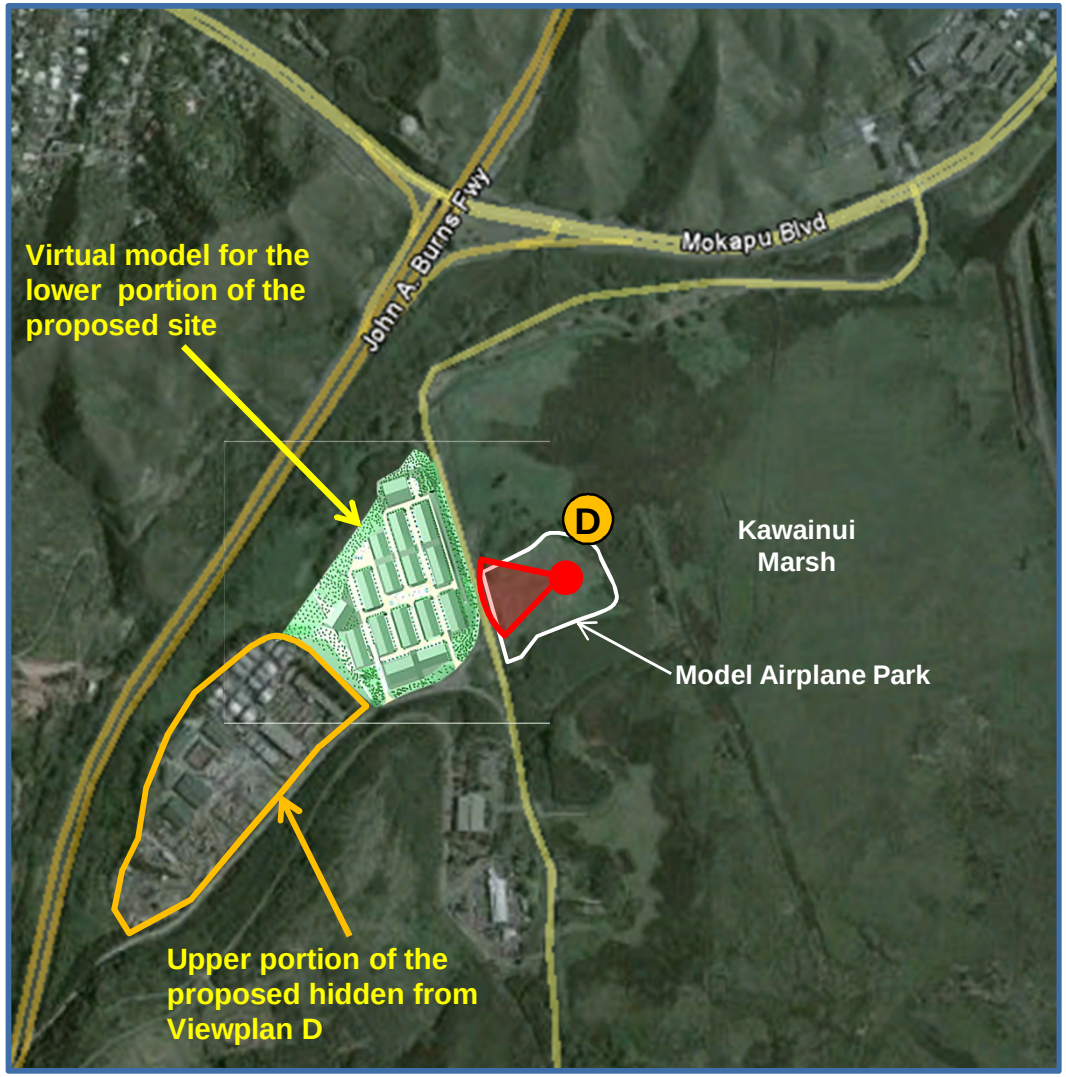
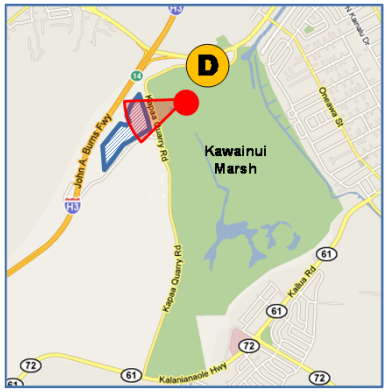


Figure VIA-16: Definition of the Viewplane D for simulated future view

Existing warehouses on upper portion of site (partly hidden behind existing trees)

Virtual model of warehouses (partly hidden by trees in buffer)

Virtual model of trees in buffer zone along Kapa'a Quarry Road)



D View from the eastern side of the Model Airplane Park looking west towards the project site. The development in the lower portion of the site is simulated with rendering using a shaded (yet using ray-tracing) representation of the virtual model. (The parts of the proposed development closest to the Kapa'a Stream, e.g. towards the right margin of the rendering, are not shown for this presentation.

Figure VIA-17: Simulating future view of Viewplane D with virtual model

Image 1:
Virtual renderings using **photo realistic models of trees** within the vegetated buffer zone in lieu of the simple color rendered trees. The height of the photorealistic models are the same as the simple tree objects used in the color-shaded-only visualization. .

Image 2:
Virtual renderings using **simplified shaded models of trees** within the vegetated buffer zone.

D

View from the eastern side of the Model Airplane Park looking west towards the project site. The development in the lower portion of the site is simulated with renderings using a shaded) representation of the virtual model.(see image 1 above). In order to simulate a more realistic close-up view, photo realistic models of trees were used in lieu of the simple color rendered trees (see image 2 above).

Figure VIA-18: Comparison of shaded object versus photorealistic rendering for close-up view in Viewplane D

F-2

- Only views of **Sub-viewplane F-2** have direct line of sight to the proposed site.
- In **Sub-viewplane F-1** there is no direct line of sight to the proposed site; the direct line of sight is obstructed with trees.

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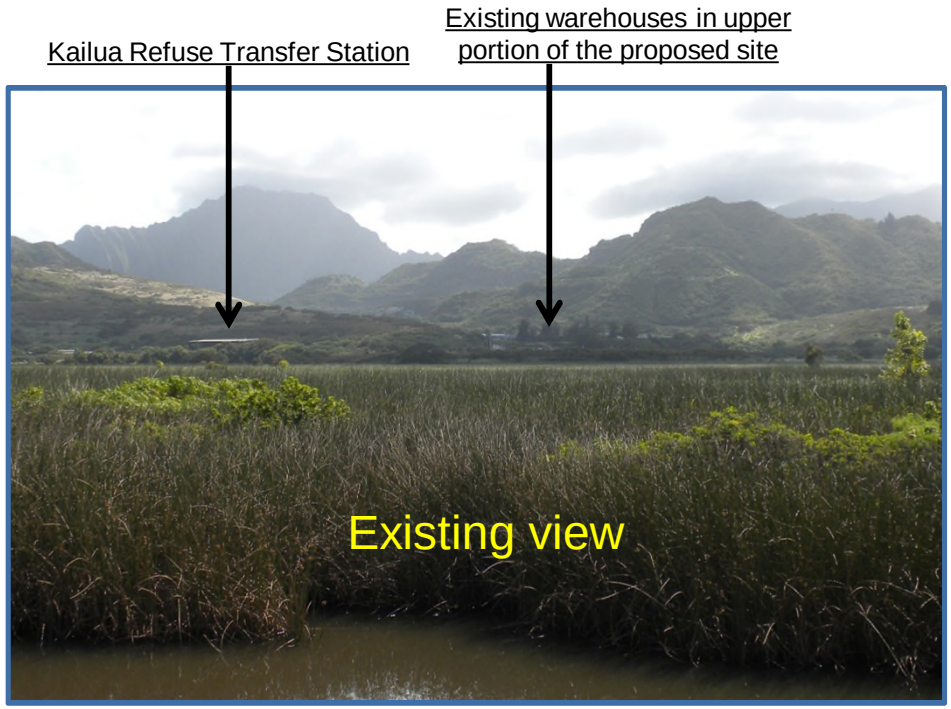
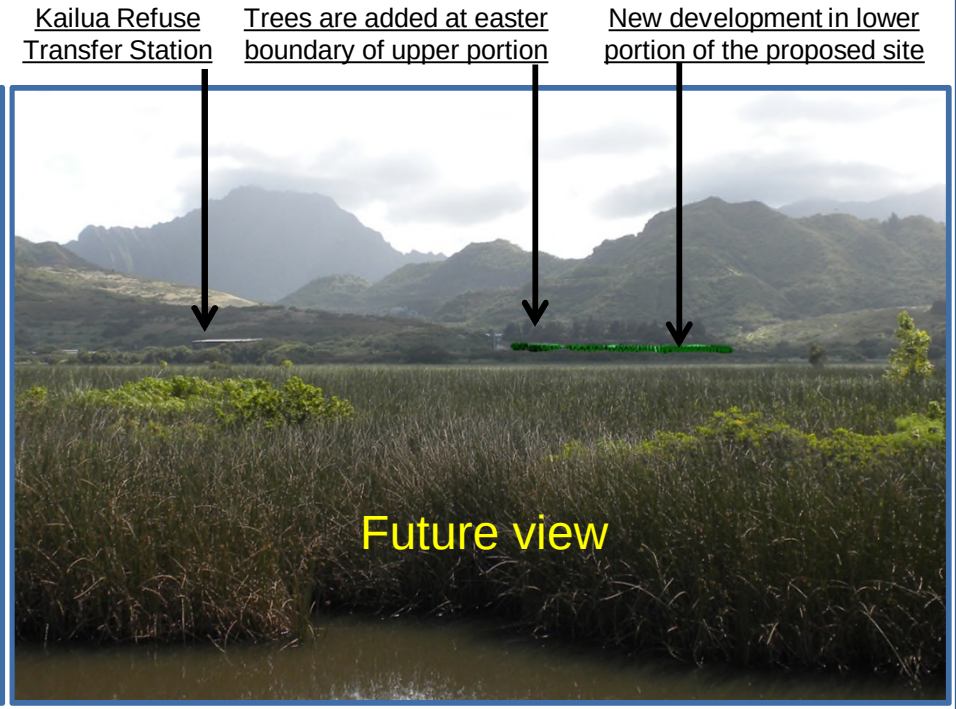
Figure VIA-18/Add A: Definition of the Sub-viewplane F-2 for simulated future view





5 Detailed view 5: **Existing view** from the path along the flood control levee (at the location of Detailed View 5; shown in Figure VIA-21.A) over the marsh toward the existing condition of the proposes site development. The existing warehouses in the upper portion of the site are partially visible behind a row of tall trees that are planted at the eastern perimeter of the upper portion of the site (e.g. within the area between the upper and the lower portion of the proposed project sit)e.

5 Detailed view 5: Rendering of the **future view** is superimposed on the existing view. In this anticipated future view there are several trees added to the existing row of trees at the eastern perimeter of the upper portion of the site . Adding these tress increases the "camouflage" of the upper portion of the site. A computer generated image (color enhanced) indicates the anticipated view of the vegetated buffer around the lower portion.

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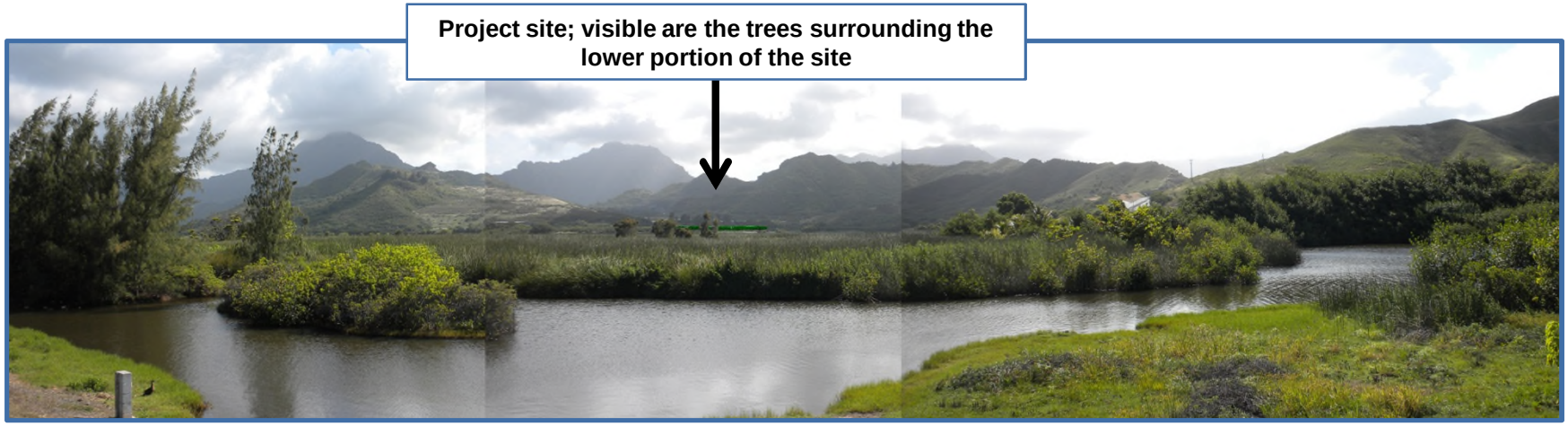
Figure VIA-18/Add B: Views in Sub-viewplane F-2 with future simulated view of proposed project superimposed on existing view

Panoramic view F-A Future panoramic view F2-A from of taken from the path along the flood control levee toward the proposed site



Panoramic view F-B Future panoramic view F2-B of taken from the path along the flood control levee toward the proposed site

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Figure VIA-18/Add C: Views in Viewplane F-2 with future simulated view of proposed project superimposed on existing view

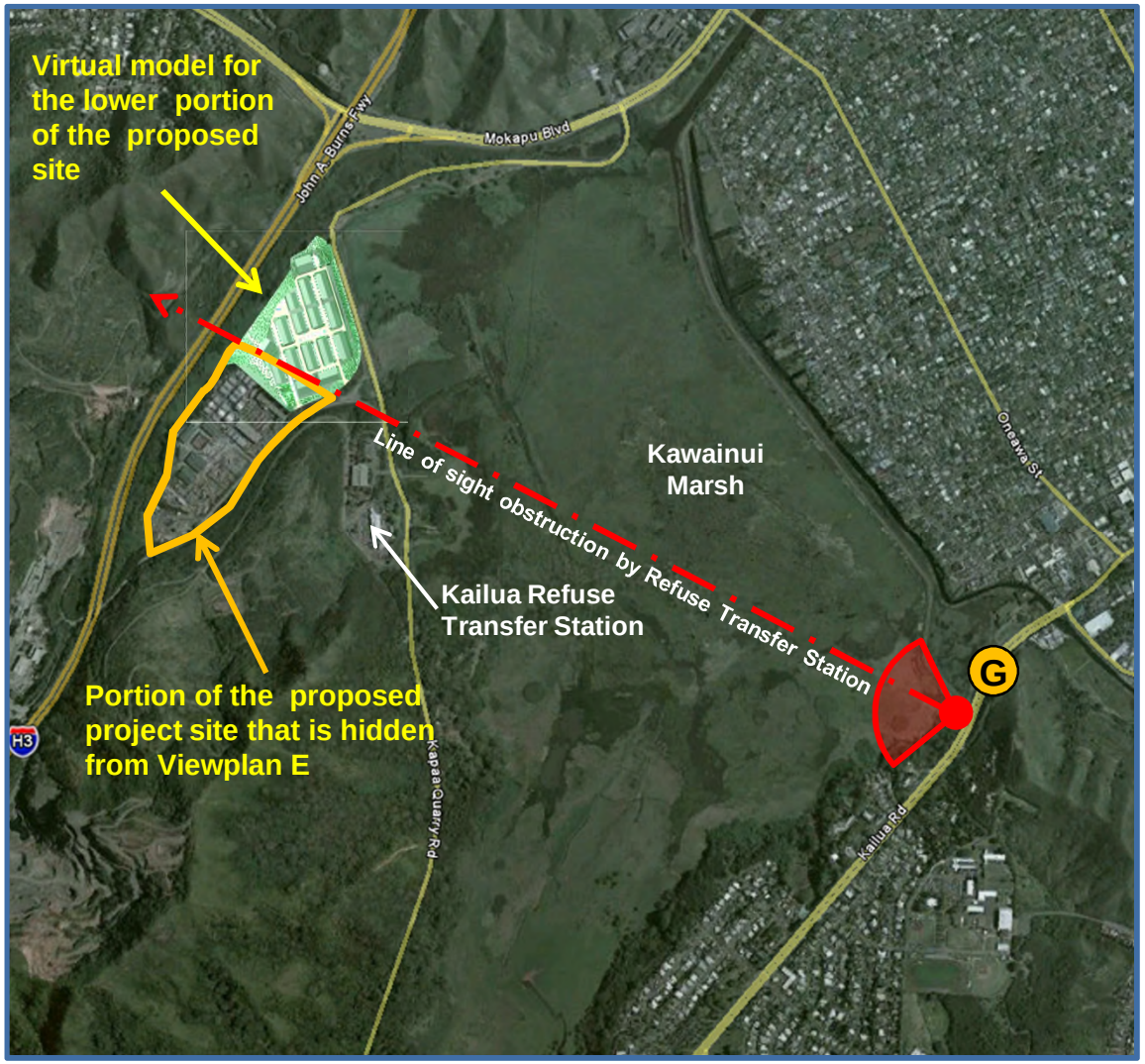
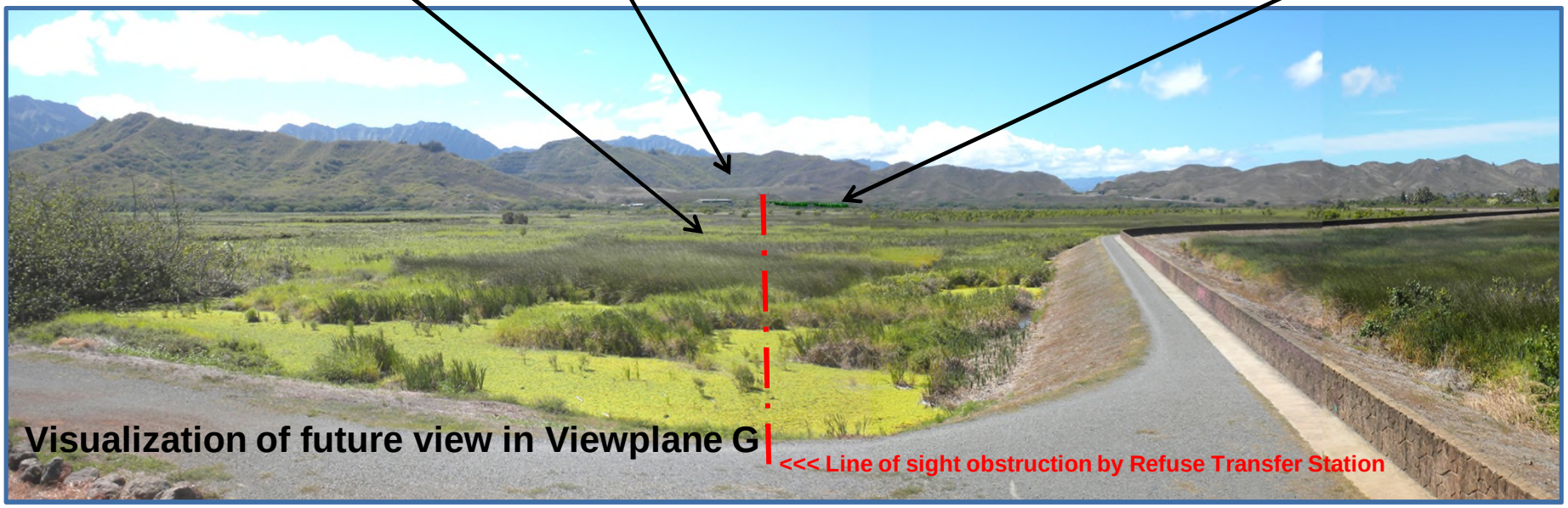


Figure VIA-19: Definition of the Viewplane G for simulated future view

Kailua Refuse Transfer Station (at quarry road); two buildings

Existing warehouses on upper portion of site (obstructed from view by existing structures or vegetation)

Virtual model of lower portion of site



G

View from the south eastern end of the flood control levee. The lign of sight obstruction illustrates that parts of the proposed project site are hidden by structures and surrounding trees and berms of the Kailua Refuse Transfer Station. In the image only portions of the proposed development that are located to the right , e.g. north-eats, of the line would be visible in Viewplane G. The green line of the rendering suggest on trees will be visible, but no buildings.

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Figure VIA-20: Simulating future view of Viewplane G with virtual model

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Final Environmental Impact Statement

for the proposed

Kapa'a Light Industrial Park

Kailua, Hawaii

Appendix 9:

Information about previously conducted archeological survey

<u>Appendix 9 is identical to Appendix 9 of DEIS</u>

January 2011

Prepared by

Sustainable Design & Consulting LLC
Technical and Organizational Sustainability Consultants
Honolulu, Hawaii
www.sustain-hi.com

Appendix 9 – Introductory Remarks:

The State Historic Preservation Division, Department of Land and Natural Resources in their letter dated February 23, 2009, suggested citing in the body of the EA and inclusion of a portion of the following report as an appendix:

> *Cultural Survey Hawai's (2000) "Archeological Assessment and Background Literature review Search for the proposed Circle-Kawai Nui Marsh Trail Project, Kailua Ahupua'a, District of Ko'olaupoko, Island of Oahu, Honolulu, Hawaii, TMK: (1) 4-2-013:010 and 038; 4-2-16:001 & 006.*

This report was previously published in conjunction with the Final Environmental Assessment for the proposed Circle-Kawai Nui Marsh Trail Project. The report can be downloaded from the website of the Office of Environmental Quality Control.

http://hawaii.gov/health/environmental/oeqc/index.html

Archaeological Assessment and Background Literature Search for the Proposed Circle-Kawai Nui Marsh Trail Project, Kailua *Ahupua`a*, District of Ko`olaupoko, Island of O`ahu

Prepared for:

Helber, Hastert, and Fee, Planners, Inc.

By

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Tina Bushnell, B. A.,
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Scott Kikiloi, B. A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaii, Inc.
December 2000

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I. INTRODUCTION

Cultural Surveys Hawai'i, Inc., was contracted by Helber, Hastert, and Fee, Planners, Inc., to provide an archaeological assessment for the Kawai Nui Marsh Pathway project, Kailua Ahupua'a, Ko'olaupoko District, Island of O'ahu. For decades there has been community, county, and state discussion regarding the construction of a peripheral trail system along the margins of Kawai Nui Marsh. The proposed trail system is to be recreational and interpretive, highlighting the natural and cultural/historical resources of the marsh. The 1994 Kawai Nui Marsh Master Plan, prepared for the State of Hawaii Department of Land and Natural Resources, summarizes some of the objectives and purposes of the marsh trail network:

> The primary planning objective for trails is to provide access along the marsh fringe and to interpret resources for educational purposes. Recommended actions set forth in the 1983 State Resource Management Plan encourage the creation of establishment of safe hiking paths and jogging trails in perimeter areas of the marsh; and the establishment of trails and overlook systems to connect principal cultural features such as heiau, and interpretive centers with wildlife overlooks. The trails could link park space, the visitor center, the ethnobotanical garden, cultural sites, and other master plan components in a contiguous manner. In addition to being a recreational asset, the trails would be of educational value by allowing access to natural areas for group hikes. It is envisioned that the trails would serve school groups of all ages, providing them access to the marsh fringe. However, the trails should also be capable of serving the unaccompanied public via signage and interpretive displays. (Wilson Okamoto & Associates, Inc. 1994:4-15--4-16)

The current report is a step toward making these Master Plan objectives a reality. Kawai Nui Marsh and its periphery were the focus of land use from early prehistoric times into the modern era. This land use has left physical remains, legends, and oral traditions. Historical, ethnohistorical, and archaeological research document the rich cultural resources of the area. One of the objectives of the Kawai Nui Trail is to expose trail-users to this rich cultural heritage. This report looks at the potential, feasibility, and impacts of trail construction from the stand point of historic preservation and historic/cultural interpretation.

Background research for the project was undertaken in the Spring of 2000. The field inspection was done in July 2000. Figure 1 shows the location of the project area and the proposed trail segments.

A. Scope of Work

The agreed upon scope of work consisted primarily of historical and archaeological literature review and a reconnaissance-type field inspection of the proposed pathway alignment. With the background research providing the historical and cultural context of

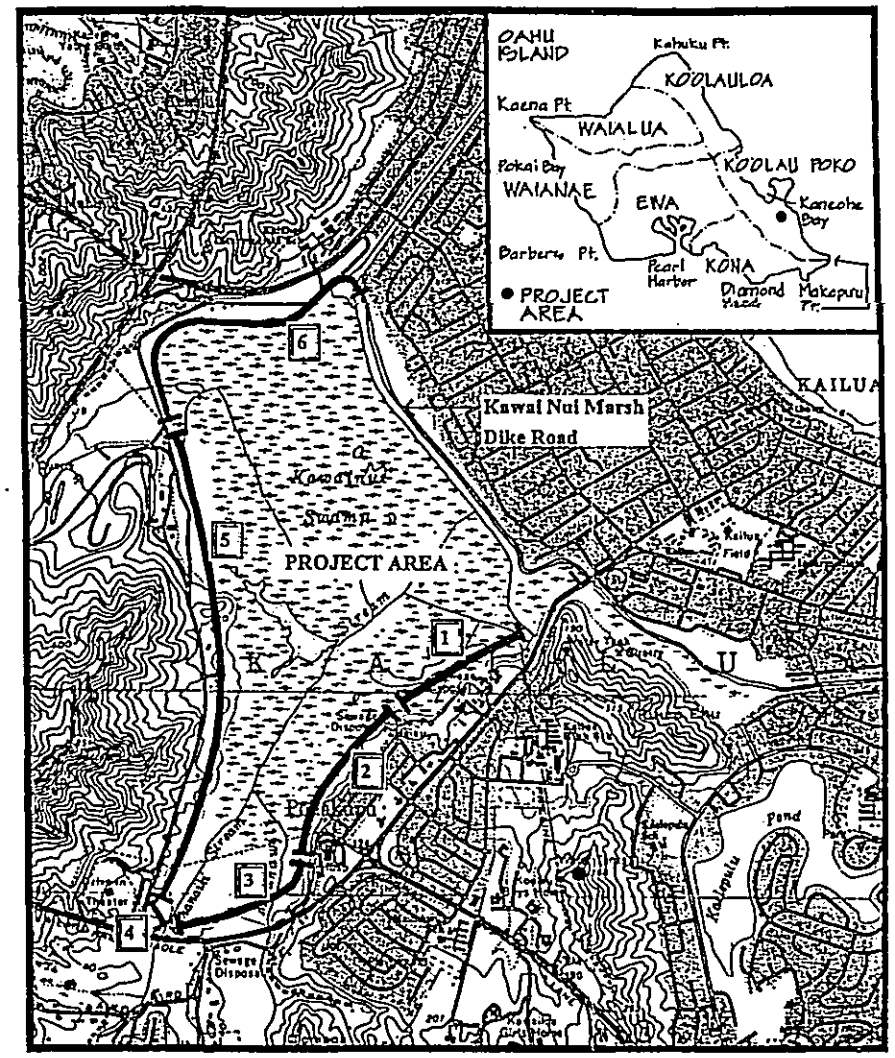

Figure 1 Portion of the 1983 USGS Topographical Map, Mokapu Quadrangle, Showing the Project Area in Hatching and the Proposed 6 Segments of the Circle-Kawai Nui Trail

the Kawai Nui Trail, the field reconnaissance assessed and addressed potential impacts of the pathway construction on the historic properties known to be in the vicinity of the trail alignment. Terrain and vegetation limitations were noted. The interpretive potential of the different sites was considered along with the potential impact to the sites with increased pedestrian traffic through this currently under-utilized area. The specific scope of work included three items:

1. A literature review to a) produce an up-to-date bibliography of all studies on Kawai Nui, b) produce an updated table and map of all archaeological sites in the immediate vicinity of Kawai Nui, c) produce an assessment of the impacts of path development on archaeological resources and of the opportunities presented for archaeological resource interpretation, and d) produce a compendium of information for the interpretation of the archaeology of the entire marsh as well as of the most important archeological sites in the immediate vicinity (Ulupo, Pahukini and Holomakani *Heiau*) for which site interpretation may be desired.

2. A field reconnaissance of the entire proposed pathway to a) better understand constraints and opportunities of archaeological resources, b) to document photographically archaeological sites and opportunities for cultural landscape interpretation

3. Production of this report to document findings specifically dealing with archaeological constraints and their mitigation and archaeological opportunities and their enhancement and interpretation.

This document is not intended for review by the Department of Land and Natural Resources/State Historic Preservation Division as part of the State's historic preservation review process. This document is for planning purposes and is intended to guide decisions regarding the potentials for various trail alignments, for public interpretation of historic properties, and how to mitigate the impacts of trail construction on the adjacent historic properties.

B. The Proposed Trail Alignment

The 1994 Kawai Nui Master Plan has the following to say regarding the location of the proposed trail:

> The trail system in the proposed master plan is a perimeter trail. This was supported by community participants despite concerns about safety and security, and the cost of footbridges or boardwalks across the wetland. However, the primary segments continue to be from Ulupo Heiau to Kukanono Slope, along the Kapa'a Quarry Road slope, and along the flood control levee. Construction of the remaining trail segments to complete the perimeter trail is envisioned as a long-term project. (Wilson Okamoto & Associates, Inc. 1994:4-16--4-17)

Helber, Hastert, and Fee have proposed the completion of the circle-Kawai Nui Trail through the construction of 6 contiguous trail segments, see Figure 1. These trail segments are to be completed as funds are made available.

Segment 1, the first segment proposed for construction, will connect the southern end of the Kawai Nui Dike (or Levee) Road with the vicinity of Ulupo *Heiau*. The terrain in this area is characterized by steep to moderate undulating slopes that meet abruptly at the edge of the marsh. *Hau* bush fringes the marsh edge and forms a thick nearly impenetrable forest throughout the area.

Continuing clockwise around the marsh, Segment 2 will connect Ulupo Heiau with the vicinity of Castle Medical Center. This segment will pass along the Kukanono slope through areas that are currently used by the Knott ranching operation. Some of the more striking natural features of this area include medium to large rock outcrops and the aerial root structures of Banyan trees.

Segment 3 will connect Castle Medical Center with the Pali Highway end of the Kapa'a Quarry Road. This segment extends from the southeast corner of Kukanono Subdivision to Kahanaiki Stream near the intersection of Quarry road and Kailua Road. The natural character of this segment which is currently dominated by the Knott cattle ranch operation, is mostly open land with level terrain. Natural slopes occur along the access road to the ranch operations, as well as at Mokulana Peninsula. The segment is bisected by Maunawili and Kahanaiki Streams. The Army Corps of Engineers has proposed the excavation and maintenance of shallow ponds in the vicinity, generally parallel the two streams in the area. The pond construction is intended to restored waterbird habitats.

Segment 4 is a short trail length that cuts across the corner formed by Pali Highway and Kapa'a Quarry Road. This corner is one of the proposed sites of the Kawai Nui Marsh Visitor Center. The terrain varies from forested slopes to low lying wetland marsh along Kahanaiki Stream. The area incorporates some of the lands proposed to become restored waterbird habitat

Segment 5 will extend approximately 1 ½ miles along Kapa'a Quarry Road from Pali Highway to the vicinity of the Honolulu City and County's model airplane park, near Kapa'a Land Fill. Natural characteristic of the area are similar to those in the Kukanono area (Segment 2), with moderate to steeply sloped terrain that includes a variety of mature tree and shrub species that combine to create a full shade producing canopy. Significant area of the Hau bush also fringe the marsh in some locations. The area includes several prominent rock outcrops including the Na Pohaku O Hauwahine Overlook. Ranch operations (VO Ranch) occupy approximately 10 acres just south of Na Pohaku.

Segment 6 will connect the vicinity of the model airplane park with the north end of the existing Kawai Nui Dike (Levee) Road. A foot bridge may or may not be built to cross Oneawa Canal at the northern end of the Dike Road. Alignment options for this final segment include a pathway on the makai (marsh) side of Quarry Rd. As recommended by the 1994 master plan, or crossings to the mauka side of the road. The natural character of

the area makai of Quarry Road is flat, with much of the area consisting of actual marsh features in close proximity to the road. Terrain mauka of the road includes an area of moderate to steeply sloped terrain with a number of mature tree and shrub species to create a more forest-like setting. From the northeastern end of Segment 6, the Kawai Nui Dike Road extends to Segment 1 and completes the perimeter of the marsh.

C. Methods

Background Research

Background research included a review of previous archaeological/historical studies on file at the State Historic Preservation Division of the Department of Land and Natural Resources; a review of geology and cultural history documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum; and a study of historic maps at the Survey Office of the Department of Accounting and General Services. Land conveyance research related to the *Māhele* of the mid-19th century was done through *Waihona-'Aina.com*, the Internet search company. This research provided the environmental, cultural, historic, and archaeological background for the project area.

Many good historical and/or archaeological sources exist for Kawai Nui Marsh and its vicinity. These include, but are not limited to, Cordy (1977), Kelly and Nakamura (1980), Creed (1992), Clark (1980), Hall (1997), Erkelens (1993), Athens (1983a), Hammatt (*et al.* 1990), and Athens and Ward (1991). The purpose of the background research was to glean information from these existing sources and present it in the context of trail development. Previous historic and archaeological reports were used to prepare site location maps and site tables. Site location data were overlain on the proposed trail route alignment supplied on the Helber, Hastert, and Fee Kawai Nui Maps.

Field Inspection

Using the Helber, Hastert, and Fee trail alignment map with the overlay of the site location information, the trail alignment was walked. Using the site and feature descriptions from previous reports it was usually possible to relocate the previously documented sites. Comparisons were made between the previous description of the site and its present condition. Sites that may potentially be affected by trail construction and use were inspected to assess what the trail impact might be. Recommendations for mitigating trail impacts on specific sites were recorded. Using the site and feature maps from previous reports, proposed trail alignments through or near site areas were sketched. Trail alignments and their relationship to historic properties were photographed. A general assessment of the feasibility of trail alignments based on limiting factors such as vegetation and topography was also made.

II. CULTURAL AND HISTORICAL SETTING OF KAWAI NUI WITHIN THE *AHUPUA'A* OF KAILUA

The history of the Kailua region of O'ahu has been documented in a number of studies including, but not limited to, Hall's (1997) "The History of Kailua", Creed and Chiogioji's (1991) "Facets of Maunawili Valley and Kailua *Ahupua'a* History", and Kelly and Nakamura's (1981) "Historical Study of Kawai Nui Marsh Area, Island of O'ahu". All of these studies detail the legendary history and oral traditions, the legendary rulers and personalities, the early historic accounts, land ownership and utilization changes during and following the *Māhele*, and the changes in land use from traditional to modern times. With so many sources already documenting Kailua's rich historical and cultural past, the purpose of this section is only to orient the present project area within the overall historical and cultural setting. For more detailed accounts of Kailua's past, the reader is referred to the above sources, as well as the ones cited in the following text. Included in this section, under the discussion of the *Māhele* land divisions of the mid 19th century, is a detailed discussion of the Land Commission Awards claimed and awarded along the margins of Kawai Nui Marsh. This information was provided through Waihona Aina Corporation (*Waihona.com*), an Internet *Māhele* database.

A. Setting

Kailua *Ahupua'a* is the largest valley on the windward side of O'ahu, and the largest *Ahupua'a* of the Ko'olaupoko District (approximately 15 km by 11 km). Flanked by the *Ahupua'a* of Waimānalo on the southeast, Kāne'ohe on the northwest and Honolulu to the south, the *Ahupua'a* of Kailua is shaped like a rectangle. From the Ko'olau ridge line it extends down two descending ridge lines which provide the natural boundaries for the sides of the *Ahupua'a*. The fourth side of the rectangle is the reef line of Kailua Bay.

The natural environment includes the sand barrier upon which Kailua Town stands, the mountainous upland terrain and alluvial valleys of Maunawili, the largest fresh water marsh in Hawai'i (Kawai Nui Marsh), another inland pond (Ka'elepulu), approximately 18 permanent and intermittent streams, a freestanding mountain halfway between the shore and the Ko'olau (Olomana--1,643 ft.), several low ridge lines, and off-shore the Mokulua Islands, Mokole'a Rock, and Popoia Island. It comprises 11,885 acres of land according to the Boundary Commission Review of the mid-19th century, but in fact extends beyond the shore approximately a mile out to sea, to the reef.

During the estimated 1000 to 1500 years since initial Polynesian settlement, the sand barrier that forms the shore at Kailua Bay has provided a desirable location for residences with a sunny, dry beach area. The well-watered interior lands, including the two marsh/pond areas of Ka'elepulu and Kawai Nui and the many springs and streams of Maunawili, provided bountiful agricultural and resource gathering areas. During the 15th and 16th centuries Kailua O'ahu was the center of a large royal complex with ample playgrounds for sports and physical training, and recreation (Sterling and Summers 1978:231-232). Supporting this large complex was a most bountiful garden hinterland

where fish, fowl, and vegetables were plentiful (*Ibid.*:227-228).

Mele or chants about Kailua frequently mention the two fishponds famous for their mullet and *awa*. They also tout the taro gardens of the area (see Beckwith 1979 and Drigot (1982), in the legendary *mo'olelo*, or epics (e.g. Hi'iakaikapoliopele, Kahinahinanui, Makalei Tree, Ka'ulu are a few of the stories). Early visitors (Bowser (1880), in particular) to the island also mention a wealth of birds in the area.

Beside a sunny beach area and uplands watered by frequent showers, other resources were easily available in Kailua. As the center of the caldera of the ancient Ko'olau Volcano (MacDonald and Abbott 1974:363) a basalt quarry (the present Ameron Quarry is built upon the site of the pre-contact quarry) for material for lithic tools was near at hand. Kailua was a residential district surrounded by *Ahupua'a* that were also highly cultivated and capable of providing ample resources for a large resident and visiting population. Kailua apparently also was a *pu'uhonua* (place of refuge) before Kamehameha I conquered the island of O'ahu. After this time the ancient *pu'uhonua* were abolished.

B. Oral Traditions and Legends

Legends and oral history provide stories for many of the place names and also give specific beliefs Hawaiians held and hold about the land. The name Kailua, meaning "two seas", apparently refers to the two large inland waters, Ka'elepulu Pond and Kawai Nui Pond (Pukui *et al.* 1974:69; Quebral 1991:14). That Kailua was a "fat" land, a land of plentiful food in all times, is suggested by several legends. The *Makalei*, or Fish-Attracting Tree was a mythological tree or stick which could summon fish from Kawai Nui. Reportedly located near the present day Hāmākua Street Bridge, it was described as a never failing source of a plentiful supply of food (Beckwith 1970:279-280 and Pukui and Elbert 1981:382, cited in Kelly and Nakamura 1981:5). Another tradition of the ample productivity of the Kailua region involves the edible, *haupia*-like mud, called *lepo'ai 'ai*, which was available from Kawai Nui Marsh (Kelly and Nakamura 1981:5). This legend implies a bountiful Kailua where even the mud is edible.

Kailua is one of the places where, following their arrival on O'ahu from Kahiki, the *menehune* were assigned to live. These legendary workers are credited with the construction of numerous fish ponds and religious structures. Fornander points out that the term *menehune* in Tahitian had become the name for the lowest laboring class of people--suggesting a Tahitian origin for the term for the legendary workers (Fornander 1969:23).

There are legendary accounts of the prominent Mount Olomana, that is named after a great mythological giant and/or chief (Kelly and Nakamura 1981:1) Tradition also says Kawai Nui was inhabited by a *mo'o* (large dragon-like mythical creature) called Hauwahine, whose name literally means "female ruler". Her residency at Kawai Nui follows Haumea's, the earth-mother goddess whose name literally means "red ruler". She made sure all the people of the *Ahupua'a* shared in the pond's wealth and punished those

who were greedy (Beckwith 1970:126).

Oral history notes that the stones overlooking Kawai Nui on Pu'u 'o 'Ehu are sacred to Hauwahine and her companion (Paki, 1976). The reason for this is connected to the ancient Hawaiian notion that the channel/canal beneath Pu'u o Ehu connects Kawai Nui and Ka'elepulu and was considered to be the coital connection between the two fishponds, giving the area great *mana*. Kawai Nui Marsh was considered male and Ka'elepulu Pond, female. They mated at Kawailoa according to a Hawaiian tradition (Paki 1976).

Traditional history credits Kailua as the residence of many prominent O'ahu ruling chiefs. There is 'Olopana "who with his brother Kahikiula came to O'ahu from Kahiki . . . He is said to have established several *heiau* in Kāne'ohe and Kailua, including Pahukini and Holomakani in the Kawai Nui area" (Kelly and Nakamura 1981:3). One of the earliest great chiefs to reside in Kailua was Kakuhihewa, who built himself a great house at 'Alele in Kailua (*Ibid.*:5). At approximately the same time (the 16th century) another prominent chief, Kūali'i, born at Kalapawai, Kailua, and raised in Kualoa and Kailua, had his navel cutting ceremony at the *heiau* of Alala (present day Lanikai point), and, after being the hero of many battles, became the high chief of all O'ahu (*Ibid.*:6) In early historic times the conquering chiefs Kahekili followed by Kamehameha I resided in Kailua for a time (*Ibid.*:6-7).

C. Early Population Estimates

The drastic depopulation of the Hawaiian Islands following the introduction of Western disease has been documented in a number of sources (Bingham 1847; Stannard 1989; and Bushnell 1993). According to one estimate the population of Hawaiians and part-Hawaiians fell from approximately 300,000 in 1778 to 82,593 by 1850 (Schmitt 1968:43, 74, cited in Kelly and Nakamura 1981:10). Population counts from the 1830s place the population of Kailua at approximately 760 individuals (Schmitt 1973:19 cited in Kelly and Nakamura 1981:10). This low population figure is incongruous with the productivity of the region, but well in keeping with population decline estimates due to western disease. Westerners passing through Ko'olaupoko in the mid 1840's made note of the cold and flu symptoms among the native Hawaiians and that much formerly productive land appeared abandoned (Wyllie 1848:20 cited in Kelly and Nakamura 1981:10).

D. Early Historic Accounts

Historic accounts of Kailua before the 1850s are rare. One of the only accounts that could be located is that of Levi Chamberlain, a missionary who made a circuit around O'ahu to inspect the mission schools in 1828. This account is particularly important because Chamberlain travels through and describes the landscape in the immediate vicinity of the current project area. Chamberlain describes his progress from the settlement at Kailua through the low hills, today called the Kalaheo hills and the location of Kalaheo High School, that separate Kailua from Kāne'ohe.

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> Directing our course towards Kāne'ohe, the next district, we were obliged to pass over a tract of low land mostly overflowed with water by the late rains. Here I was obliged to wade, as the distance was too great to admit of my being carried on the shoulders of my attendants, as was generally the case in passing a small stream of water. After emerging from the flat, our path was not improved, for we had now to walk through mud instead of water--we walked some distance along the steep hill, and at length by a winding path ascended to the top of it. We sat down to rest for a few minutes, and I found myself upon the summit of a ridge extending from the mountains in a right line to the sea and dividing the low lands of Kailua from those of Kaneohe. (Chamberlain Ms.:664 in Kelly and Nakamura 1981:7).

It is clear from this account that this west-northwest portion of Kailua, in the vicinity of the current project area (Segment 6), was low lying and prone to flooding. As we shall see in later discussion, this does not appear to change with the passage of time.

E. *Māhele* Records

Māhele records are an important resource for determining land-use during the first half of the 19th century. In the great division of lands among Kamehameha III and his people between 1848 and 1853, approximately 250 Land Commission Awards (LCAs) were claimed before the Board of Commissioners to Quiet Land Titles (Land Commission) in Kailua. Many persons claimed their land from the time of their *makuakane* (ancestors) but no one indicates any time farther back than the time of Kaloli (contemporaneous with Kamehameha I). The most recent claims are probably those granted by Governor Kekū'anao'a. Not all claimants told how long they had occupied the land but of those who do they refer primarily to the ruling chiefs and then some refer to the local *konohiki*.

Many Kailua claimants list kings, queens, *kuhina nui* or governors to provide a time frame for when they received their land. The earliest such reference appears to be Kaloli, the wife of Kalaniopu'u who lived from 1752 to 1782 (Kuykendall 1980, vol I:30-32), followed by Kamehameha I, *Mo'i* or king and conqueror of O'ahu in 1795 (p.87), Liholiho, King Kamehameha II in the 1820s, Kaomi, the Tahitian companion of Kamehameha III who died in 1833 (p. 135), Boki, governor in 1820s and his wife Liliha, *kuhina nui* - after 1829 and during the 1830s, Kīna'u, Queen from 1832-1839, Ka'ahumanu, Queen and *kuhina nui* in 1820s and Kekū'anao'a, the governor of O'ahu in the 1830s and 40's (p. 286), Paki, a high chief during the same period (p. 285), and Kamehameha III during the early 1840s. Some claimants give specific dates and these range from 1828-1848. Thus, the people established in Kailua by 1848-1853 only ascribe their roots to the land for the period of the 60-70 years before the Land Commission Awards. While some claimant's lands may have been in their family for longer periods, it would not have been politic in the land commission claims for land offered to them by Kamehameha III to refer to rulers prior to the Kamehameha dynasty.

At the time of the *Māhele*, it would appear that Kailua, Kāne'ohe and Waimānalo

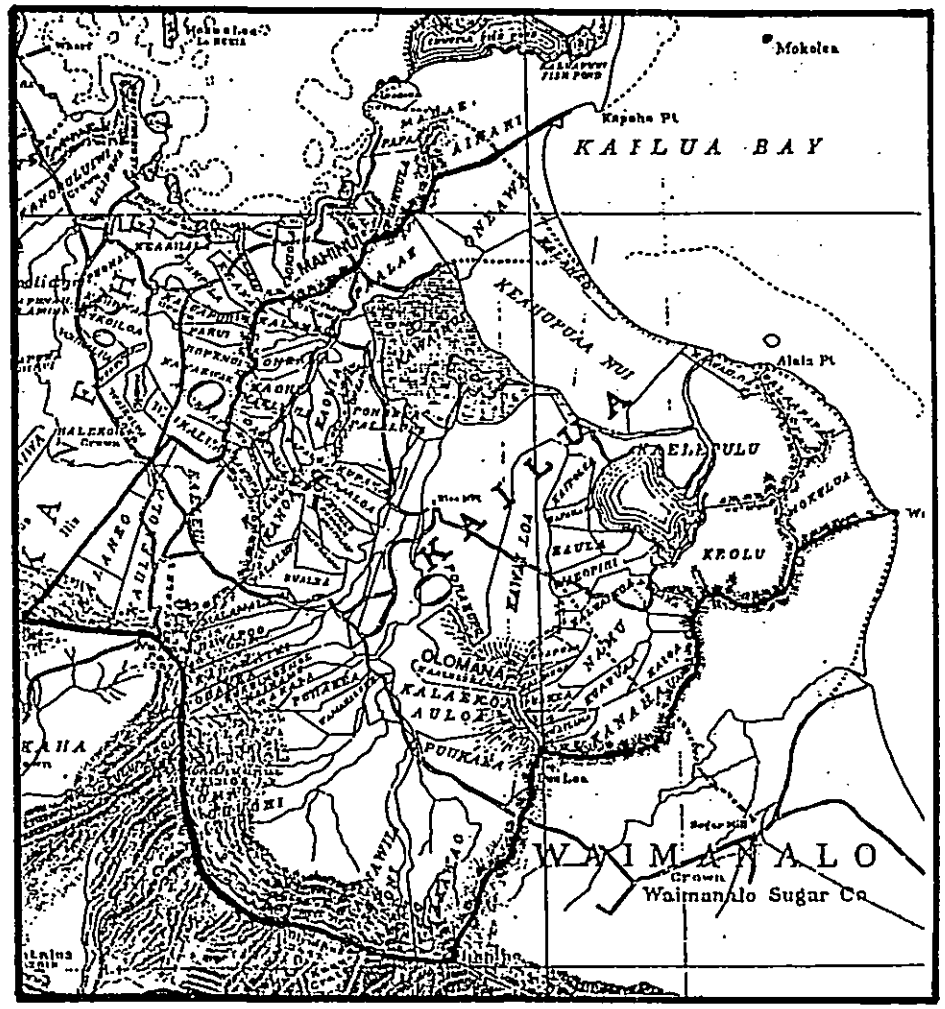

Figure 2 Map Showing the *'ili* Land Divisions of Kailua *Ahupua'a*, From John M. Donn, 1902, Hawai'i Terr. Survey

family, and then to important *ali'i*, particularly warrior chiefs for Kamehameha I. The entire *Ahupua'a* of Kailua was awarded to Queen Kalama. Within the *Ahupua'a* the Crown took for itself the *'ili* of Kawailoa which surrounds the Olomana peaks, with a portion in Maunawili Valley and the major portion descending to the sand barrier and yet another detached portion of this *'ili* is found along the shoreline. Princess Victoria Kamāmalu was awarded the *'ili* of Ka'elepulu which has both a down land and upland portion.

At the time of the *Māhele* land claimants testified before the Land Commission. This testimony provides valuable information in terms of land use circa 1850 and before. The LCAs records for Kailua document a thriving area of garden areas clustered along its 18± permanent and intermittent streams. The Maunawili/Kahana'iki Stream delta is a large, marshy low-lying area with no more than a 6% slope, with fertile soils along stream beds with many taro *lo'i*. Kapa'a Valley is narrow but also had many gardens along its stream. Other fertile areas are on the *mauka* side of Ka'elepulu Pond (modern fill now surrounds most of the former pond) going toward Waimānalo; and several very fertile areas are found within the present-day MidPac Country Club. The two great lagoonal fish ponds joined underneath the lookout point of Pu'u o Ehu and a few LCAs are found nearby. Another area between Keolu Hills, just to the southeast of the Pond/Lake, which shows fertile soils but does not have recorded Hawaiian farming there. This isn't to say that farming wasn't taking place there, merely that we have no record of it. A very narrow fertile area sits on the Pohakupu upland about the location of Kailua High School. These fertile soil areas are the location of most of the awards in the LCAS Native Register, Foreign Testimony and Native Testimony.

'Ili are the land divisions within the *Ahupua'a* and these were governed by the lesser chiefs and *konohiki*. The *'ili* of Kailua are shown in Figure 2, a portion of a map prepared by John Donn in 1902. Land divisions came about supposedly under the reign of Ma'ilikūkahi (born about 1360 A.D.), one of the chiefs who spent time in Kailua. There were approximately 70-80 *'ili* exploited in Kailua at the time of the *Māhele*.

A majority of the *'ili* in Kailua, O'ahu were divided up among 41 of Kamehameha III's high chiefs. Others (39 *konohiki* awards) received *'ili* or partial *'ili* from Kamehameha III (13 or 20% of the 60 *ali'i* granted land in Kailua). These 39 are given 38 *'ili* (two each get a half of Pohakupu). Thirteen of the 60 high chiefs and *ali'i* retained the majority of the 70-80 *'ili*. At least two of the descendants of these chiefs still live on their land in Kailua; the descendants of Kuke (Tute) and the descendants of Peleleu. In addition to the names of those persons applying for a claim, we have witnesses' names and names of neighbors. Field boundaries are described by naming the neighboring cultivators, and many of these names did not appear on the LCAs list. Some claimants mention where they are cultivating under the aegis of another. In all, there are about 251 names given in the Native Register, Foreign and Native Testimony in the claims dealing with the Kailua, O'ahu area. Of these 251, 200 persons are mentioned tilling the land in Kailua Ko'olaupoko in some way. About 65% of those working the land actually applied for an award.

In the *Māhele* records, 123 house lots are mentioned in the awards. This, probably does not offer a true reflection of habitations, as the majority of 171 claimants probably lived within the *Ahupua'a*. Where "kauhale" or homes are mentioned the location of these house lots is typically bounded "on all sides by upland." However, although they were close to the fields, they had to be out of the wetlands. There are several house lots in the vicinity of the current project area.

Ali'i in Kailua don't specify what use they are making of their land in the LCAs. Most land use information comes from the LCAs (*kuleana*) belonging to commoners. In Kailua most claims include taro patches. All the many upper and lower valley streams are lined with taro *lo'i*. Upper valley springs also have their taro patches. Some 1255± taro lo'i are listed in the LCAs. (Where Native Register and Foreign Testimony differ, the smaller number was used for conservative estimation, (cf Kelly 1981:27)). Kelly researched both the *'ili* of Olohana and Kumu and found no boundaries ever defined, the LCAs listed there all claimed taro *lo'i*. Although we don't have information on the size of the taro patches, we know that there were 1255 taro *lo'i* being tilled by some 200 claimants at the time of the *Māhele* in Kailua, O'ahu.

Kailua LCAs list other crops: *malas* of *wauke* or tapa fields, bananas, sugarcane, 'awa, sweet potatoes and gourd fields; coconut, hala, kukui, koa, and fruit trees and one in Kukanono mentions cotton growing. An upland *'ili* is named for a koa pit, which would indicate that at some time in the past, koa existed in the area. Other woods mentioned in the *'ili* names are noni ('Ainoni - "to eat noni"), koa (Kālaikoa - "to hew koa"), 'ohia (Ka'ohia), kukui (Kukuimoemoe - kukui and sleep or ambush), and kamani (Kalelekamani - "where the kamani trees sway."). Wauke (paper mulberry), Melons and potatoes, potatoes or sweet potatoes and *'awa* are some crops mentioned in the LCAs. Four *'ili* in Kailua have names associated with tapa/kapa. Kapaloa (long kapa), (LCAs 2464, 8799 mention a *mo'o* or *kula* without specifying what kind of cultivation) Kapa'ele (dark kapa), Kapalai (silent kapa), Kapalepo (dirty kapa). There are many *mo'o* (garden plots) mentioned in the LCAS testimonies with no crop designated. According to local farmers (Rocky Mikami, pers. comm.) the small piles of rocks in rows that one encounters on hillsides in Kailua are a sign of sweet potato patches and because sweet potatoes were a staple of the Hawaiian diet, it would make sense that these *mo'o* where crops are unspecified were mostly being used to grow sweet potatoes.

No mention of livestock shows up in the claims, but presumably there was some. Mention is made of numerous fisheries and pools where fish would have been raised. Early 20th century testimony (S. Mahoe) indicates that the fishermen at the shore traded ocean fish for taro with the upland farmers and this is probably a long-established pattern.

F. Land Commission Award Information for Kawainui Trail Segments

Queen Hakaleleponi Kapakuhaili Kalama (ca 1820-1870), wife of Kamehameha III received the entire ahupua`a of Kailua of 11,885 acres as Land Commission Award 4452: portion 12 at the time of the *Māhele* (1848-1853). There are over 250 claims for the entire *ahupua`a*, of which 28 Land Commission Awards are in or surrounding the marsh (See Table 1 following this section).

Segment 1, (TMK 4-2-13 and 4-2-16)

This segment extends from the southern (Kailua Rd.) Terminus to the levee to Ulupo Heiau. The TMK maps and the J. Iao 1919 map traced from W. Wall 1899 (R.M. 2049) and A. Bishop 1888 map (R.M. 1434) show slightly different locations for the Land Commission Awards. On TMK maps there is only one award located towards the ocean (north) and east of Ulupō *heiau* - No. 10183.

LCA 10183 - Makea claims and is awarded LCA 10183 in the *`ili* of Kumu. The award is shown on TMK 4-2-16, but no maps indicate the *`ili* and its boundaries. No. 10183 award is for one *apana* of 1.442 Acs, where Makea has 14 *lo`i* since the time of Liholiho (1820s). He died in 1848, before the claim was fully processed. Kumu inherits his land.

Segment 2, (Portion of TMK 4-2-13)

This pathway segment extends from the spur trail leading to Ulupō Heiau to the service access road behind Castle Hospital. In this section we find 7 land claims with 11 portions (*apana*) of land claims: (1) *Māhele* Award 7; (2) LCA 2536:3; (3) a portion of LCA 4452: 12 to the Queen for half the `ili of Pohakupu; (4) LCA 4896, (5) LCA 5833:3; (5) LCA 6099 1&2; (6) LCA 7147:2; and (7) LCA 9546;2,3,&4 (Figure 2)

Four *kuleana* awards in 5 parcels are shown on both Wall and Bishop maps as along the marsh and east of the *heiau*. These same *kuleana* appear on TMK 4-2-13, i.e. Segment 2 (which we will assume is more accurate). Here they appear towards the marsh and inland of Ulupō *heiau*.

Māhele Award 7 - Kaluaiainanea (M.Aw. 7) received ½ of Pohakupu (the Māhale Awards were reserved for the *ali`i*,) of 38.27 Acs. It appears that Kaluaiainanea did not live permanently in Kailua, as he only claims the `ili land, the planted trees, and some coconut and hala trees. This land with such resources would have provided him with goods needed for a person of his status to provide for the higher chiefs and the King (tithing or taxes) and his own retinue. He receives his right from the *Mo`i*, King Kamehameha III. He does not state an earlier right in the land; so he may not have been one of the many Kamehameha I's warriors and entourage, who got compensated in land for their part in helping to conquer O`ahu when Kamehameha I unified the islands. No land use is given, but the land extends into the marsh and there may have been *lo`i* near the Maunawili Steam and *kula* upland.

LCA 2536:3 - Ukikolo who was awarded the *heiau* site (*apana* 3). The other two apana are in Segment 3 (*Apana* 1 is for 2 *lo`i* and apana 2 is for 4 *lo`i*). Ukikolo (LCA 2536), possibly the descendant of an *ali`i*, listed in other Kailua claims as a *konohiki*, does not receive a *Māhele* Award, but is awarded 3 *apana* or parcels totaling 4.19 Acs. He appears to have been a permanent resident of Kailua and claims *lo`i*, *kula* and house lot. He notes that his ancestors received these lands from Kamehameha I (previous to his death in 1819) and indicates his ancestors were likely part of the Hawai`i Island soldiers and retinue awarded lands in Kailua. Since his house lot includes the Ulupō *heiau*, his ancestors may also have been the caretakers of the *heiau*. According to claim 6969 Ukikolo is a *konohiki*.

Ukikolo's properties include Ulupō *or Upo heiau*, the *`ili* of Manu and its *kula*. His house site in Kukanono includes the *heiau*, which is not named in the claim. At the time of the *kuleana* awards the few *heiau* mentioned are often described as house sites standing on former *heiau*. If it were not for the protest of Kahele, the konohiki, whose property surrounded Ukikolo's, the fact that this site had been a *heiau* wouldn't have been part of the *kuleana* record. Kahele believes that the *heiau* site should have been part his, the *konohiki's*, property. Despite Kahele's protest Ukikolo receives the property and his lands were bequeathed to his daughter, Kaiwikuilani, when he dies of small pox in 1853.

Ukikolo also claims several other *`ili*. His award (2536) consists of a) 2 *lo`i* at Olohana along Maunawili Stream (see map); 4 lo`i at Manu and it is notable that he does not receive his other *`ili* he claims in Malamalama (an *`ili* kupono - not subject to the *konohiki* management of an *ahupua`a* but owing fealty only directly to the Highest Chief).

LCA 4452:12 is a part of the entire *ahupua`a* awarded to Queen Kalama and is one of several *`ili* of Pohakupu shown on the map as belonging to Queen Kalama. Although Native Testimony (page 358 volume 10) says that all those lands (Kailua being one of them) are for Hazaleleponi Kalama as fee simple without a half division for the government, in fact, another large portion of Pohakupu, directly *makai* was for the Government.

LCA 4896 - Kekoahaleole (LCA 4896) is awarded a .844 Ac.-parcel for 7 *lo`i* in Pohakupu. This parcel is surrounded by Paki *mauka*, the *kahawai* on the Koolauloa side, Holoaa's *lo`i makai* and *kula* on the Waimānalo side. He received these *lo`i* from Holoaa in 1843. This parcel is one of 5 that he receives in Kailua. He appears to be a permanent resident of Kailua with his house lot in the *`ili* of Palawai, where he is awarded 3 *apana* He cites 1843 as the date of his acquisition of this land from Liliha, a former *kuhinanui* or regent of O`ahu (the wife of Boki). Thus he may be a more recent arrival to Kailua than Ukikolo. Or he may have been an even earlier resident, among those conquered, who would find it more politic not to mention tenure prior to the time of the Kamehamehas.

LCA 5835 - Kaleiokane claims (LCA 5835) five *lo`i* at Kekai and his *kula* house lot at Kapia. Like Ukikolo, he too is probably the descendant of one of the warriors or retinue of Kamehameha I since he claims his right from that time. He is probably a resident of Kailua since he was awarded the .37 Ac. in Pohakupu and .52 Ac. in Kihewakukakua

(Kapia) (where witnesses claims he has both 6 lo'i and his house lot). It would appear that his house lot was actually in Pohakupu or what became Pohakupu. Claimant died in 1848 at the beginning of the *Māhele* land division and is survived by Makalani, his widow.

LCA 6099:1 &2 - Miomio (LCA 6099) claims a *kula* house lot (6900:2) at Kukanoa [Kukanono]. He also claims a *mo'o* at the shore, and a *kula* planted in 'awa way inland near Kukapoki (Maunawili) (another *heiau*). His witness in the Native Testimony ascertains *Apana* 1 is 10 *lo'i* and *Apana* 2 is the house lot. The two pieces total 1.088 Acs. He derived his land from Kaleohano at the time of Boki (about 1824). He does not receive his claims at the shore or in Maunawili, but he does receive this 10-lo'i piece below Ulupo *Heiau* in addition to his house.

LCA 7147 - Kahele (LCA 7147) is a *konohiki*, and claims the 'ili of Kukanono contesting Ukikolo for the parcel containing the *heiau*. He is awarded 4.19 Acs in 3 pieces at Olohana, but Ukikolo is awarded the *heiau* land. No land use is given, but because of its location within the marsh, it is likely that this land was used for *lo'i*.

LCA 9546 - Kapolo , claims 1 and gets 4 *apana*. The 1.4 Ac.-parcel at Ulupo may be the 2nd parcel described in the Native Testimony as bounded on all sides by upland. No land use is described. Kapolo died in 1848, leaving his wife Kaulailaa as his heir. He receives an *apana* at Ulupo of 1.4 Acs; this would have been his house lot; and he receives two other *apana* which are out in the marsh along Maunawili Stream. These most likely would have been used for *lo'i*.

Segment 3 includes the area from the southwest corner of Kukanono Subdivision to Kahanaiki stream near the intersection of quarry Road and Kailua Road. It includes 7 *'ili*: Kamakalepo, Kapaloa, Kapia, Manu, Manulele & Kaihee (TMK 4-2-13). This area includes 3 *Māhele* Awards, and 11 land claim awards in 14 parcels. These include: (1) *Māhele* Award 6; (2) Māhele Award 27:1; (3) Māhele Award 47:1&2; (4) LCA 2536:1&2; (5) LCA 2544:1; (6) LCA 2575:1; (7) 5825 (8) LCA 6153; (9) LCA 6813:2; (10) LCA 6969:2; (11)LCA 7113:1&2; (12) LCA 7122:3; (13) LCA 8162; and (14) LCA 9539:2.

Māhele Award 6 - Honaunau, an *ali'i* (M.Aw 6), is awarded ½ 'ili of Manulele in Kailua in Māhele Award 6 (12.88 Acs in 2 *apana*). Honaunau also claimed and received lands in Lahaina, Maui and Ewa, O'ahu. Honaunau died in 1854 and since his wife Julia Kekoa died before him, he left his property to an adopted son, Beritani [Pelekane] and an adopted daughter, Halakaipo. A. Paki was to be administrator. Honaunau claims his right from the King, but does not mention which king (Barrère 1994:56). No land use is given, but because this is in the marsh, it is likely *lo'i* land with perhaps some other *kula* type plantings.

Māhele Award 27- Kalawaiaku, an *ali'i* is awarded a *Māhele* Award (M.Aw 27). The claim for the *'ili* of Kapia is listed under land claim 7146 which was not awarded. Also under another claim, 5668, Kalawaiaku claims several *po'alima* (land that is worked by others for him) and the *'ili* of Manu in Kailua and other pieces in Nu'uanu. He received the 'ili of Kapia, supposedly in 2 *apana*, which amounted to 14.12 Acs. He does not receive the

other claims. No land use is given, but its location would indicate *lo'i* land, with perhaps some *kula*.

> Since his inherited land (aina hooilina) was an aina panalaau ("conquered land") it is safe to assume that it had been given in reward by Kamehameha after the Battle of Nuuanu, as so many of the Koolaupoko lands were (Barrère 1994:176).

This large land area would have been ideal for *lo'i* , since it lies between the two streams.

Māhele Award 47- Kaeliwai, an *ali'i*, is awarded a Māhele Award (M.Aw 47). The claim for this award is described in land claim 6237 which is not awarded. Kaeliwai claims ½ of Kaaihee 'ili in Kailua) which is 2 *apana* amounting to 9.12 Acs, as well as land in Wai'anae and land on Molokai.

> Kaeliwai requests Government to take his ½ interest in ili Kaihee in payment for fee simple title to his houselot in Honolulu (Barrère 1994:106).

However, he receives his claim for Kaihee. Kaeliwai was the son of Lono (father) and Kapau (mother) and was married to Paalua, the granddaughter of Hewahewa. It is not known when he died, but is thought to be some time after 1860. He had no children (Barrère 1994:107). He does not state the right for his claim. He does not mention land use.

LCA 2536:1&2 - Ukikolo, whose house lot is in Kukanono (Segment 2), also claims 2 patches in "Olohana", an ili (Section 1) bounded on the Waimānalo side by the stream and 4 patches in "Manu," an ili (Section 2) which is also bounded on the Waimānalo side by the stream. Section 1 he received from Hekona in 1845 or 1856 and Section 2 he received some time before Poki (or Boki) went to Kahiki in 1828.

LCA 2544:1 - Lapalapa claims a *mo'o* at Manu from the time of Kaiola. And he has some orange and lemon trees at Hoaauloa. He is awarded 4 *lo'i* and a house lot; 1 apana in *'ili* of Manu for 1.38 Acs and another *'ili*, Kalaiopuu, for 6.46 Acs. The section 1 description describes the land as bounded by Ukikolo *makai* and the stream on the Waimānalo side. Section 2 is described as being in the upland.

LCA 2575:1&3 (2?) - Hekona claims an *'ili*, Manulele, and a *kula* from the time of Kaleohano. He had one *mala ipu* [gourd garden] in the *kula* of Pohakupu. The second claim is for *'ili* of Olohana. He is awarded 10 *lo'i* and a house lot in the *'ili* of Olohana ((2.29 Acs). His *lo'i* land is bounded by the stream on the Koolauloa side. His house lot is bounded on all sides by upland. He received his land from Honaunau in the time of Liliha. He died in 1849 and his widow, Kamakakau is his heir.

LCA 5825 - Kaanaana claims 4 *apana* which contain a mo'o, 4 *lo'i*, and a *kula* house lot. He receives only 1 *apana* in Kaaihee of 2.297 Acs. His section 1 is bounded by an *'auwai mauka* and the river on the Waimānalo side. It is likely that he received a consolidated parcel of land to make up for the 4 parcels claimed, since he only received 1 of

them. He received his land in 1840 or thereabouts and appears to be a resident of Kailua. It is likely that this is *lo'i* land and his house may have been higher up on the same piece of land.

LCA 6153 - Nanawahine claims 2 *lo'i* at Manulele and a *mala* of *wauke* at Kawailoa from the time of Kalola (a wife of Kamehameha *ca.* 1795).He received 1 *apana* of .22 Ac. He does not receive his nearby *wauke* land.

LCA 6162 - Punipeki (LCA 6162) claims 12 *lo'i* at Olohana, and a small *kula* in Pohakupu. He receives 1 *apana* in Olohana of 2 *lo'i* totaling .47 Ac.

LCA 6807:2 - Kapano claims a *mo'o* from 1833. This parcel (6807:2) is 8 *lo'i* and he lists his neighbors and Kuula and Kaleo with *nahelehele* (fallow land or waste land) on two sides. He receives 2 *apana* in Kamakalepo of 11.59 Acs and another *apana* which today would be in an area across the highway in Maunawili away from the presently bounded marsh for other *lo'i* and his house lot.

LCA 6811:1- Kuula claims a *mo'o* of 4 *lo'i* in Kamakalepo. He received his lands in 1846. This land is bounded by Keliikanakaole (claim 6813) on the *makai* side. He receives 1 apana of 2.56 Acres.

LCA 6813:2 - Keliikanakaole (LCA 6813) claims the *'ili* of Kamakalepo and has there 19 lo'i and a house lot in 6 portions of Kamakalepo. Portion 2 is shown on the TMK map. He also claims a lo'i in Kapalai and one in Moapilau and orange trees in Kahanaiki and a lauhala tree in Haimilo. Only three *apana* in Kamakalepo are awarded (7.126 Ac.). His tenure dates from the time of Kinau (Queen from 1832-1839).

LCA 6969:2 - Kuwahine (Kuahine) claims 30 *lo'i*, a *kula* and a house. Five of his patches are in the 'ili of Manu, the others in Kawailoa. Section 2 is bounded by the creek on the Waimānalo side. He receives a 1.3 Ac.-parcel in the *'ili* of Manu and 1.52 Acs in Kawailoa.

LCA 7113:1&2 - Keaka claims ½ Manu 'Ili. He claims it is his one-half right from the King. He resides at Kapamoo, not in Kailua. Keaka receives 1.52 Acs in Manu and 1.52 Acs in Kawailoa, both are for taro lands.

LCA 9539:2 Kaikihoio claims a *mo'o 'āina* at Palawai which is bounded by the creek on Koolauloa side and a hill called Auelepu *mauka*. He is awarded 2 pieces of land totaling 4.36 Acs. The parcel in the marsh is section 2 for which there is no separate description. Kaikihoio received his land in 1842. He died in 1848 and Ohole, his wife is heir. This claim is contested by C. Kanaina who claims Kaikihoio has all the patches and he has none, but the award is upheld. Being on the Maunawili Stream, it is likely these were taro patches.

Segment 4 is the southwest corner of the marsh and does not contain any Land Commission claims.

Segment 5 runs approximately 1 ½ mile along Quarry road, from the intersection at Kailua Road to the Model Airplane Park. In this portion there are 1 *Māhele* Award and 4 awarded claims in 5 parcels..

Māhele Award 9:2 - Hale receives a *Māhele* Award (M.Aw 9) the 'ili of Kaakepa, in 4 *apana* of 60.56 acres. The portion within the marsh is portion 2. The claim for this property is made in claim No. 7273, which he does not receive. In order to get his *Māhele* Award, Kaakepa he relinquished his claim to the *'ili* of Pohakea 'ili (which contains the site of the Holomakani *heiau).* In Claim 696, for Hale's Honolulu property, Piikoi testifies that Hale is a "kanaka hana (worker/servant) of the King (presumably Kamehameha III) or a "Kanaka maoli (native Hawaiian) (Barrère 1994:27). It is quite curious that a worker/servant or native would receive a *Māhele* Award if he weren't an *ali'i*. It is also interesting that he should have had the care of Pohakea *'ili* prior to the *Māhele*. It is even more interesting another *apana* or part *(lele)* of Kaakepa is probably the present site of the Pahukini *heiau (*TMK 4-2-15). The other large section of Kaakepa is cut in two sections by H-3 Highway, closer to Kahekili Highway. A prominent Hawaiian, S. Kaapuiki also claimed Pohakea as a *konohiki* award (Baker and Baker 1989*).* The fact that Hale was not a resident of Kailua, and had the stewardship of these two lands, one with the Holomakani *heiau (*this *heiau* was thought to have been destroyed and was only recently re-located), and the other with Pahukini *heiau* would fit the pattern of a person of a family in the forces or retinue of King Kamehameha I, who was given land in Kailua for his services during the unification of the islands. It makes one wonder if there were certain persons entrusted with the care of these *heiau* lands. There was no probate when he died so it may not be possible to find out more information about Hale although there are several Hale families on O'ahu. No land use is given.

LCA 6808:1 - Poniuohua claims a *mo'o* in the *'Ili* of Kamakalepo with fifteen taro *lo'i*. He has a house nearby in the *'ili* of Haimilo where he has some fruit trees in the land of Kaoo (8797). His *lo'i* are along the river. He is awarded 3 *apana*, totaling 5.254 Acs., all in Kamakalepo. He acquired the land in 1843.

LCA 7122:2 - Tehuarii Tute (Kuke) A Tahitian Missionary from the London Missionary Society in the Society Islands arrived, with his wife, L. Kalawela, in Hawaii in July 1826 and became the private chaplain of both Kamehameha III and IV. Tute was the *konohiki* of Oneawa and claimed and received 6 parcels for Oneawa of 674.90 Acs in Kailua. Tute bequeathed his property at his death, in 1858 (age 77), to his Hawaiian born daughter, Manaiula Sumner (Barrère). No land use is given in the document.

LCA 7588 - Kamoonohu, an *ali'i*, divides his land with the King, but he is not given a *Māhele* award. He claims the 'ili of Palahele (or Palapule) in Kailua, and Mooiki in Hamakua Hawaii Island. He receives Palapule in Kailua in 1 piece totaling 7.88 Acs. Kamoonohu had his land from Kamehameha I and was either a retainer/warrior or a descendant of one. No land use is given. It is likely that the *lo'i* land would be down near

the marsh and other things might have been planted on the higher ground.

LCA 8797 - Kaoo claims 1 apana of *kula*, house lot, and a *hala* tree in Kapaloa. The testimony declares there is also *kalo* land. Kaoo acquired this land at the time of Liliha (1829-30). He died in 1848 of smallpox. He is awarded 2 parcels next to each other, both along the Kahanaiki stream. His 2 parcels total 2.61 Ac.

LCA 8799 - Kauakamalii claims two *lo`i*, one *kula*, and one house lot, in Kapalaoa. He has other claims elsewhere in the *Ahupua`a*. He received the land from his grandfather, Kaliu, in 1839, and Kaliu acquired it from Keano during his lifetime. He is awarded 1 apana of 2.658 Acs.

Segment 6 extends from the Model Airplane Park to the proposed Kalaheo Park on Mokapu Blvd. There are no Land Commission claims in the marsh for this section.

Settlement Pattern within and near the Marsh

As reflected by Land Commission documentation, the settlement pattern along the margins of Kawai Nui Marsh during the mid 1800s was dominated by both dry-land and irrigated agriculture with associated dispersed habitations. Agricultural lands included numerous spring and stream watered pond fields (*lo`i*) with their associated irrigation and drainage ditches (*`auwai*). Dryland agriculture would have dotted the hill slopes above the marsh. Crops included traditional Hawaiian economic plants as well as Western introduced economic plants, such as fruit trees. House lots would have been dispersed on the higher grounds surrounding the marsh. *Māhele* records indicate differing periods of occupation of the land claimants. Some appear to be long time local residents. Others evidently received their land from the Kamehameha dynasty relatively recently. The distribution of LCAs indicated that the southern end of the marsh, closer to Maunawili, Pahukiki *Heiau*, Holomakani *Heiau*, and Ulupo *Heiau*, was more developed agriculturally and may have been the site of more residences.

Table 1 lists the LCAs for the vicinity of Kawai nui marsh. The table was compiled using LCA information available through *Waihona-`Aina.com*. These data provide insight into the specific land-use that was under way along the trail alignment during the mid-19th century. Several of the LCA correspond to specific State Inventory of Historic Places site numbers. For example State site 50-80-04-3957 corresponds to LCA 7147.

Table 1: Land Claim Awards within the Present-day Boundaries of Kawainui Marsh, Kailua, listed by Segments

Land Claim #	Claimant	Kawai Nui Trail Segment	Ili (land division)	Land use	Acreage awarded
4452	Kalama, Queen	in particular, 1 & 3	entire Ahupua`a (in particular) Kawainui Fish pond, Pohakupu	none given	11,885 Acs
10183	Makea	Segment 1	Kumu	14 *lo`i*	1 *apana* of 1.442 Acs
Māhele Award 7	Kaluaiainanea	Segment 2	½ of Pohakupu	no land use given, probably *lo`i* near Steam and *kula* upland.	38.27 Acs
2536:3 2536:1 2536:2	Ukikolo	Segment 2 Segment 3 Segment	Ulupo, Kukanono Olohana Manu	house lot 2 *lo`i* *4 lo`i*	3 ap.; 4.19 Acs
4896	Kekoahaleole	Segment 2	Pohakupu	7 *lo`i*	1 ap. .844 Ac
5835	Kaleiokane	Segment 2	Kekai Kapia	5 *lo`i* *kula* house lot	.37 Ac. .52 Ac.
6099:2	Miomio	Segment 2	Kukanono	*kula* house lot 10 lo`i	2 ap.; 1.088 Acs.
7147	Kahele	Segment 2	Olohana		3 ap.; 4.19 Acs
9546	Kapolo I	Segment 2	Ulupo	house lot?	1 of 4 ap.; 1.4 Acs
Māhele Award 6-	Honaunau	Segment 3	½`ili of Manulele	no land use given; likely *lo`i* land with some *kula* ?	2 ap.; 12.88 acs

Land Claim #	Claimant	Kawai Nui Trail Segment	'Ili (land division)	Land use	Acreage awarded
Māhele Award 27	Kalawaiaku	Segment 3	*`ili* of Kapia	no land use given; likely *lo`i* land with some *kula* ?	2 *ap.*; 14.12 Acs.
Māhele Award 47	Kaeliwai	Segment 3	½ of Kaaihee	no land use given; likely *lo`i* land with some *kula* ?	2 *ap.;* 9.12 Acs
2544:1	Lapalapa	Segment 3	Manu	*mo`o*	1 ap.; 1.38 Acs
2585:1 & 2	Hekona	Segment 3	Manulele Pohakupu Olohana	*`ili & kula* *ipu* garden 10 *lo`i* and a house lot	not awarded not awarded 2 ap.;2.29 Acs
5825	Kaanaana	Segment 3	Kaaihee	*lo`i* and house lot?	1 *ap.;* 2.297 Acs
6153	Nanawahine	Segment 3	Manulele	2 *lo`i*	1 *ap.;* .22 Ac.
6162	Punipeki	Olohana	Olohana Pohakupu	12 *lo`i* kula	1 ap.; .47 Ac. not awarded
6807:2	Kapano	Segment 3	Kamakalepo	8 *lo`i*	2 ap.; 11.59 Acs
6811:1	Kuula	Segment 3	Kamakalepo	4 *lo`i*	1 ap.; 2.56 Acs.
6813	Keliikanakaole	Segment 3	*`ili* of Kamakalepo Kapalawai	19 lo`i and a house lot 1 *lo`i*	*3 ap.;* 7.126 Acs not awarded

Land Claim #	Claimant	Kawai Nui Trail Segment	Ili (land division)	Land use	Acreage awarded
6969:2	Kuwahine (Kuahine)	Segment 3	Manu Kawailoa	5 *lo`i* 30 *lo`i*, a *kula* and a house	1 ap.; 1.3 Ac. 1 ap.; 1.52 Acs
7113:1 & 2	Keaka	Segment 3	½ Manu `Ili Kawailoa	taro lands	1 ap.; 1.52 Acs 1 ap.; 1.52 Acs
9539:2	Kaikihoio	Segment 3	Palawai	*mo`o* (lo`i)	2 ap.; 4.36 Acs
Māhele Award 9	Hale	Segment 5	Kaakepa	no land use given (lo`i land?)	4 *ap.;* 60.56 Acs
6808:1	Poniuohua	Segment 5	Kamakalepo	15 *lo`i*	3 *ap.;* 5.254 Ac
7122:2	Tute / Kuke	Segment 5	Oneawa *`ili*(s)	no land use given, (marsh edge lo`i land?)	6 ap.; 674.90 Acs
7588	Kamoonohu	Segment 5	Palapule	no land use given(lo`i land?)	1 ap.; 7.88 Acs.
8797	Kaoo	Segment 5	Kapaloa	*kula*, house lot, and a *hala* tree	2 ap.; 2.61 Ac.
8799	Kauakamalii	Segment 5	Kapaloa	2 *lo`i*, a *kula*, and a house lot	1 ap.; 2.658 Acs.

F. Ranching

In the early 1900s Kāne'ohe Ranch comes to dominate land holdings in the Kailua and Kāne'ohe area. Included within this acreage is much ranch land which has been bought, sold, let and used as ranch land by numerous parties since the mid-1850s. Kelly and Nakamura's history (1981:34-35) mentions that Government land sales amounting to 3,000 acres were sold to 21 buyers in Kailua between the years 1849 and 1863. The largest parcel went to William Jarrett of the *'ili* of Maunawili in 1849. The second largest was 399.5 acres to T. Cummins in Mokulua. Both parcels were used for ranching. Other land holdings which were turned into ranch land in the mid-1850s included the *'ili* of Mōkapu and 'Oneawa (by William Sumner and J. I. Dowsett) and the *'ili* of Puanea and 'Ohua'uli (by the son of Paula Marin, Paul F. Manini). These large land holdings were used for years as ranch lands before becoming part of the Castle's Kāne'ohe Ranch. Cattle, sheep, and horses, were thus allowed to roam at will through may parts of Kailua, and would have destroyed many gardens and abandoned habitation areas. Kelly and Nakamura point out that although specific records are not available, based on tax information, it is not unreasonable to estimate that several thousand head of cattle were grazing in Kailua by 1875 (1981:69).

Kāne'ohe Ranch (Castle Trust) eventually acquired much of the land in Kailua (Hall 1997:84). Kāne'ohe Ranch, in addition to ranching, grew pineapple and sugar cane. The With the decline of rice farming around the margins of Kawai Nui, cattle stock move onto the abandoned agricultural lands. Ranching in Kailua continues to this day, albeit on a drastically reduced scale.

G. Growth of Cash Crops in Kailua

For the nearly 100 years following the *Māhele*, Kailua grew into an important area of commercial agriculture. Until the early 1900s, rice was the major crop. Rice was followed by truck farming of taro and Western crops. The truck farming gave way to surburbanization, as Kailua became the premier bedroom community for growing Honolulu.

The Reciprocity Treaty between the United States and the Kingdom of Hawaii allowed for the duty free exportation of Hawaiian sugar to the U. S. This 1876 treaty greatly fanned the flame of the already smoldering Hawaiian export sugar industry. The duty free export of rice was also covered under the treaty, however, it was the growing Asian population, first Chinese and later Japanese, brought to Hawaii to supply labor to the escalating export sugar industry, that provided the main impetus for the expansion of rice growing. With local consumption steadily growing, and duty-free export, rice growing in Hawaii had a boom period of its own.

Unlike the adjacent *Ahupua'a* of Ko'olaupoko, Kailua's main cash crop became rice rather than sugar. Kailua's numerous abandoned taro *lo'i* in the former taro lands of Maunawili and Kawai Nui provided perfect areas for the expansion of rice. At one time

there were multiple rice mills functioning in Kailua *Ahupua'a*. By the first part of the 20th century, rice growers in California were using more modern production methods to reduce their costs. This lead to the rapid decline in rice farming in Hawaii (Kelly and Nakamura 1981:51-63).

Sugar never became an important crop in Kailua itself, but the need for water for the adjacent sugar lands of Waimānalo was an important factor in the transformation of the Kailua water shed. Following the 1876 Reciprocity Treaty the adjacent *Ahupua'a* of Waimānalo became the site of rapid sugar development, what became the extensive Waimānalo Sugar Company's fields. The development of these fields relied upon water from Kailua. As early as the late 1870's a system of flumes, ditches, and tunnels were built in the *mauka* portions of adjacent Maunawili to collect water from the abundant springs and streams. By 1881 close to 1,000 acres of sugar had been planted and milling operations were underway in Waimānalo (Kelly and Nakamura 1981:76). Expansion in acreage continued, increasing the need for water. By the 1920s improvements to the Waimānalo Irrigation System included catchment tunnels that were excavated into the base of the Ko'olau in Maunawili to increase flow.

Also, completed in 1923, was a system of pumps, pipelines, tunnels, and ditches, that conducted water from Kawai Nui Marsh into the Kailua ditch, a portion of the Waimānalo Irrigation System. This system continued to supply Kawai Nui water to Waimānalo until the early 1950s (Harland, Bartholomew, and Associates 1959:53-54; Hall 1997:94; Kelly and Nakamura 1981:778-79;). According to Wilcox (1996:111) two pumps lifted water from Kawai Nui and took it to the head of a 10,000-foot system of small tunnels, most through stone or hard earth, into a reservoir in Waimānalo.

In 1909 the Hawaiian Copra Company is established on the sandy area that is today bounded by Kalaheo and Oneawa Streets. Over 130 thousand trees were planted in an operation that involved leveling "the sand dunes and smooth[ing] out the sand hillocks" (*Honolulu Star Bulletin*, Sept. 12, 1931 cited in Kelly and Nakamura 1981:100; Hall 1997:77-78). The name Coconut Grove stuck, referring to most of the sand barrier area of Kailua. Clearly this leveling and smoothing of former dune areas had a great impact on the archaeological record of this area of Kailua.

The most prominent inroad made by sugar agriculture in Kailua was the establishment of the Hawaiian Sugar Planter's Association's field laboratory in 1926. It was established in former rice fields in stream bottoms, near present day Kailua Town.. By 1946 the laboratory was in the process of moving further *mauka* into Maunawili (Kelly and Nakamura 1981:100).

By the 1950s, the truck farms that had flourished since the turn of the century within the bounds of present day Kailua Town, are slowly replaced by housing, municipal, and retail developments. Kailua is promoted as the bedroom community for Honolulu businessmen, only "8 miles and 20 minutes" from Downtown. Residential developments are planned for more outlying areas of Kailua Town, such as Olomana, Pohakupu, and Oneawa Hills (Hall 1997:141).

H. Kawai Nui Flood Control

As Chamberlain's early account, quoted above, shows, Kailua has historically been susceptible to flooding. From 1902 to 1940, Kawai Nui Marsh was hit with numerous heavy rainfalls resulting in major alluvial run-off. The Kawai Nui Marsh area became the target for federal flood control projects in the 1930's and a report was authorized by the Flood Control Act of August 11, 1939 (Wheeler 1949: 3; Kelly and Nakamura 1981). Plans for this project initially called for a canal that was expected to provide for a discharge of water at the rate of 4,000 cubic feet per second and maintain control of the water levels in the marsh. The plan for the canal was drawn out on an aerial photograph in December of 1948 (figure 22 in Kelly and Nakamura 1981:87). In March of 1951 Kailua experienced a major flood, resulting from two days of continuous rain (Swain and Hexel 1971: 8), where Kawai Nui overflowed and 250 people were forced to be evacuated. The flood extended from Noela Place to Uluniu St. (Brady 1959:10).

As a result of this flood, the Territory of Hawai'i implemented its "pilot channel" project, where in 1952 the 'Oneawa canal, which extended from Kawai Nui marsh to Kailua Bay, was built. Part of this pilot canal project was the "inner canal, that ran perpendicular to 'Oneawa, which was expected to carry the water away from the marsh and prevent flooding of adjacent residences. Both the "inner canal" and the larger 'Oneawa canal are directly adjacent to the current project area (Segment 6 and the Kawainui Dike Road. The excavation and dredging associated with the construction of these two drainage channels would have directly affected the current project area.

The completion of the 'Oneawa Canal (1952) led the Kailua community to believe they were safe from flooding, however this was not the case. In March of 1958, heavy rainstorms again flooded Kailua, forcing the Army engineers to admit publically that "the present Kawai Nui Canal system would not be able to handle such a downpour..." (Brady 1959: 10).

A study published in 1971 (Swain and Huxel 1971: 18) revealed that the shallow water table beneath the frequently flooded areas and the lack of drainage was the primary reasons responsible for continued flooding in the low land areas.

III. PREVIOUS ARCHAEOLOGY

A. Summary of Previous Archaeological Research in Kailua *Ahupua'a*

This previous archaeology section is intended to compliment the cultural and historical background section. It discusses the archaeology of Kailua *Ahupua'a* in general, with many specific references to Kawai Nui, to provide an archaeological context for the trail. The specific archaeological sites that circle Kawainui Marsh will be listed and summarized by trail segment at the end of this section.

Twentieth century archaeological findings from inventory surveys, data recovery projects, and inadvertent finds during development are the main source of our knowledge about the archeological record in Kailua. Archeological work in the last 25 years in Kailua has been fairly extensive. This work has been concentrated along the margins of Kawai Nui Marsh and within Maunawili Valley for the most part. This is largely due to the fact that most of the *makai* portions of the *Ahupua'a* had been developed prior to the implementation of State and Federal Historic Preservation Rules (Dye 1992). The many archaeological reports dealing with Kailua are listed and briefly summarized in Table 1.

The earliest habitation of the Kailua area is still under debate. A radiocarbon date obtained from a charcoal enriched soil layer has been interpreted as evidence that human habitation of Kailua began somewhere in the neighborhood of 350-650 A. D (Clarke 1980: 32-33, 77-78). This site is located within the current project area. This date is not universally accepted, however, it is fairly well agreed among the archaeological community that by approximately 1200-1300 A. D. dramatic changes in the pollen record are indicative of the expansion of agriculture in the Kailua area, most likely in the well-watered margins of Kawai Nui Marsh (Hammatt *et al.* 1990; Athens and Ward 1991). Human colonization of the region would clearly have had to precede this agricultural expansion, perhaps by many centuries. Erkelens (1993:51) reports three early dates, A.D. 1024-1296, A.D. 779-1256, and A.D. 770-1270, from his excavations along the Kukanono slopes within the current project area. It is logical that Kailua, and other regions of Ko'olaupoko, with their abundant marine and terrestrial resources, would have been attractive to the initial Polynesian colonizers.

The work of Hammatt (*et al.* 1990) and Athens and Ward (1991), has largely discredited Kraft's (1980) earlier assertions that Kawai Nui Marsh was an open water embayment at the time of initial Polynesian colonization. Athens and Ward (1991) suggest the Kawai Nui Embayment was sealed off during the first millennium B. C. as the result of a drop in sea-level. They correlate the Kawai Nui event with similar events at the same time in Kahana Valley and Ft. Shafter Flats, O'ahu.

Remains of upland terraces show that taro has been grown extensively and intensively in Kailua since the 13th or 14th century, and possibly earlier (Allen 1981, Williams, Mills and Allen 1995). The work of Cordy (1977, 1978), Allen (1981, 1986-87), and Athens (1983a) all document the mix of irrigated and dryland agriculture that was carried out in Kailua during prehistory and continuing into the historic period. Dryland

agriculture, including yams, gourds, and sweet potato, would have been carried out on slopes and on drier flat-lands. Modification to the landscape would have been varisble, ranging from none at all to the construction of terraces and mounds for planting. According to Handy (1940:155) the beach barrier at Kailua (current day Coconut Grove) was famous for its production of sweet potatoes, grown in small mounds. Irrigated agriculture would have been carried out along streams and below springs. Associated landscape modifications would have included construction of terraces and/or pondfields, *'auwai*, and earthen and stacked-stone berms. These types of dryland and irrigated agricultural features have been found in Maunawili and along the margins of Kawai Nui Marsh.

Previous archaeological investigations in Kailua have located dispersed prehistoric habitation remnants. This is in keeping with the observations of early Westerners in Hawaii that the settlement pattern for the most part was dispersed habitations scattered across the landscape amid agricultural fields. It should be remembered that settlement data is conspicuously absent from the lowland, beach berm areas of Kailua, due to early development of these areas.

McAllister (1933) reported eight *heiau* within the *Ahupua'a* of Kailua, and it is not unreasonable to conclude there were several more of which McAllister's informants had no knowledge. This is well in keeping with Kailua's status as a productive *Ahupua'a*, the residence of *Ali'i*. The three known *heiau* closest to the current project area are McAllister's sites 359 Pahukini *Heiau*, 360 Holomakani *Heiau*, and 371 Ulupo *Heiau* (located within the project area)--see discussion below.

In the last eleven years over 15 reports of inadvertent finds of human skeletal remains have been made in Kailua, on the sandy beach berm of Coconut Grove and Lanikai. As with other near shore sandy areas in Hawaii, clearly Kailua was used for burial of the dead. These burial remains are not nearly as extensive, however, as the hundreds of human burials discovered from nearby Mōkapu peninsula (Snow 1974).

Table 2. Previous Archaeological Reports, *Ahupua'a* of Kailua, Ko'olaupoko, O'ahu

Reference	Location	Description and Results
Thrum, various 1907-1918.	Kailua *Ahupua'a*	In his articles for the *Hawaiian Almanac and Annual* (1907-1918) Thrum is the first to document many of the *heiau* in the *Ahupua'a* of Kailua.
McAllister 1933	Kailua *Ahupua'a*	McAllister's island-wide survey of the major archaeological sites of O'ahu supplies some of the first detailed descriptions, maps, and photographs of Kailua's archaeological remains. He describes 16 sites within Kailua *Ahupua'a*, including Kawai Nui pond (#370), Ka'elepulu fishpond (#377), Ulupo *heiau* (#371),Holomakani *heiau*, and Pahukini *heiau* (#359). In all eight *heiau* are reported for Kailua.

Handy 1940	Kailua *Ahupua'a*	Handy's discussion of traditional Hawaiian agriculture gives regional descriptions of what crops were planted where within the Hawaiian chain. Kailua *Ahupua'a* is described as a rich, productive, well terraced taro growing area (p. 99). The "sandy plains" of Kailua were planted in sweet potato, using a planting system of small soil mounds (p. 155, plate 8)
Clark and Connolly 1977	Hāmākua Drive along Kaelepulu Stream.	This survey identified five stacked-stone alignments, a possible wall alignment, a potential habitation site, two agricultural sites, the remains of an irrigation ditch, and surface midden. A possible *heiau* was also recorded, however, when Hommon (1982) and Morgenstein (1982) revisited this project area, they found no remains of the possible *heiau* structure reported by Clark and Connolly.
Cordy 1977	Kawai Nui Marsh	Cordy, working for the U. S. Army Corps of Engineers, performed archaeological survey, historic document research, and aerial photograph analysis, for the alignment of a proposed City and County sewer-line along the south and southeastern margin of Kawai Nui Marsh. He documented historic house sites and both dryland and wetland agricultural features, including terraces.
Cordy 1978, Morgenstein 1977.	Kawai Nui Marsh	Agricultural features from Cordy's earlier identified "Site 7" (from Cordy 1977) were subjected to excavation to determine the chronology of land use. Previous examination of aerial photographs revealed extensive agricultural fields in this southern extension of Kawai Nui Marsh. Excavations revealed sequential land use of the area, from prehistoric irrigated taro agriculture, into historic irrigated taro agriculture, into later historic rice agriculture. Prehistoric agricultural features, such as terrace walls, were found buried below sediments, suggesting that they had not been substantially disturbed by later historic rice and livestock grazing activities in the area.
Dye 1979	Kapa'a Ridge	Reports the discovery, mapping and excavation of Bishop Museum site # 50-Oa-G6-31, a combination of terrace remnants and cobble paving, thought to be prehistoric agricultural remnants. The site is located just below the summit of Ulumawao Ridge, in a hanging valley of an intermittent stream. After the work was completed these features were destroyed by the expansion of the Ameron Quarry facility
Kraft 1980	Kawai Nui Marsh	John C. Kraft is a specialist in prehistoric and historic coastal land form changes. Based on his research, which included coring various spots around the marsh, Kawai Nui Marsh was a shallow marine embayment of the coastal reef tract, very similar to present day Kāne'ohe Bay. Between 6000 and 2800 years B. P., before the Kailua sand berm had formed, corals grew and marine foraminiferal sands and carbonate muds were deposited around the margins of the embayment. Only after 2800 B.P. did the sand berm begin to form, slowly closing off the embayment. Until 400 or 500 years B. P. both the north and south outlets of the embayment ('Oneawa and Ka'elepulu) remained open. Kraft suggested the possibility that formation of the sand berm could be related to human factors, such as the construction of stacked stone fish ponds within the embayment. According to Kraft's recreation, the terrigenous in filling of the margins of the embayment was a relatively recent development, in the last 400-500 years B. P., with most taking place in the last 200 years.

Allen-Wheeler 1981	Kawai Nui Marsh	Allen-Wheeler conducted excavations in the Marsh with results that confirmed and refined Krafts' (1980) sequence of Kawai Nui development from embayment to marsh. Terrestrial in-filling of the marsh began about 650 A.D. with the formation of a peat layer. By 1300 A. D. a layer of alluvial soil had been deposited--possibly the result of human agricultural activity within Maunawili. Rapid alluvial in-filling continued at a rapid rate until the present. Taro cultivation within the marsh could not have taken place until approximately 1200 A.D.
Morgenstein 1982; Hommon 1982	Hāmākua Drive adjacent to Ka`elepulu Stream	Morgenstein and Hommon report surface survey and subsurface testing conducted to assess the potential of archaeological features along the Ka`elepulu truck sewer line. The investigation documented layers of historic fill in the upper layers and the presence of one potential agricultural bund, thought to be associated with rice farming, below.
Neller 1982a	Kawai Nui, Kukanono area TMK 4-2-13:38	Neller reports the work he undertook in Kukanono as part of a field school on behave of the Sierra Club School Hikers Program and Hawaii Science Teachers Association. These limited subsurface investigations were carried out in the same area reported by Clark (1980) and Athens (1983a). Neller dismisses the early date reported by Clark (1980).
Neller 1982b-	Maunawili Valley TMK 4-2-09:1	This short letter report documents a field trip to investigate archaeological sites in the back of Maunawili Valley. The reported locations of McAllister's sites 373 (Halaualolo *Heiau*), 374 (Kukapoki *Heiau*), and 375 (house sites, were visited. The extensive agricultural terraces, abandoned *lo`i*, were noted along large portions of both Omao and Maunawili Streams.
Athens 1983a	Pohakupu Kukanono slope S.S. #50-80-11-2022	Working in much the same area documented by Clark (1980), these investigations consisted predominantly of surface collections and subsurface testing. Excavation revealed that the abundant surface features (primarily agricultural mounds and terraces) were built in the most recent soil layers after 1900 A. D. Only one small area of the project area contained undisturbed prehistoric deposits. An earth oven in this prehistoric deposit was dated to the 13th to 16th centuries A. D., calling into question the early dates (4th to 7th century A. D.) obtained by Clark on the same slope of Kawai Nui. Soil erosion on the Pohakupu-Kukanono slope was apparently intense during the prehistoric period and soil deposition and development was infrequent prior to construction of the historic terraces.
Athens 1983b	83 Kihipai Street, Kailua TMK 4-3-57:65	This report documents the 11 grid units excavated in site 50-Oa-G6-40, the H.A.R.C. site. The site consists of marine midden, and subsurface features including hearths and pits. Radiocarbon dates indicate occupation of the site sometime in the mid- 13th to early 15th century. Midden remains were analyzed and conclusions suggest a change through time in the exploitation pattern. Athens suggests the use of the Kailua accretion barrier for habitation may have started about the same time as the occupation of the site. This site was originally located and excavated by Wheeler (1981)-.

Toenjes and Donham 1986	Maunawili Valley	This reconnaissance for the City and County's Maunawili District Trunk Sewer was located along Maunawili Stream north (*makai*) of Maunawili Road to the southern extent of Kawai Nui Marsh and Kalaniana'ole Highway. One historic site, a ditch which once carried water from Maunawili Stream to a rice mill, and several potentially prehistoric terrace remnants were discovered within the project area. The authors report previously unreported archaeological features within the vicinity of the project area, associated with Maunawili Stream.
Brennan 1986	Maunawili Valley	This reconnaissance survey was done for Royal Hawaiian Country Club, Inc., for a parcel proposed for a golf course in MAUNAWILI. Brennan located and described 42 sites, some of which had been previously identified. Sites include historic features (a bath site), a *heiau* (which appears to match McAllister's site 374, "*Heiau* on the land of Kukapoki") prehistoric irrigated taro fields, habitations, walls, burials and stream embankments.
Allen 1986, 1987	Maunawili Valley	These mitigation and data recovery plans and preliminary reports detail the results of archaeological investigations at the site of the Royal Hawaiian Country Club, Inc. golf course. Sites investigated included historic habitations, charcoal kilns, roads and trails, and agricultural sites. The final report for these investigations is forthcoming
Shun, Price-Beggerly, and Athens 1987	Kailua *mauka*, west of the Pali Golf Course	This inventory survey of approximately 200 acres, the site of a proposed golf course, revealed that the area was not used extensively by traditional Hawaiians for habitation, agriculture, or other activites. Historic document research revealed that Pineapple agriculture (c. 1912) and truck farming, in the 1920s, were some of the greatest land uses of the parcels. Sites found included a small terrace complex, two charcoal kilns or seepage wells, a habitation complex, and a rock wall.
Williams 1988	Maunawili	This reconnaissance survey took place to investigate the proposed new location for the displaced Luluku farmers (by H-3 development). 13 sites were recorded in this *mauka* portion of Maunawili (640'-920' elevation), including probable historic charcoal kilns and agricultural complexes.
Szabian 1989	Foot of Mount Olomana	During this archaeological reconnaissance survey of the proposed site of the Women's Community Correctional Complex (adjacent to Maunawili Elem. School) no new surface or subsurface archaeological sites of deposits were discovered. The authors did remap the remains of Kukuipilau *Heiau* (State Site # 50-80-11-372), which was first reported by Thrum and McAllister (site # 372), and re-discovered by Neller. They also note the freshwater spring "Kawailoa freshwater spring" adjacent to the *heiau*.

Hammatt, *et al.* 1990	Kawai Nui Marsh	The sediments from sediment cores from 10 locations in the Marsh were analyzed to characterize their "depth, age, and nature". Conclusions: Kawai Nui was marine bay with open circulation and tidal activity for most of the Holocene. Around the end of the first millennium B. C., in a relatively sudden geological event, the bay was partially blocked by a sand barrier, becoming a lagoon of mixed fresh and saline waters. This change is marked by a 600% increase in sedimentation rates on within the Kawai Nui basin. The lagoon persisted until as late as 570 A. D. By 1400 A. D. the lagoons outlet to the sea was closed and the Kawai Nui basin, already largely filled with terrestrial silty clays developed its wetland appears of today. Pollen samples which bracket the periods from bay to marsh show no apparent changes resulting from early Polynesian settlement. At approximately 1400 A. D. there are dramatic changes showing voluminous drops in mixed mesic forest species and an increase in grasses and sedge. These changes may well be the result of increases in Hawaiian subsistence activities.
Quebral, Orndoff, and Athens 1991	Hāmākua Drive and Pu`u o Ehu Ridge	Four most likely historic sites were locate during this inventory survey along the margins of Ka'elepulu Stream, in an area that has seen modern in filling. Although background research indicated the importance of the project area for traditional agriculture, no specific indication of traditional Hawaiian land use was found. The project area was used for historic rice cultivation and livestock grazing.
Athens and Ward 1991	Kawai Nui Marsh	Thirty-seven core/auger units were dug along the eastern margin of Kawai Nui Marsh, in the vicinity of the drainage control levee. Conclusions: The marsh basin was transformed into a relatively closed, freshwater system at about 200 B. C. Data from other locations on O'ahu (Ft. Shafter Flats and Kahana Valley) support the conclusion that the transformation was due to regional causes, namely a fall in mean sea-level, rather than local forces, as had previously been proposed. The Kailua sand berm begins to form between 600 and 1000 B. C. Until approximately 1000 A. D., the Kailua lowlands were dominated by *Pritchardia*-palm forest. After 1000 A. D. these forests decline rapidly. The vegetation transformation is attributed to rising human population levels and the expansion of agriculture. Counts for cheno-am type and grass pollen rise dramatically after approximately 1200 A. D. These pollen types are indicators of disturbed environments and are thought to be indicators of the expansion of agriculture. Based on increases in sedge pollen after about 1000 A. D., it appears that Kawai Nui basin was too deep to support a marsh community, except along its margins, until this time.
Hammatt and Shideler 1991	Maunawili	This inventory survey for the Na Ala Hele Trail Corridor through the *mauka* portion of Maunawili Valley found seven sites. Sites included the Old Pali Road, two probable historic charcoal kilns, and a large agricultural complex. It was unclear if any of the sites were prehistoric.
Hammatt, Pfeffer and Creed 1993	Pu`u o Ehu Ridge TMK 4-2-03:46	This inventory survey for the proposed location of the Kailua 272 Reservoir found no historic properties. Oral history research did reveal the traditional Hawaiian significance of Pu'u o Ehu peak as a spot overlooking the waterway that joined Ka'elepulu and Kawai Nui ponds.

Brennan 1994	Maunawili Valley	This short letter report, address to Dr. Tom Dye, SHPD, documents and explains significance evaluations for 8 newly recorded sites in Maunawili. These sites were found during monitoring for the Royal Hawaii Country Club Golf Course. Features include pondfields, firepits, trash dumps, a cemetery documented from oral history, habitations, slope retainers, terraces, and a possible military training bunker.
Hammatt, Creed and Masterson 1994	Maunawill Estates (TMK 4-2-63:31,38)	This reconnaissance survey of a 10 acre parcel revealed no historic properties.
Williams, Mills, and Allen 1995	Upper Maunawili Valley	Excavations at six sites within upper Maunawili Valley (the location of the Luluku Banana Farmers Relocation) are reported. These six predominantly prehistoric agricultural sites, based on radiocarbon dating results, were constructed between 1260 and 1650 A. D. These radiocarbon dates suggest that extensive agricultural and other cultural activities began in the valley by the 14th century, and possibly a few centuries earlier. No human burials or definite habitation areas were discovered in the six sites, but evidence for pre-Contact habitation was found at a previously unidentified site.
Hammatt and Chiogioji 1997	`Aulos Road	This reconnaissance assessment of a 0.8 mile section of `Aulos Road, immediately *makai* of Castle Junction, found no historic or archaeological sites, other than the previously recorded Kāne`ohe Ranch office building and the adjacent war memorial monument (State site 50-80-10-1360).
Hammatt and Medeiros 1999	Kailua Ahupua`a TMK 4-3-28:73	Inadvertent burial find of a single individual, represented by the remains of one bone fragment (radius or ulna) in situ. The lower skeletal remains were recovered by SHPD/DLNR staff, while the contents of the excavated sand was intensively screened and fragmented remains were recovered. The remains collected by the Burial Program staff included both femora, both fibulae, one tibia, both innominates, both humeri, proximal fragments of right ulna and radius, distal fragment of left ulna, mandible, sacrum, and a frontal fragments of the cranium.
Medeiros, Bush, and Hammatt 2000	Kailua Ahupua`a TMK 4-3-53:29	Inadvertently discovered burial of a single individual was partially recovered because of previous disturbance of this Kailua project area. A total of 5 human bones were recovered during the length of this project, including 1 adult skull (minus the mandible), 1 rib fragment, 1 carpal fragment, and two unidentified fragments. This represents less than 5% of the total remains. The remains collected appear to represent one individual. The ethnicity of the remains is not apparent, especially with the low percentage of the entire burial recovered. There was no evidence near the remains, or anywhere within the stratum containing the burial, to suggest ethnicity.
Kikiloi, McDermott, and Hammatt 2000	Kailua Ahupua`a TMK 4-2-17:por 4	Archaeological inventory survey with a focus on the evaluation of subsurface deposits of a small lot on the north-northwest margin of Kawai Nui Marsh. Backhoe testing revealed modern fill sediments overlying sandy marsh type sediments at a depth of 1.25-1.5 m below the current land surface. No historic properties documented. This margin of the marsh was heavily modified by the dredging of the adjacent Oneawa and "Inner" canals that control Kawai Nui drainage.

B. Summary of Recorded Historic Properties at Kawai Nui Marsh By Trail Segment

The recorded historic properties around the margin of Kawai Nui Marsh are shown on Figure 3, an adaptation from the State Historic Preservation Division/Department of Land and Natural Resources GIS historic property location data base. More detailed site location information, and in some instances site maps, are provided in the discussion of each individual segment of the Kawai Nui Trail, see below. Table 3, below, is a site number correlation list that outlines the various site designations that have been used for the Kawai Nui periphery sites over the years.

Segment 1

There are five archaeological sites within Segment 1 of the Pathway. These include State Site #s -371, -2022, -2027, -3957, -3958, and -4042.

Site -371, Ulupo Heiau:

Site -371, Ulupo Heiau is a large *luakini* type *heiau* (state-temple where human sacrifice occurred) that is located on a natural promontory west of the Kawainui Marsh. The *heiau* platform measures 140 x 240 feet, with walls up to 30 feet in height. In May 1971, Ulupo Heiau was submitted to the Hawai'i Historic Places Review Board and placed on the Hawai'i Register of Historical Places on June 21, 1971. It was later listed on the National Register of Historic places on November 9, 1972.

According to McAllister (1930), "Its earlier importance and size is indicated by the large open terrace... the paving is now very rough, undoubtedly having been disturbed by relic hunters. The stones used average about 1.5 feet in size. The sides of the terrace are not evenly faced, but are roughly piled at about a 45-degree angle... this huge mass of stones completely dominates the surrounding taro patches and it is little wonder that the construction of the temple is attributed to the *menehunes*... (the menehune pathway)... is most clearly visible on the side of the *heiau*, but at the top is confused with the disturbed paving.... The south half of the structure is completely covered with *hau*... There is evidence of a small inclosure, but the southern walls and extent of the *heiau* were obliterated in the construction of a cattle pen..."

The following features were catalogued in McAllister's 1930 survey:

1. Sides of terrace form slope 30 feet high roughly piled with stones
2. Crudely built wall 40 feet from top of terrace, 5-6 feet high, broken lines indicate slight evidence of terracing.
3. Walls evenly faced with 2-foot stones, 4 to 5 feet high and wide on three sides, open on *heiau* side.
4. Small inclosure 4 feet wide, 7 feet long, walls 2 feet high outside, paved flush with 6-inch stones on *heiau* side.

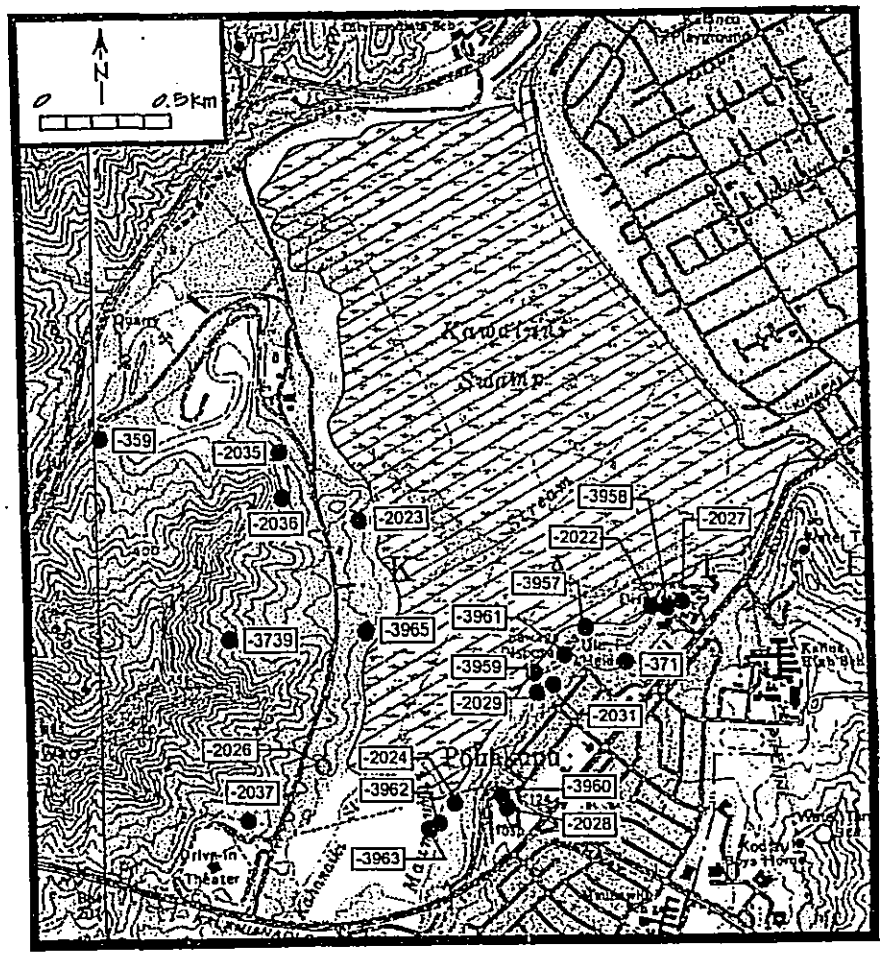

Figure 3 Portion of the 1983 USGS Topographical Map, Mokapu Quadrangle, Showing the Location of Recorded Historic Properties Adjacent to the Project Area (Created Using Information from the SHPD/DLNR GIS Data Base)

Table 3: Kawainui Archaeological Sites - Correlation Table of Site Nomenclature & Site Descriptions

State Site #	Mc Allister #	Bishop Museum Site #	Clark (1980a& b) #	Cordy (1977/ 1978) #	Ewart & Tuggle (1977) #	Site Description	Site name/ TMK
50-80-11-359	359	50-Oa-G6-4	---	---	---	—*heiau* located by McAllister and now in middle of landfill in Kapa'a Quarry. This site is now on the National Register and State Register of Historic Sites as State Site 50-80-11-359. This *heiau* was also called *Mo'okini heiau* referring to many lineages; the name *pahukini* means "many drums" (see Pukui & Elbert, 1974). Thrum also lists an alternate name of Makini. It is said to have been built by the high chief Olopana in the 12th century and is a *luakini* or state-class of *heiau*, important enough to accommodate preparations of war and other highly important state matters. Rescued from oblivion in 1987 when a restoration project was begun. The upkeep is now shared by Ameron HC&D and the Lani-Kailua Business & Professional Women's Club.	Pahukini Heiau TMK 4-2-15:1
50-80-11-360	360	50-Oa-G6-5	---	---	---	-*heiau* that McAllister (1933) noted on Ulumawao Ridge, NE of the quarry; supposedly built by high chief Olopana in the twelfth century. The name means "wind running or racing". Holomakani (Site 369; State site 50-80-11-369), McAllister lists on the slopes below Pahukini, & was thought to have been destroyed when the land it occupied was cleared for agriculture (Sterling & Summers 1978:229). Between the present landfill and Kalanianaole Highway, a site was recently located which may be this *heiau*. C. Kawachi of the State Historic Preservation Division and staff did a field check on 6/15/88 (memorandum) in response to a call from Susan Miller to check the site. LCA 6966, awarded to Keala, listed its land use as "a kula." State archaeologists said that this site may be Holomakani Heiau (Site 360).	Holomakani Heiau TMK 4-2-14:2

State Site #	Mc Allister #	Bishop Museum Site #	Clark (1980a& b) #	Cordy (1977/ 1978) #	Ewart & Tuggle (1977) #	Site Description	Site name/ TMK
50-80-11-371	371	50-Oa-G6-1	---	---	---	—*heiau*, (State site #50-80-11-380) agricultural *heiau* dominating the Kawainui Marsh. Located on the southeast side of marsh in the area known as Kukanono, near the present YWCA site. Its large 43 m. (140') x 9.1 m. (30') high terrace dominates the marsh. Its name means "night inspiration." It is said to have been built in a night by the Menehune, The spring beneath was used for washing the pigs before bringing them up to the temple oven (Akuni Ahau in Sterling and Summers, 1978). The land was accepted as a part of the territorial park system in 1951 and now is a state park.	Ulupo Heiau TMK 4-2-13:2
50-80-11-2022	---	50-Oa-G6-32	cluster 1	site 1	site 1	Series of terraces from marsh edge up edge of slope, a long retaining wall upslope, ruins of a historic house, a spring, excavation yielded charcoal dates in range of A.D. 353-655 & A.D. 529-0965, Artifact found on surface	Kawainui Terraces 2022 TMK 4-2-13:38
50-80-11-2023	---	50-Oa-G6-33	clusters 10 & 11	---	---	cluster 10: 12 features: retaining walls, L-shaped alignments of rocks, terraces, a roadbed, a level terrace or platform, surface scatter; cluster 11: 2 retaining walls	Kawainui Cluster 2023 TMK 4-2-13:10
50-80-11-2024	---	50-Oa-G6-34	cluster 7	---	site 4	mounds, wall remnants, a terrace	Makalii Slope Cluster 2024 TMK 4-2-13:10
50-80-11-2026	---	50-OA-G6-36	cluster 12	---	---	a large agricultural terrace; 67 m. long along marsh edge in a NE/SW direction, 14 m SE/NW; walls single-course high; rusting crane	Kapaloa Agricultural Terrace 2026 TMK 4-2-13:10
50-80-11-2027	---	50-Oa-G6-37	cluster 15	---	---	stone-walled enclosure, linear pile of rocks, terrace, surface artifacts	Kukanono Habitation Site 2027 TMK 4-2-13:38

State Site #	Mc Allister #	Bishop Museum Site #	Clark (1980a& b) #	Cordy (1977/ 1978) #	Ewart & Tuggle (1977) #	Site Description	Site name/ TMK
50-80-11-2028	---	50-Oa-G6-38	cluster 14	---	---	2 walls which meet at a right angle	Ulukahiki Walls 2028 TMK 4-2-06:4 or 7
50-80-11-2029	---	50-Oa-G6-39	cluster 13	site 7	---	large agricultural complex of rectangular fields, probable water channel; excavation yielded basaltic glass date A.D. 1738+34 years as well as large taro root stains and taro pollen	Kawainui Marsh site 7 TMK 4-2-13:14, 16:06
50-80-11-2030	---	50-Oa-G6-40	Allen-Wheeler 1981	---	---	excavation exposed a truncated cultural layer under modern fill and overlying beach sand producing prehistoric artifacts. Dates obtained were between A.D. 1374 to 1630	Kihapai Occupation Site 2030 TMK 4-02-57:65
50-80-11-2031	---	50-Oa-G6-41	Athens 1983	---	---	evidence for prehistoric occupation/ many surface artifacts; corrected carbon dates range A.D. 1240-1385 obtained were between A.D. 1374 to 1630	Kawainui Slope Site 2031 TMK 4-3-13:38
50-80-11-3957	---	50-Oa-G6-32	cluster 2	site 2	site 2	9 dryland agricultural terraces, 20 mounds, small c-shaped structures, walls, a walled depression, remains of a historic structure; surface artifact recovered.	Kawainui Agricultural Complex 3957 TMK 4-2-13:38
50-80-11-3958	---	50-Oa-G6-32	cluster 3	site 3	---	terrace, walls 38+ m. & 28+ m. long	Kukanono Terrace 3958 & Habitation Complex TMK 4-2-13:31 or 38
50-80-11-3959	---	50-Oa-G6-32	cluster 4	site 4	site 3	26 mounds, 19 dryland agricultural terraces, linear walls, one 53 m. long, a historic house foundation, a prehistoric basalt mirror found on surface & other prehistoric basalt artifacts, large boulder grindstone; historic artifacts, date ranges from AD 1362+ 70 to A.D. 1742 + 79	Miomio Agricultural & Habitation Complex TMK 4-02-13:38

State Site #	Mc Allister #	Bishop Museum Site #	Clark (1980a& b) #	Cordy (1977/ 1978) #	Ewart & Tuggle (1977) #	Site Description	Site name/ TMK
50-80-11-3960	---	50-Oa-G6-32	cluster 5	site 5	---	a large *lo'i*, ca 40 x 30 m.; a stone and earthen platform, a stone-lined channel 10 m. long, stone mounds	Pohakupu Agricultural Cluster 3960 TMK 4-2-13:38
50-80-11-3961	---	50-Oa-G6-32	cluster 6	site 6	---	stone mounds, a stone-edged canal, terraces, retaining walls	Kukanono Cluster 3961 TMK 4-2-13:38
50-80-11-3962	---	50-Oa-G6-34	cluster 8	---	site 5	3 historic buildings	Makalii Historic Site 3962 TMK 4-2-13:10
50-80-11-3963	---	50-Oa-G6-34	cluster 9	---	site 6	earthen mounds	Makalii Mounds 3963 TMK 4-2-13:10
50-80-11-3964	---	50-Oa-G6-36	---	---	sites 8, 9	recently abandoned houses	Kaeleuli House site TMK 4-2-15:06
50-80-11-3965	---	50-Oa-G6-36	---	---	site 7	low stone terrace perpendicular to stone wall; abut at SE corner	Pohakea Terrace 3965 TMK 4-2-13:10
50-80-11-3739	---	50-Oa-G6-85	---	---	---	Kawachi (1988) did a field inspection and describes a large level terrace (30 by 15 m.), NW-SE with three levels of wall terracing. Suggests this is a *heiau* and may be Holomakani Heiau. Pantaleo and Cleghorn (1989) did a reconnaissance survey, found the same feature and describes it as a large, rock-faced terrace and an L-shaped terrace. Mentions this site as a possible *heiau*, but does not associate it with Holomakani.	Unnamed Heiau, possibly Holomakani TMK 4-2-14:2

5. Inclosure 4 feet wide, 7 feet long, walls 2 feet high and wide on three sides, open on *heiau* side.
6. Curved arm of large 2-foot stones, 6 feet wide, 3 feet high.
7. Stone-paved area, slightly depressed.
8. Slope 5 feet high probably formerly depressed.
9. Circular inclosures with low surrounding walls similar to pens 16 and 17.
10 outer wall to pen 11.
11. Former cattle pen now planted in bananas
12. Stone mound 4 feet high, 10 feet in diameter, with several large flat stones about base.
13. Round pile of stones 4 feet in diameter, large stones on outside and small stones in center.
14. Small mound of stones.
15. Irregular wall built of 6-inch stones, 10 feet long, 2 feet high and wide.
16. Pen similar to Pen 17 with better constructed walls 2 feet high, but rough paving, small break in wall to south.
17. Circular pen paved with 3-inch and 4-inch stones, 9 feet in diameter, with walls of roughly piled stones 1 foot high, small break in wall to south.
18. Open terrace 140 by 180 feet by 30 feet high.
19 portion of low terrace 1 foot high.
20 Partial inclosure, with flat stones forming pathway.
21 Portion of low stone wall.

Later surveys of the *heiau* revealed some features not previously noted, specifically three "niches" in the western slope, the side that overlooks Kawainui Marsh. The three "niches" are of different sizes in the approximate center of the slope. It has been suggested that these might have been emplacements for wooden idols.

Site -2022, Kawainui Terraces: Excavation (Clark, 1980)

Site -2022, called the Kawainui Terraces, is considered a substantial site. It has been recorded during several surveys of the Kawainui Marsh. The site has been disturbed in the recent past. There are 34 features in Site -2022 of seven basic types:

1. DRY FIELD AGRICULTURE TERRACES: Most of the terraces (21 features) are probably associated with dry field agriculture (Features 1-4, 6-17, 21-22, 28-30). These terraces are marked by retaining walls that range from single to several courses high (0.2-1.4 meters).

2. IRRIGATED AGRICULTURE TERRACES: The remaining (5) terraces (Features 23-27) are situated perpendicular to a small spring most likely were constructed to be irrigated by the spring. The terraces are retained by single-course stone walls.

3. LINEAR WALLS: Three free-standing linear walls, two run perpendicular (Features 18, 31) to the marsh edge and one is roughly parallel (Feature 19).

4. ENCLOSURE: One small oblong enclosure (Feature 5) that measures 2 m N/S x 3 m E/W, with a single-course stone wall.

5. J-SHAPED STRUCTURE: Cordy (1977: 45) stated this feature was "suggestive of prehistoric house patternings". The structure has a retaining wall (1 stone high). This feature was test excavated (Clark, 1980:64-65). One stratum was exposed with charcoal flecking. 176 artifacts were recovered, most from the first 5 cm. 169 artifacts were non-indigenous, 7 were indigenous (basalt flakes). Clark concludes that there is no evidence to support this was a prehistoric house site. One sondage was excavated and a C14 sample collected, although it is not associated with any cultural feature. The calibrated calendar age was A.D. 353-655.

6. STONE PLATFORM: Small, crude stone platform 8 m x 1.8 m x .2 m (Feature 20).

7. HISTORIC STRUCTURE FOUNDATION: Constructed of stones and mortar (Feature 32), a local informant identified this site as a piggery. There is also the remains of a historic building (Feature 33) associated with piggery. An aerial photograph shows these structures still standing and a local informant confirms the site was abandoned in the 1950s.

One test pit was excavated at Site -2022. Excavation revealed a number of artifacts such as glass shards, ceramic sherds, nails, metal, .22-caliber cartridge casings, a metal clamp, mortar fragments, tar, and basal flakes. This mixed assemblage of traditional Hawaiian artifacts with historic materials indicates the continuation of land use in the vicinity from prehistoric times.

Site -2027, Kukanono Habitation Site:

Site -2027, called the Kukanono Habitation Site, consists of six features located along a basalt outcrop bluff. There are four types:

1. STONE WALL ENCLOSURES: 2 features were considered stone-walled enclosures. The walls of both measured 0.5 meters (one-course) high and 2.5 meters (one-course) wide.

2. LINEAR PILE OF ROCK: 1 features was considered a linear pile of rocks that was 7 meters long, 2 meters wide, and 0.7 meters high. A metal cable twisted around some of the rocks indicate that it is historic in nature, although post-construction collapse may account for this positioning.

3. LINEAR WALL: 1 feature was considered a linear wall (Feature 4). It extends for 16 meters and then turns into a retaining wall that extends over 8 meters. The wall runs parallel to the bluff edge.

4) SMALL TERRACES: 2 features were considered small terraces. Both terraces

are fronted by retaining walls several courses high.

Surface artifacts include one basalt adze fragment and one piece of pearl shell. Clark (1980) suggested that the enclosures may represent prehistoric residential structures, while the rock plie may be historic in nature. No excavation was conducted at this site.

Site -3957, Kukanono Residential Complex

Site -3957 (also called cluster 2 and 3 in Clark (1980)) is comprised of a cluster of features located just north of the Pump House (formerly known as "Kukanono Sewage Plant" in Clark 1980). There were 72 features located within this area (Clark 1980 Map; Erkelens 1993 Map), with 5 basic types:

1. TERRACES: 22 features were considered agricultural terraces and typically consisted of a retaining wall, one to two courses high (0.3 to 0.5 meters).

2. C-SHAPED STRUCTURES: 5 features were C-shaped structures, that ranged from 2 to 4 meters across and the retaining walls were one coarse high.

3. MOUNDS: 35 of the features were stone mounds that were roughly circular at the base, and showed variation from oval to rectangular in cross-section. The mounds are generally well built structures in the form of a truncated cone. The sizes of the mounds vary from 0.7 meters on the shortest axis, to 1.5 - 3.0 meters on the longest axis, and 0.5 - 1.8 meters high.

4. LINEAR WALLS: 3 free-standing linear walls are located in this area. They range from 12- 25 meters long, and 0.4 - 0.7 meters high.

5. HISTORICAL RESIDENCE: 2 identifiable historic features were found in this area that consists of a roughly circular cluster of rocks with interspersed historic glass and ceramics. Nearly 40 meters to the south lies the foundation of a historic structure that has a foundation constructed of mortared stones and has two concrete steps facing the marsh. One basalt adze was located on the surface. Structure is visible on 1928 USGS quad map.

Four test pits were excavated in Site -3957 by Clark (1980).

TP1: Test pit 1 was excavated in a terrace retaining wall. The location was chosen because the wall appeared prehistoric and a date for wall construction was desired. Three non-indigenous artifacts were found (2 glass sherds, one brownstone ceramic sherd) within the wall construction. This is a clear indication that this feature was constructed post-contact (within the last two hundred years). A small subsurface retaining wall (E2) was found during the excavation of the terrace retaining wall. The top of the feature was found at 30 cmbs and this wall runs parallel to the originally excavated wall. Thirteen artifacts were found, seven non-indigenous (five glass sherds and one ceramic sherd) and six

indigenous artifacts , two volcanic glass flakes and four basalt flakes.

TP2: Test pit 2 was excavated on the next terrace up slope from TP1. There was charcoal flecking throughout the unit. This was interpreted as an indication of generalized surface burning in the vicinity. One subsurface feature was encountered, a stone alignment, at a depth of 31 cmbs. A charcoal sample was collected from a piece of burned branch for radiocarbon dating. Thirty-six artifacts were found in the first 15 cm, 27 non-indigenous and five indigenous. The indigenous artifacts include three volcanic glass flakes, one basalt flake, and one basalt flake with modified edge. From 15-30 cmbs, four basalt flakes were recovered.

TP3: Test pit 3 was excavated on the Feature 54 Terrace. No sub-surface features were identified during excavation. Ten artifacts were collected including nine non-indigenous and one indigenous artifact.

TP4: Test pit 4 is situated at the base of Feature 93, a stone mound. Mound construction consists of larger boulders around the perimeter with an interior fill of smaller pebbles. Five indigenous artifacts were found, three basalt flakes and two volcanic-glass flakes. A few fragments of carbonized kukui were also found.

Subsurface excavations revealed an abundance of artifacts in the vicinity, such as bottle glass, glass, volcanic glass, numerous basalt flakes, coral, midden, lithic tools, ceramics, charcoal flecking, historic machinery pieces, wire, mortar, and metal. Also, features such as grindstones, *'auwai* (water irrigation channels), stone alignments, *imu* (cooking pits), hearths, and post molds were discovered within the subsurface strata.

As part of a University of Hawaii archaeological field school, Conrad Erkelens (1993) studied site -3957. His objective was to provide empirical evidence for rates and causes of geomorphological alteration of Kawainui Marsh in order to better establish models concerning settlement patterns, agricultural intensification and the evolution of social stratification. Up to now, the generally accepted hypothesis is that Hawaiian slash and burn agriculture caused accelerated erosion of slope areas which resulted in dramatic alteration of the physical environment. Newly discovered surface features (12 new features were discovered, including modified springs, mounds, walls, and one enclosure) were mapped. Twenty-nine test pits were excavated. Analysis of the stratigraphy and related archaeological features indicated that:

> at Kukanono there is no evidence of colluvial or alluvial flows occurring that could have moved large volumes of sediment recently or in the past. . . . While it is certain that Kawainui Marsh has been in-filled by deposition, evidence from Kukanono suggests Hawaiian agricultural practices had little impact on this long term natural process. The majority of the sediment deposited in Kawainui is more likely the result of runoff from Kahanaiki and Maunawili Streams over the millennia rather than the result of rapid deposition from Hawaiian induced erosion of the landscape. (Erkelens 1993:42-43)

Excavation results support the evidence that the Kawainui Marsh area was settled by at least 1000 BP and land use was continuous thereafter. In addition, there is substantial evidence for pre-contact habitation occurring in the lower slopes surrounding the marsh. A additional grindstone was discovered during this study (Erkelens 1993).

Site -3958, Kukanono Terrace and Habitation Complex:

Site -3958 is composed of comparatively few features (5): three terraces (Features 34, 35, 37) and two linear walls (Features 36, 38). The three terraces are divided from the linear walls by a spring rivulet. One terrace which lies adjacent to the rivulet may have been irrigated by it. One of the linear walls lies perpendicular to the marsh edge and the other lies parallel to the marsh edge. Other features exist in the dense *hau* thicket, but could not be mapped. No excavation was conducted at this site.

Site -4042

In 1923 a system of pumps, pipelines, tunnels, and ditches, was completed to conduct water from Kawai Nui Marsh into the Kailua ditch, a portion of the Waimānalo Irrigation System. This system continued to supply Kawai Nui water to Waimānalo until the early 1950s (Harland, Bartholomew, and Associates 1959:53-54; Hall 1997:94; Kelly and Nakamura 1981:778-79;). According to Wilcox (1996:111) two pumps lifted water from Kawai Nui and took it to the head of a 10,000-foot system of small tunnels, most through stone or hard earth, into a reservoir in Waimānalo. This entire system was given State Site # 50-80-15-4042 in 1992 (Creed 1992). The pump house and the associated canal are located within the present project area in Segment 1. The pump house foundation is a rectangular concrete foundation with some construction of mortared basalt boulders. This pump house once housed the pumps that lifted water out of the marsh and into the pipe line. Several large diameter iron pipes are located within the structure. There is a canal that extends out from the pump house into the marsh. The banks of this canal are lined with basalt boulders near to the pump house, but are earthen further out towards the marsh.

Segment 2

There are seven recorded archaeological sites within Segment 2 of the Kawainui Path. These include State Site #s, -3961, -3959, -2031, -3960, -2024, and a good portion of -2029.

Site -3961, Kukanono Cluster 3961

Site -3961 is located west of the Kukanono Sewage Treatment Plant. Land disturbances from the sewage plant construction separate Site -3961 from Site -3957 to the north and Site -3959 to the south. There are six recorded features at this site: No test excavation was done at this site.

STONE MOUNDS: Two stone mounds were recorded, ranging in size from 1-2 meters in diameter to .4-1 meter in height.

TERRACES: Two terraces were recorded, one may be natural and the other is probably historic as it has mortar in its construction.

C-SHAPED RETAINING WALL: with mortar chunks and mortar rocks found in the wall construction indicating its historic construction.

CANAL: stone-lined canal measuring 1-1.5 m wide, 0.6 m deep and almost 12 m long.

Site -3959, Miomio Agricultural & Habitation Complex

Site -3959 is located on the slopes fronting Kukanono Subdivision and south of Kukanono Sewage Treatment Plant. Site -3959 is separated from Site -3961 in the north by land disturbances created by construction and from Site -3960 in the south by a rock outcropping. The northern portion of the site has been previously disturbed and is now used for cattle pasture. A total of 49 features were recorded with the majority located in the southern part of the site. The site is divided into a north and south segment by an erosional gully (Clark, 1980).

DRYLAND TERRACES: 19 dryland terraces with retaining walls, often utilizing natural outcropping. Terrace heights range from 0.5 to 1.2 meters in height.

STONE MOUNDS: There are two types of mounds: free-standing and terrace. Free-standing mounds. Twenty walls seem to be free-standing and four are terrace mounds.

LINEAR WALLS: two linear walls, one 53 meters in length and 0.5-0.9 m high. This wall may correspond to the boundary between Kukanono and Pohakupu *`ili*. The second wall is short, 2.5 m long, and crudely constructed.

HISTORIC DUMP: scatter of metal, concrete and other items

HISTORIC CONCRETE FOUNDATION: pre-1940 aerial photographs show several structures in this location

Test Excavations at Site -3959

Clark (1980) excavated two test pits in Site -3959, one in a terrace-style mound situated next to an earthen terrace. The second test pit was excavated in a free-standing mound.

TP 6: Excavated within a terrace-style stone mound with a perimeter of large boulders surrounding an interior of pebble fill and earth. Excavation proceeded to a depth of 35 cmbs. Charcoal was noted throughout. Forty-six artifacts recovered, 25 indigenous and 19 non-indigenous. The indigenous artifacts include basalt flakes, volcanic-glass flakes, one volcanic glass core. The non-indigenous artifacts include glass sherds, ceramic sherds, nails (including square nails) and mortar fragments. Most of TP6 had a mix of

indigenous and non-indigenous artifacts.

TP 8: excavated to 35 cmbs in a free-standing mound. Mound construction consists of a outer perimeter of larger boulders with an interior cobble fill. No subsurface features or artifacts were observed.

Neller (1982) led a group of Sierra Club High School Hikers in an Ecology Camp at Kawainui Marsh. Nine test pits were excavated in the old Miomioi LCA 6099. Several prehistoric artifacts were found including basalt waste flakes, adze blanks and adze fragments, worn basalt flakes, hammer stone fragments, stone abraders and polishing stones, cut bone, bone fragment, large amounts of unworked coral (3533.1 gm), few marine shell fragments. The majority of the artifacts were historic including bottle fragments from the 1800s, metal objects and few ceramic sherds. Also found was a large grinding stone on the Kukanono slopes. "The abundance of artifacts in the disturbed cultural layer verifies the former use of the area by prehistoric Hawaiians, 19th century native Hawaiian farmers, and 20th century Japanese-American farmers, and suggests that habitation sites existed somewhere in the immediate area" (Neller 1982). The entire project area was previously disturbed by farming and grading. The test pits were not excavated to an adequate depth to determine the presence or absence of buried, undisturbed archaeological features in the study area.

Site -2031, Kawainui Slope Site 2031

Site -2031 has no surface features except for a pig pen foundation (still in use in 1959 according to aerial photographs). However, the large quantities of surface artifacts suggest subsurface deposits. Six trenches and a "strat pit" were excavated and a probably earth oven was located. In addition, several pit features were identified. Artifacts are almost exclusively indigenous with the exception of two small metal fragments which were the result of infiltration from upper levels. Corrected age ranges are of AD 1240-1385.

Athens (1983) undertook archaeological investigations of both Sites -3959 and -2031 due to a proposed residential development and recommendations by the Bishop Museum. Objectives were to date and determine the function of a sample of the surface features and conduct a search for possible subsurface deposits that might be of very early date. Excavation revealed that all the surface features were built in the most recent soil layers after AD 1900. Above the marsh slope, undisturbed prehistoric deposits were located at G6-41 (State Site -2031). An earth oven gave dates of between the 13th and 15th centuries. Analysis of a large collection of stone artifacts recovered suggests this area was being used as a reduction area for lithics. The presence of a large boulder grindstone is further evidence. Athens suggests that the lack of prehistoric agricultural features on the slopes may indicate that this area was being used only for non-intensive forms of agriculture, such as for breadfruit and other trees and bushes that can tolerate marginal soil conditions. Athens questions Clark's (1980) early dates (5th and 8th century AD) considering that the C14 samples that were dated did not come from *in situ* archaeological features and were not primarily deposited stratigraphically. Athens' investigations indicate that prehistoric habitation was most intensive in the area above the slope in the vicinity of G6-

41 (Site -2031). This is indicated by the distribution and densities of surface and subsurface lithic artifacts. A wide range of adze sizes and six awls suggests a variety of different woodworking activities were being performed. Athens suggests there is a lack of prehistoric agricultural features and implies the use of a cropping system.

Site -3960, Pohakupu Agricultural Cluster 3960

The site is situated near the marsh and separated from Site -3959 by a basalt outcrop. There are natural springs in the area (at least 3). Site -3960 has 11 features (Clark 1980).

LO'I: dimensions are c. 40 by 30 meters separated from the marsh by a stone and earthen embankment. *Lo'i* are fed by a natural spring directed through a stone-lined channel. Waimanalo resident, Norman Kawachi remembers his father using the existing *lo'i* for taro and watercress in the 1930s.

STONE MOUNDS: five free-standing stone mounds, two built by Mr. Kawachi's father during land clearing.

LINEAR WALL: also constructed by Mr. Kawachi's father, 16 meters long and 0.5-0.7 m. high.

RETAINING WALL: three retaining walls, two bordering natural springs.

TERRACE OR PLATFORM: crudely constructed

Cordy (1978) excavated one test pit in Site -3960 and found one artifact (dated AD 1692-1788) and charcoal. Cordy suggested the charcoal was evidence of some type of agriculture, being practiced at the same time as agriculture in the swamp.

Site -2024, Maknlii Slope Cluster 2024

The site is located up slope approximately halfway between Uluoa and Manu-Laiki Streets within the Kukanono subdivision. It is somewhat isolated from other sites along the Kukanono slope. It consists of one terrace and four small stone mounds. No test excavation was carried out on this site (Clark 1980).

Site -2029, Kawainui Marsh Site 7

Site -2029 consists of a series of walls through the marsh from Pohakupu slopes to Maunawili Stream (1400 feet). These features were studied through analysis of aerial photos (Cordy 1977). Site 7 is a remnant of the abandoned field system that was once extant in this portion of Kawai Nui Marsh. Four test trenches were excavated, two across a wall (1 meter high and 2.4 m wide), another trench across a second wall (0.5 m wide) and the last trench on the slope (in Site -3960) overlooking the marsh. The first wall can be dated to AD 1704-1772. Taro root stains in soil layers are evidence of taro cultivation, though taro pollen percentages were low. In Site -3960, there is evidence of agriculture in the form of charcoal. Dated at AD 1692-1788, this trench is evidence of contemporaneous

cultivation in the marsh and on marsh slopes. Analysis of aerial photos show rectangular to square fields approximately 60 by 90 meters in size. The field remnants seem to cover an area of 250 acres (Cordy 1978).

Allen-Wheeler (1981) did further research at the site. The objective was to determine more precisely the geophysical setting of the marsh sites at the time that initial occupation took place centering on archaeological excavation of the marsh floor. "The general theoretical focus concerned the evolution of land-use and human occupation in and around the marsh and, by extension, in windward O'ahu, during the prehistoric and early historic periods" (Allen-Wheeler 1981). As in Cordy's study in 1978, the research centered on the Marsh floor itself (Site -2029), rather than the surrounding slopes. A review of maps and aerial photographs was undertaken. A ground survey was conducted. Two former canals were identified, one along the north border of LCA 6969:2 and the other alongside Maunawili Stream at the base of the Pohakupu slopes. Four trenches were excavated where taro and later rice were grown. Trench A was excavated to expose a standing wall (visible above ground) situated perpendicular to Pohakupu slope. Trench B was excavated in a feature identified from aerial photos, aligned perpendicular to field boundaries. Trench C was excavated to test agricultural plots visible in aerial photos (not recorded by Cordy). Trench D could not be completed. Based on palynological, stratigraphic, and sedimentological analysis, the settlement pattern for Kawainui was presented. At approximately AD 500-600 there was initial settlement of the Pohakupu/Kukanono area. The higher ground of the marsh slopes sloped met a coral and cobble beach on a marine bay, that was to become Kawai Nui Marsh. Initial land use of the area was interpreted as marine and coastal bay exploitation, possibly accompanied from the beginning by dryland cultivation on the hill slopes around the bay. Wetland agriculture developed later. After AD 1300, pond-field cultivation expanded into the wetlands in the marsh. The adjacent hillsides were terraced for dry and/or wet cultivation during the late prehistoric or early historic periods.

Site 2028, Ulukahiki Walls 2028:
Located behind Castle Hospital, off of Ulukahiki Street the site consists of two standing walls (.7-1.5 meters high) meeting at right angles to each other. Clark (1980) suggests that the north-south wall relates to the old road and both walls are historic. No site map. No excavation made.

Site 3962, Makalii Historic Site 3962:
This site is composed of the remains of a historic building. No site map and no excavations were made by Ewart and Tuggle (1977). No site description in Clark (1980).

Site 3963, Makalii Mounds 3963:
This site is composed of some earthen mounds located in a *hau* grove immediately west of a "farm lot". No site map and no excavations were made by Ewart and Tuggle (1977). No site description in Clark (1980).

Segment 3

There are no recorded archaeological sites along this segment of the proposed pathway.

Segment 4

There are no recorded archaeological sites along this segment of the proposed pathway.

Segment 5

Site 2026, Kapaloa Agricultural Terrace 2026:
Located approximately 500 meters north of Kalanianaole (Pali) Highway and Kapa'a Quarry Road intersection, this site is along the marsh edge. A rusted crane (approximately 80 m north of the site) supposedly marks the general location of this site. The site consists of a large terrace, with walls 65 m long NE-SW and 14 m long SE-NW. Walls are one course high and the terrace is built on partially flat region next to marsh (Clark 1980). There is no site map for this site and no subsurface testing was done. This site is not marked on the SHPD GIS map of Kawainui sites (but the approximate location has been added to the adaptation of this map that is Figure 3) and may be difficult to relocate based on available information.

Site 3965, Pohakea Terrace 3965:
A low stone alignment forming a terrace approximately 5 m. in length, with a stone wall running perpendicular. No site map, no excavations (Ewart and Tuggle 1977).

Site 3739, thought to be Site -360, Holomakani Heiau:

Holomakani *Heiau*, Kapa'a, Kailua--McAllister's Site 360. This *heiau*, on the mountain side of Kawainui fishpond, was destroyed and the land used for agricultural purposes. It was just beneath Pahukini. Said to have ben built by Olopana (McAllister 1930:182)

More recently a large stacked stone terrace was re-discovered on the slopes above the Kapa'a Quarry Road. This terrace is thought to be the remains of Holomakani *Heiau* (Kawachi 1988)

Site 2023, Kawainui Cluster 2023:
(Clark, 1980) Located east of the Kapa'a Quarry Road and eastern Kapa'a Land-Fill Access Road junction, the site consists of 11 features, separated into two clusters. This area is also known as *Na Pohaku o Hauwahine* overlook and the most striking feature is the basalt outcrop that provides a splendid view of the entire Kawainui Marsh. This basalt outcrop also serves as a focal point for several archaeological features, the outcrop being incorporated into feature construction. Features radiating out from the outcrop include retaining walls, linear walls, L-shaped alignment of rocks, terrace (6 x 3 m.), portion of old

north-south running road bed, platform. Nearer the marsh is another set of features including two retaining walls covered in short grass and *hau*. One test pit was excavated in the terrace located near the basalt outcrop. Excavated to a depth of between 33 and 43 cmbs, two distinct strata were identified with cultural material in both including charcoal. One subsurface feature was recorded, a single use fire pit or the dump of a more permanent hearth. Several artifacts were collected including two glass shards, basalt flakes, volcanic glass flakes, one basalt grinder, one probable adze flake.

Site 359, Pahukini Heiau: (McAllister, 1933)

Pahukini Heiau is one of the larger religious sites on the windward side of O'ahu. It's remnants include a large enclosure that measures 175 by 110 feet. It is located along a ridge in Laonia, on the Kapa'a slope, facing the range of hills dividing Kaneohe from Kailua. The site is today enclosed by the Kapa'a Land-Fill. It is believed to be of *po'okanaka* (human sacrifice) class. Oral traditions indicate Chief 'Olopana built this *heiau* at around AD. 1100, naming it Pahukini, which means many drums. On the north wall is a small inclosure which Thrum believes is of "modern service" (32 x 38 feet in dimension). The paving has been moved around and piled into small mounds throughout the heiau. The site has also been disturbed by a heavy growth of guava, lantana and other shrubbery withing the heiau.

Along one end of the structure a ledge several feet in width ran probably its entire length, resembling a prominent feature of the temple of Puu o Mahuka. Like the rest of the site, this structure has also been disturbed.

Segment 6

Site 3964, Kaeleuli House site:

"North of the stream, two recently abandoned house sites were located"...modern trash suggests they were occupied until recently (Ewart and Tuggle, 1977). No site map, no excavation. This site location is not marked on the SHPD GIS map of Kawai Nui March historic properties; see Figure 3.

Kawainui Marsh Coring:

(Hammatt *et al.*, 1990) The U.S. Army Corps of Engineers proposed construction of open water channels in the marsh for flood control. There was concern for impacts to archaeological resources within/surrounding the marsh. Objective of study was to (1) characterize depth, age and nature of sediments to be impacted in relation to present marsh sediments and (2) reconstruct environmental history of marsh to determine nature and location of native Hawaiian use including shoreline habitation, fishponds, agricultural sites. Ten sediment cores were taken from Kawainui Marsh and analyzed for pollen, organic clay mineralogy, stratigraphy and heavy metals. Results of paleoenvironmental study of Kawainui Marsh were:

1) the marsh basin is not a uniform bowl-shaped depression
2) during most of the Holocene, Kawainui was a marine bay with open circulation and tidal activity. The bay was partially blocked by sand barrier by 1000 BC.
3) Kawainui became a lagoon with alternating fresh and saline environments until as late as AD 570. By AD 1400, the ocean inlet was cut off and the basin became filled with terrestrial silty clays.
4) The transition from bay to lagoon was marked by a dramatic increase in sedimentation rate (600%)
5) There are no apparent changes in pollen zones during early Polynesian settlement. Dramatic changes appear in pollen zones by AD 1400 associated with dramatic decreases in mixed mesic forest species and increases in grasses and sedges. These changes may be related to increased Hawaiian agricultural and subsistence activities.
6) Vast numbers of *loulu* palm (*Pritchardia*) may have provided a major food supply to Hawaiians during early Hawaiian occupation. The dramatic decrease of *loulu* may be the result of human impact.

(Athens and Ward, 1991): This report documents archaeological work along the marsh levee. Athens and Ward evaluated the presence and absence of significant archaeological sites, which might have been affected by flood control project at Kawainui Marsh. Thirty-seven core/auger units were placed along both sides of the levee and two units were tested within the marsh and analyzed for pollen, stratigraphy, and sedimentation rates. In addition, a surface survey and the excavation of three test units on the south end of the levee (where two sites were known to be located) were conducted. No archaeological remains were found in the project area. However, much information was gained on the following areas A) prehistoric human occupation in and around the marsh, B) initial Polynesian settlement of Hawai'i, C) the natural history of windward O'ahu. The following are the results of the Athens and Ward studies conducted at Kawainui Marsh:

1) The sediments of Kawainui Marsh provide a continuous record of sedimentation and in-filling since before 2000 BC.
2) The marsh basin was transformed into a closed, freshwater system at about 200 BC
3) It is probable that the change from a marine to freshwater basin at Kawainui Marsh was due to a fall in sea-level
4) The initial appearance of the Kailua sand berm (or accretion barrier) above water probably dates to before about 600 BC, but not earlier than about 1000 BC.
5) The sediment cores from Kawainui yield a rich assemblage of angiosperm palynomorphs
6) The lowlands prior to Polynesian contact and up to roughly AD 1000 were dominated by Pritchardia palm forests.
7) The pollen diagram of Kawainui is distinctive for its triad of dominant types—*Pritchardia, Dodonea,* and *Kanaloa Kahoolawensis*.
8) After about AD 1000, the dominant plant species decline precipitously. This may be related to rising human population levels and the expansion of agriculture.
9) The pollen record from Ft. Shafter is comparable in diversity to that of Kawainui Marsh.

10) There are few "Polynesian Introduced" species in the pollen record. Only three species were found--*Aleurites moluccana (kukui), Cocos nucifera (niu), and Cordyline fruticosa (ti).* These occur late, after about AD 1000 to 1200.
11) Sedimentation data indicates that the commonly held belief that agricultural practices of prehistoric Hawaiians were responsible for in-filling of the basin is incorrect...Natural processes rather than human activities (particularly agriculture) are paramount with respect to causation for coastal progradation and basin in-filling.
12) Lack of charcoal particles suggests fire had little or no effect on natural vegetation communities in the Kawainui basin watershed.
13) Remains of vegetation associated with disturbed environments begins to rise dramatically at about AD 1200. The significance of this information is that it provides a time frame-about AD 1200--for the onset of what was probably the rapid growth of a previously small population and inland agricultural expansion.
14) The sedge pollen suggests the Kawainui Marsh was an open body of water prior to AD 1000. After this, the marsh spread rapidly.

IV. ASSESSMENT OF SEGMENT 1

Segment 1 begins at the hairpin turn in the gravel access road that connects the southern end of the Kawai Nui Marsh Dike Road with Kailua Road. The trail segment continues in a generally southwest direction, parallel to Kailua Road, to the vicinity of Ulupo Heiau. Segment 1 runs along the marsh-side of several recognizable Kailua Road properties, including St. Johns Evangelical Lutheran Church, the Kawai Nui Vista Subdivision, the Kailua Baptist Church, the Kailua Methodist Church, and the state owned parcel containing 'Ulupo *Heiau* itself.

The following discussion of Segment 1 will be by different geographical components of the segment. The properties along Kailua Road and the specific archaeological sites will be used to demarcate these different components of the segment, shown in Figure 4. Discussion of the individual components will proceed from the Kawai Nui Dike Road southwest towards 'Ulupo Heiau.

Of the five proposed segments of the circum-Kawai Nui Marsh Trail, Segment 1 will be the most difficult trail section to construct. For the most part, the land form in Segment 1 is steep, sometimes vertical, basalt bedrock outcrops and basalt boulder covered slopes. Much of the vegetation is dense *hau* thickets that will need to be cut back and maintained along the route. These conditions will make trail construction and maintenance challenging. They will also make combining vistas of the marsh with access to the archaeological sites along the marsh edge difficult. For instance, in many places to be near the archaeological sites a "*hau* tunnel" will have to be cut that will not allow views of the marsh. The specifics of these trail construction challenges will be discussed below under the different components of Segment 1.

Before discussing the trail alignments it should be mentioned that there appears to be a good location for parking at the beginning of Segment 1 at the access road that connects Kawai Nui Dike Road with Kailua Road, see Figure 6. There is room for 10 to 12 parking stalls along the lower portion of the access road. Within the *hau* immediately southwest of the access road's hairpin turn is a 20 by 20 or 30 by 30 meter area that could also be made available for parking with grubbing and grading. This area within the existing *hau* could be selectively grubbed to allow shade for the parked cars and the hikers entering and exiting the circum-Kawai Nui trail system.

Component 1 extends from the hairpin turn in the access road that connects Kawai Nui Dike Road with Kailua Road to the northwest end of the Kawai Nui Vista Subdivision. This component will be the easiest to construct because it will be the least hampered by rugged terrain and dense vegetation. The difficulty in the construction of Component 1 will be crossing the rugged terrain associated with the intermittent drainage that runs between St. John's Lutheran Church and the Kawai Nui Vista Subdivision and getting around the Kawai Nui Vista Subdivision itself, see discussion below. Closest to the hairpin turn vegetation in this component of Segment 1 is fairly high canopy of *hau* intermixed with bamboo. Further along, closer to St. Johns, the vegetation changes to grasses, vines, and

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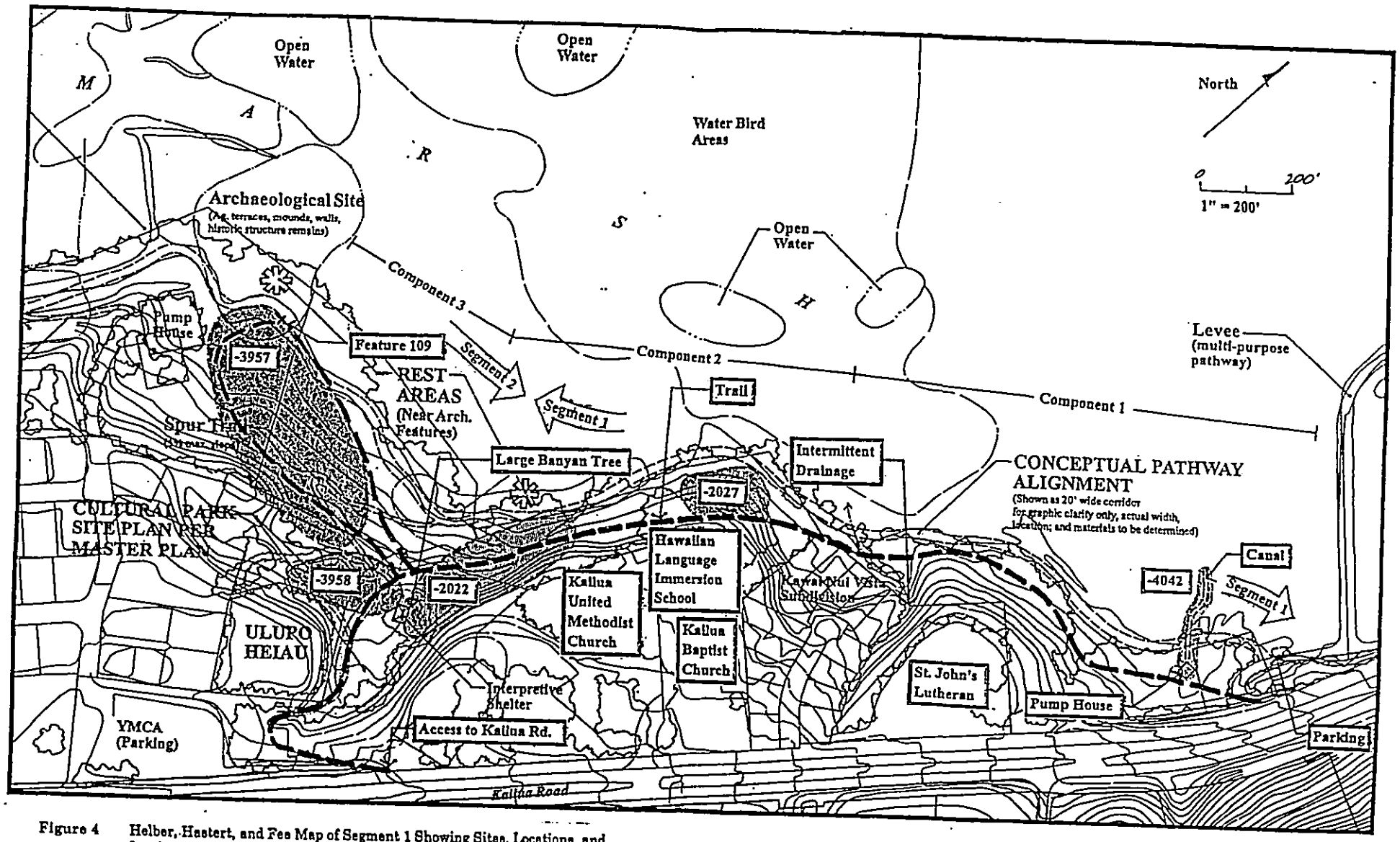

Figure 4 Helber, Hastert, and Fee Map of Segment 1 Showing Sites, Locations, and Landmarks Discussed in the Text.

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koa haole. Some good vistas of the marsh are possible in Component 1 of Segment 1. Only a single historic site is located in this first component of Segment 1.

The single historic property of note within component consists of an excavated canal and an associated housing foundation for a pumping facility. These features are part of the Waimanalo Irrigation System. Completed in 1923, the Waimanalo Irrigation System is a system of pumps, pipelines, tunnels, and ditches that conducted water from Kawai Nui Marsh to the Waimanalo sugar cane fields until the early 1950s (Herland, Bartholomew, and Associates 1959:53-54: Hall 1997:94, Kelly and Nakamura 1981:78-79). According to Wilcox (1996:111) two pumps lifted water from Kawai Nui Marsh and took it to the head of a 10,000-foot system of small tunnels to a reservoir in Waimanalo. The Waimanalo Irrigation System was nominated to the State and National Registers of Historic Places in 1992 (Creed, application form, 1992). The system was given state site # 50-80-15-4042, but was not placed on either the State or National Registers.

The location of the pump housing structure and canal is shown on Figure 4. The pump housing structure is roughly rectangular and constructed predominantly of mortared basalt boulders. There are the remains of some large diameter iron pipes within the structure. The associated canal extends out into the Kawai Nui Marsh from the pump housing structure. This canal alignment is visible on the Tax Key Map 4:2: 13 and can be seen from Kailua Road where it extends into the marsh. The canal side walls are lined with dry masonry basalt boulders immediately at the pump housing structure. Further from the pump structure the side-walls of the canal alignment are earthen. Both the canal and the pump structure are overgrown with *hau* trunks. The base of the canal is standing water and mud. For the trail to cross the canal a bridge would be needed. It is better that the trail alignment pass around the canal and pump structure, towards Kailua Road, avoiding the need for a bridge. The canal and pump structure are part of site # 50-80-15-4042 and have interpretive value as physical remains of the engineering feats undertaken by the sugarcane industry in Hawaii. I recommend that an interpretive plaque be installed along the trail where it passes near the site.

Once past the features of site # 50-80-15-4042 the trail should continue through the hau vegetation. There is an existing trail that can be improved upon. This existing trail is extant between the dike access road to the area in back of St. John's Lutheran Church. During the initial portions of the trails, no views of the adjacent marsh will be possible because of the dense *hau* vegetation. However, because of the relatively high canopy of this *hau* thicket, the trail alignment should not be hampered by vegetation. Approximately 150-200 feet past the pump structure, the vegetation becomes grasses and *koa haole*. At this change in vegetation there is a good vantage point of the marsh and the Kawai Nui Dike Road--see Figure 6. Once the trail emerges from the *hau* thicket, it can follow closely the boundary of the marsh, which will be intermittently visible between the *koa haole* vegetation. Vegetation clearance along this entire portion of Component 1, from the *hau* thicket to the intermittent drainage (between Kawai Nui Vista Subdivision and St. John's Lutheran Church), could be cut down and maintained with little effort, thereby exposing the marsh view.

Figure 5 Shot Southwest of Potential Parking Area At the Access Road Switchback at the Southern End of the Kawai Nui Dike Road

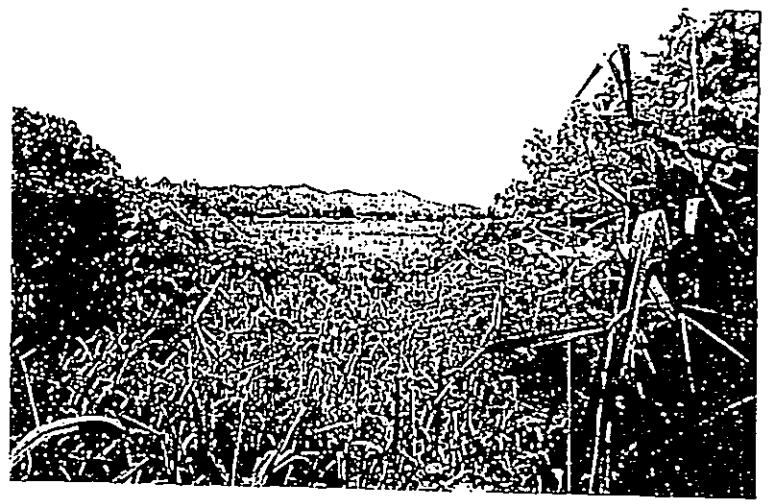

Figure 6 View North from Component 1 of Segment 1 Showing Marsh and Kawai Nui Dike Road

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In this grass and *koa haole* portion of Component 1, there are some remnants of past land use, including stone alignments, ceramic fragments, bottles, and what appears to be a portion of a historic roadway or trail. These remains are indistinct and most likely all date to the historic period. They are not particularly valuable for public interpretation and would be undetectable to the vast majority of persons using the trail. These historic remains are located up-slope of the proposed trail alignment and, because of their location and indistinctness, should not be affected by trail construction and use.

Near the intermittent drainage that separates St. John's Lutheran Church from the Kawai Nui Vista Subdivision terrain becomes more boulder strewn with exposed basalt outcrops nearer to the intermittent drainage. Trail construction around these boulders will take some negotiating. A bridge may be required to cross the drainage itself.

During the field inspection of the Segment 1 trail alignment, colored flagging tape and surveyors stakes were noted in the house lots of the Kawai Nui Vista Subdivision that border the marsh. Based on the layout of these flags and pins, the property boundaries of these lots appear to extend down to the standing water of the marsh itself--see Figure 7. If this is the case there will be no solid ground, outside of the subdivision lots, for the trail along the marsh edge. The property boundaries of these lots should be checked. It is possible the future home owners will allow the trail to go through their property if need be, although this is unlikely. Perhaps a boardwalk could be constructed in this portion of Segment 1, bringing the trail alignment out, away from the Kawai Nui Vista lots and into the marsh. This boardwalk could also be used to bypass the rough terrain around the intermittent drainage that separates St. John's Lutheran Church from the Kawai Nui Vista Subdivision.

Component 2 of Segment 1 extends from the northwest corner of the Kawai Nui Vista Subdivision to the vicinity of sites 50-80-04-3958 and -2022. Component 2 is the most rugged section of Segment 1, with vertical basalt outcrops and steep, boulder-strewn slopes--see Figure 8. Vegetation consists predominantly of a dense tangle of *hau*, with occasional mango and banyan trees. Along the up-slope areas, nearest to the churches and other structures along Kailua Road, there is some relatively level grass and low-vegetation open space. There are also some currently cultivated areas containing wetland taro and banana. These cultivated sections are part of site 50-80-04-2022.

The existing trail alignment on the Helber, Hastert, and Fee Map shows the trail running along the edge of the marsh in this portion of Segment 1. In reality this would be at the base of the basalt outcrop, through the tangle of dense *hau*, in low land that may be seasonally underwater. No view of the marsh would be possible. Because of the rough terrain, the simplest means of creating a trail alignment through this area would be to elevate the trail on the up-slope side of the basalt outcrops. This would mean the trail would have to hug the property boundaries of the church and school properties fronting Kailua Road. Good vistas of the marsh would be possible. Also the trail could take advantage of the relatively unvegetated and boulder free terrain on the up-slope side of the outcrop. One of the problems with elevating the trail on top of the basalt outcrop is accessing the top of the basalt bluff. The bluff meets with the properties of the Kawai Nui

Figure 7 Shot West from the Kawai Nui Vista Subdivision Showing the Lots Extending Down to the Margin of the Marsh

Figure 8 Shot South from the Base of the Vertical Basalt Outcrop (Approximately 20 Feet High) in the Vicinity of State Site 50-80-15-2027

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Vista Subdivision and there is little room for switch-backs to ascend the approximately 20-foot high bluff. Perhaps stairs would be possible.

Of course it would be possible to establish the trail down at the level of the marsh, down slope of the basalt boulders and outcrops. This would require some boardwalk construction and a great deal of *hau* vegetation clearance. This trail alignment would be a "*hau* tunnel" with no view of the marsh. It would also be subject to seasonal inundation during heavy rains.

The first archaeological site that is encountered along Component 2 of Segment 1 is State Site 50-80-11-2027. This site was originally recorded by Clark (1980:51-52) and appears to have been affected by bulldozer activity in the intervening 20 years. The site covers an area that measures approximately 250 ft. east/west by 125 ft. north/south. The six features that comprise the site were interpreted by Clarke as both historic and prehistoric features related to habitation and possibly agriculture. Stacked basalt wall segments, terraces, and enclosures, and basalt adz fragment were recorded--see Figure 9, which is Clark's map of the site. Feature 3, a single basalt boulder rectangular enclosure was the single feature that could be accurately re-identified during the current field inspection for the trail alignment. Features 4, 5, and 6 were also likely identified, but appear to have been affected by bulldozing in the vicinity. The Pohakapu Sewage Treatment Plant, shown of Figure 9, is no longer extant, having been dismantled in the last few years and replaced by the lots of the Kawai Nui Vista Subdivision.

The features of Site 50-80-11-2027 are somewhat indistinct and not particularly suited for public interpretation. If the trail is to be placed on the up-slope side of the basalt outcrop, then it should be placed up slope of the features, *i.e.* between the archaeological features and the properties along Kailua Road. As the features are not particularly obvious to untrained eyes (see Figure 10), care should be taken to point out the location of the features before the trail is constructed. Depending on how close the trail is to pass to these features, some form of signage might be required to protect the sites, especially Feature 3, from damage by trail users. If the trail is to be placed down slope from the basalt outcrop, the features will not be affected.

Continuing southeast along Component 2 of Segment 1, past Site 50-80-11-2027, the terrain remains fairly rugged, with dense vegetation and basalt outcrops closer to the marsh, and fairly open vegetation and a more level land surface along the up-slope areas closest to the properties that front Kailua Road. This terrain continues until the vicinity of Site 50-80-11-2022. Again the path of least resistance would place the trail up-slope, near the lower boundary of the properties that front Kailua road. Of course there is the option of building the trial down slope closer to the marsh, but this would require ample *hau* clearance and the maintenance of the resulting "*hau* tunnel". Figure 11 is photograph of the dense *hau* vegetation.

In the vicinity of Site 50-80-11-2022 the hill slope down to the marsh becomes less steep and the vegetation is less dense. Basalt boulders and outcrops are still common and a trail alignment that traverses the slope will have to negotiate this irregular terrain. In the

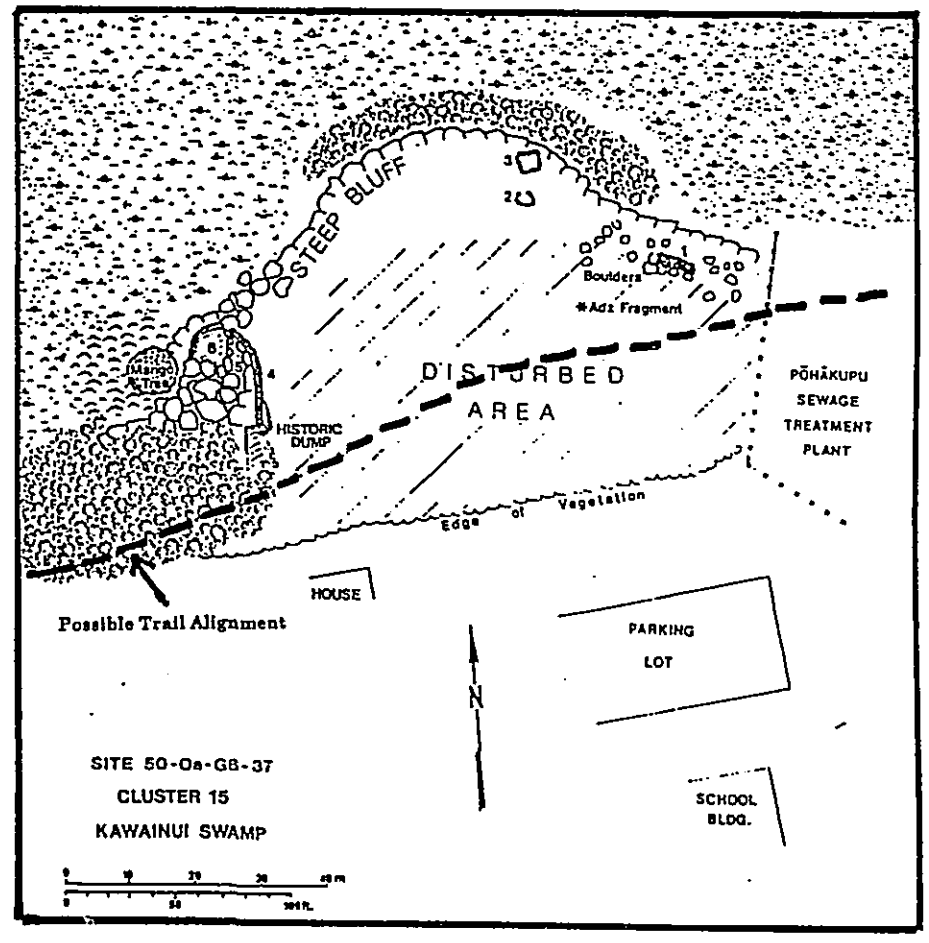

Figure 9 Clark's (1980:52, Figure 19) map of Site 50-80-15-2027--Showing Archaeological Features.

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Figure 10 Shot Southwest of Site -2027 Feature 3, Covered with Vegetation

Figure 11 Shot Southwest of Dense *Hau* Vegetation Near the Marsh Edge Between Sites -2027 and -2022

area between Sites 50-80-11-2027 and 50-80-11-2022 it is recommended that the trail remain elevated near the boundaries of the properties that front Kailua Road. This will avoid the dense vegetation and rough terrain. Closer to Site 50-80-11-2022 the slope, vegetation, and boulder outcrops are less substantial obstacles and the trail can descend closer to the marsh. In this portion of the Segment 1, closer to Site 50-80-11-2022, there is no longer a relatively level area between the properties that front Kailua Road and the hill slope that leads to the marsh. The trail will need to traverse the hill slope or run along its base at the margin of the marsh.

The features of Site 50-80-11-2022 consist largely of stacked basalt boulder retaining walls for agricultural terraces--see Figure 12, which is Clark's (1980: Sheet 1) map of the site. The terraces form rectangular *lo'i*, or wetland taro pond fields. These features were likely constructed prehistorically and their use continued through the 19th century. Several of the terraces are spring fed and are actively under cultivation with taro and banana. These active terraces are located immediately in back of the Hawaiian-language immersion school (in back of the Kailua Methodist Church). The immersion school may be responsible for the active cultivation. With the maintained terrace walls, spring-fed water trickling down slope from pond field to pond field, and the taro and banana plants themselves, this is a beautiful spot and will be one of the high-points of the Segment 1 alignment--see Figure 13. The trail will most likely have to cross this area of active cultivation--unless it skirts it, either up-slope close to the Kailua Road properties, or down slope near the margin of the marsh. A board walk would be the easiest means of crossing this area, as the exposed soils are mucky and their is standing water in the pond fields themselves. The dry masonry, stacked basalt boulder terrace walls are not substantial and are not sufficiently stable to support pedestrian traffic.

The southern most features of Site 50-80-11-2022 shown on Clark's map in the vicinity of the large banyan tree, are the foundations of a historic piggery. The foundations are low enclosures of cemented basalt boulders. Smaller internal features included what appear to be water or food troughs made of cement.

The recommended, path of least resistance, alignment of the proposed trail through Site 50-80-11-2022 is shown on Figure 12. This proposed alignment passes among the features of the site. Appropriate signage is recommended along the trail alignment to interpret the agricultural features of the site. If for some reason it were deemed undesirable to have the trail alignment pass directly through the features of Site 50-80-11-2022, the features could be skirted either up or down slope of the site. Up slope the terrain is steep and vegetation is fairly thick, but the trail could pass through. Downslope the terrain is more level, but the vegetation is thick.

The proposed trail alignment of the Helber, Hastert, and Fee map shows the trail passing along the margin of the marsh, down slope of Site 50-80-11-2022. The location labeled "Interpretive Shelter" is in the vicinity of the large banyan tree on top of the prominent basalt outcrop shown on Clark's map of Site 50-80-11-2022 (Figure 12). This basalt outcrop is rugged terrain. In the area downslope of this large outcrop the vegetation is relatively open, but the terrain consists of jumbled large basalt boulders. On the

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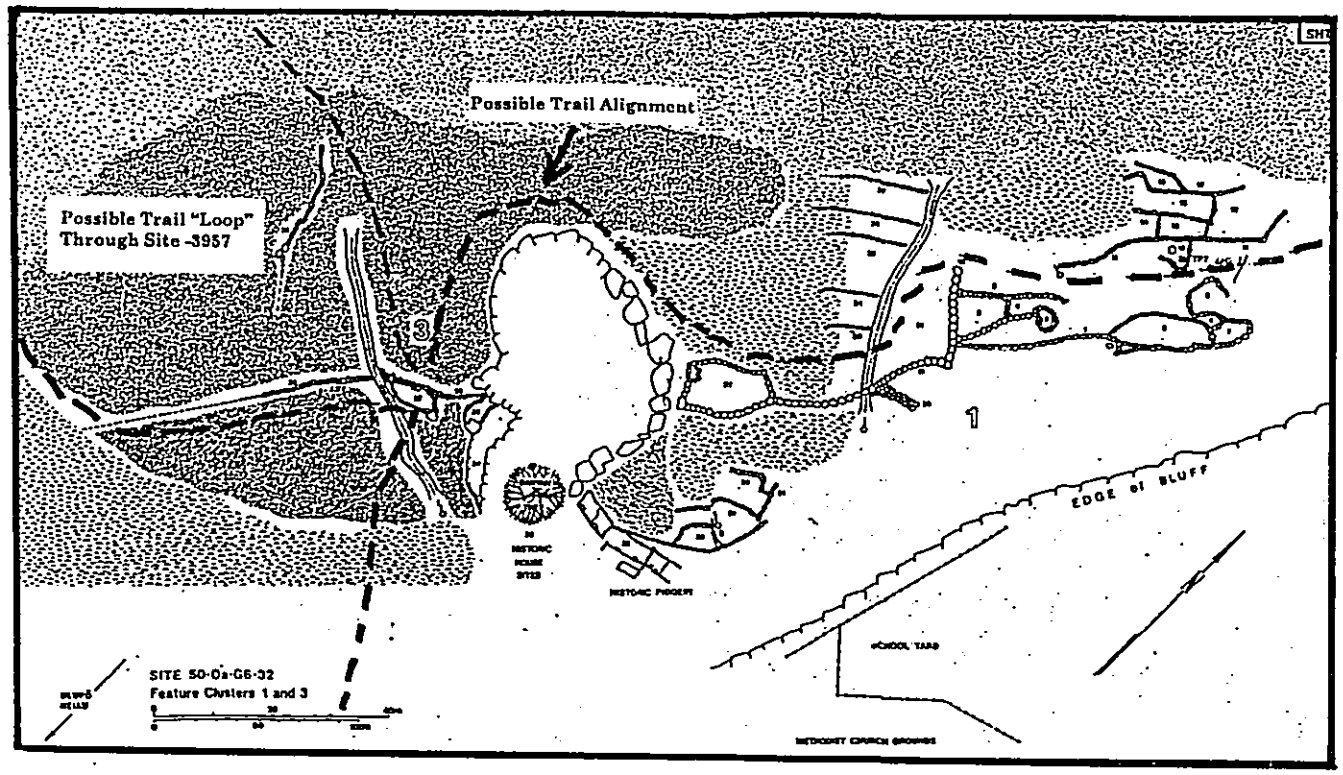

Figure 12 Clark's (1980: Sheet 1) Map of Sites 50-80-11-2022 (Labeled on Clark's Map as Cluster 1) and 50-80-11-3957 (Labeled on Clark's Map as Cluster 3)--Showing Recommended Segment 1 Trail Alignment.

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Figure 13 Shot North of the Terraces of Site -2022 Under Active Cultivation with Taro and Banana

Figure 14 Shot South of Ulupo *Heiau*

west-southwest side of the boulder outcrop (also shown on Figure 12) are the features of State Site 50-80-11-3958. These stacked basalt boulder walls and alignments are likely prehistoric features that were modified by subsequent historic land use. Clark's map depicts a spring amid the features of Site 50-80-11-3958. During the field inspection, a drainage channel from the spring was observed, but it was dry at the time.

Component 3 of the Segment 1 Trail alignment is the area west of Sites 50-80-11-2022 and 50-80-11-3958. As one progresses further west beyond this large outcrop and the features of Site 50-80-11-3958, the terrain becomes less boulder covered and more level. The vegetation however, is dense *hau*. The trail alignment will form another "*hau* tunnel" in this area. Beyond Site 50-80-11-3958 the trail alignment heads west towards Site 50-80-11-3957. The trail alignment could run along the wall segment that connects Site 50-80-11-3958 with Site 50-80-11-3957. This wall segment is labeled feature 36 on Clark's map of Site 50-80-11-3958 (Figure 12). There are many other possible alignments for the trail in this area between Sites 50-80-11-3958 and 50-80-11-3957.

Just beyond Site 50-80-11-3958 there are many possible alignments for Segment 1. The trail should access the vicinity of Site 50-80-11-3957, Ulupo heiau, and Kailua Road. This can be accomplished through trail branches, a trail loop, or by winding the trail alignment. A trail loop is recommended, see Figure 4. The trail branches shown on the Helber, Hastert, and Fee map are feasible. Again in this portion of Segment 1 vegetation is dense, but would not hinder the trail construction.

Site 50-80-11-3957 would be the furthest western extent of Segment 1. This site consists of numerous stacked stone features including clearing mounds, enclosures, wall alignments, a historic house site, and irrigation features such as *'auwai*--see Figure 15, 16, and 17. The features are both prehistoric and historic. Conrad Erkelens (1993) did extensive investigation of this site. It is one of the most studied and best understood sites along the margin of Kawai Nui Marsh. It is recommended that the Segment 1 alignment proceed as far as Feature 109, a historic residence. Research by Erkelens identified Feature 109 as the *Māhele* Land Commission Award (L.C.A.) of the *Konohiki* (land manager) named Kahele. Excavation at the feature and its vicinity uncovered traditional Hawaiian artifacts as well as historic artifacts, including a fire-arm and a U. S. coin dating to the 1840s. Site 50-80-11-3957 offers good opportunities for public interpretation as the features that make up the site are fairly representative of the changes in land use that took place from the prehistoric period into the 20th century. These features would be good for interpretation with signage along the trail route.

The Segment 1 trail alignment can meander among the other features of Site 50-80-11-3957 to reach Feature 109. Feature 109 is on the margin of the marsh not far from one of the areas of open water--See Figure 16. With some *hau* clearance a trail segment could extend from the vicinity of Feature 109 out to the open water along a constructed boardwalk.

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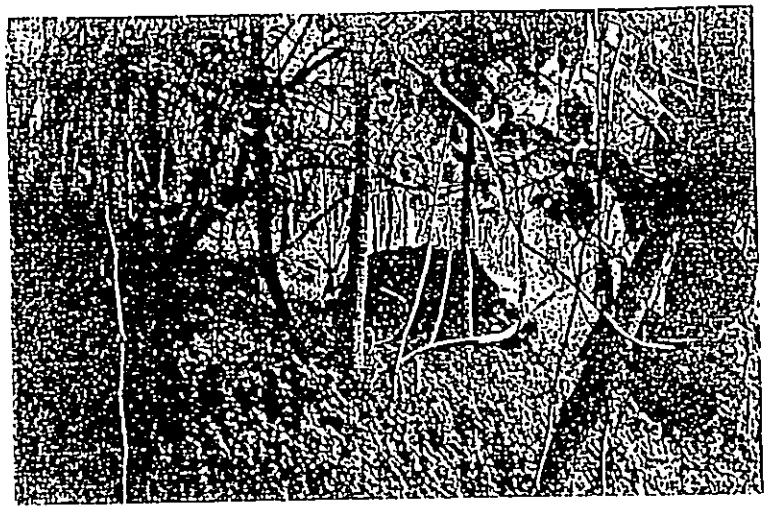

Figure 15 Shot Southwest of a Typical Dry-masonry, Stacked-Boulder Clearing Mound of Site -3957

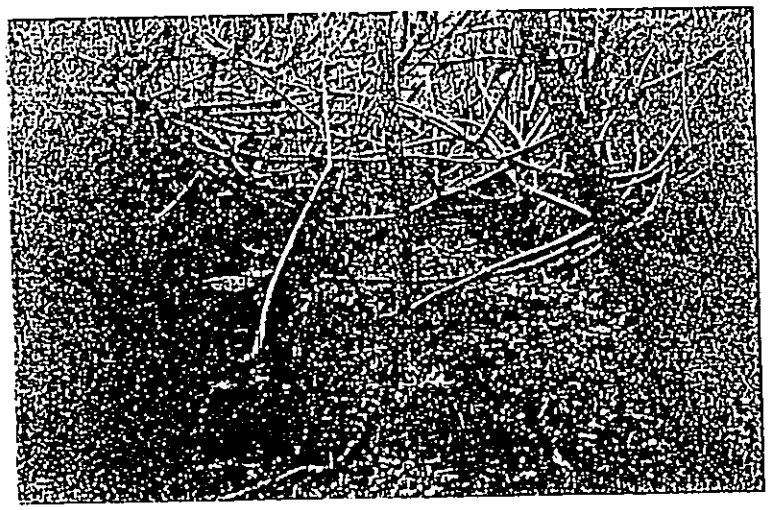

Figure 16 Shot Southwest of Site -3957, Feature 109 Habitation, Beneath Dense *Hau* Vegetation

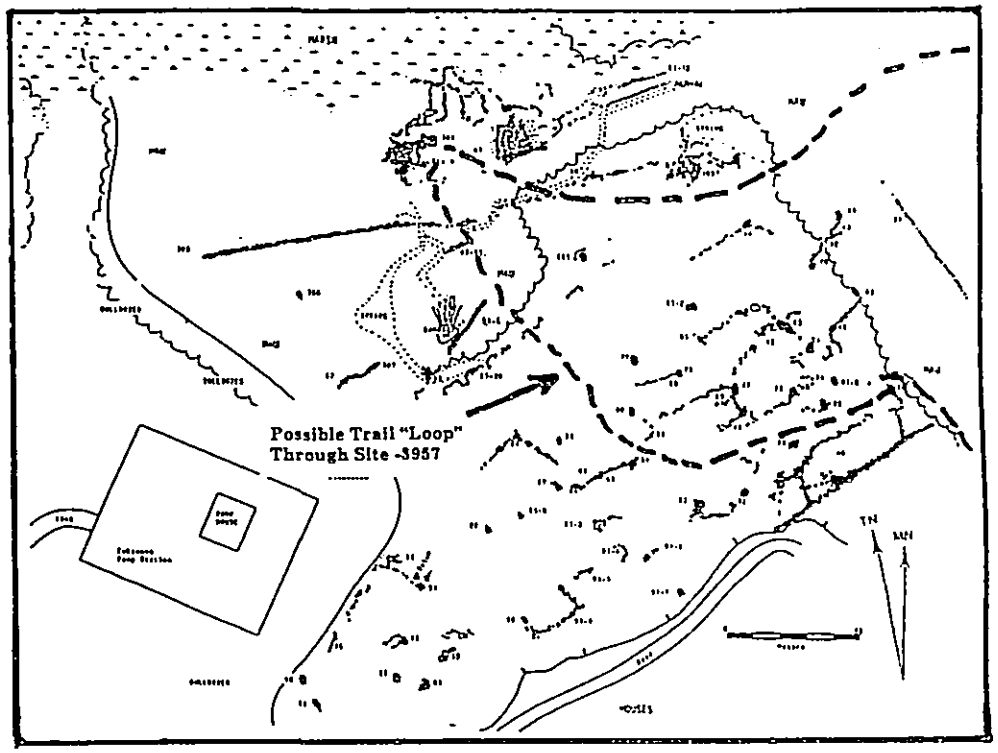

Figure 17 Erkelens' (1993:58) Map of Site 50-80-11-3957--Showing Recommended Segment 1 Trail Alignment.

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The vicinity of Feature 109 (Site 50-80-11-3957) would be the furthest extent of Segment 1--see Figure 17. From here the trail would either loop back on itself to connect with Ulupo *Heiau* and Kailua Road, or trail-users would backtrack the way they had come. Once Segment 2 is constructed the trail can continue past Feature 109.

Ulupo *Heiau* is one of the most visually impressive traditional Hawaiian religious structures on the island of O'ahu. Trail-users on Segment 1 will approach the *heiau* from below the stacked boulder terrace--see Figure 14. This approach is dramatic and highlights the labor invested in the *heiau* construction. From the marsh side of the *heiau*, the trail alignment can circle around to the upper side of the platform where existing signage is displayed. From Ulupo Heiau Kailua Road is easily accessed along an asphalt pathway that previously provided vehicular access to the Y. M. C. A. parking lot.

V. ASSESSMENT OF SEGMENT 2

The discussion of Segment 2 will proceed from Ulupo *Heiau* west to the vicinity of Castle Medical Center. From the vicinity of Ulupo *Heiau* and Sites 50-80-11-3958 and 50-80-11-3957, as was noted previously, the vegetation is a dense mix of introduced species and *hau*. This area is relatively level and has less of the large basalt boulder outcrops that characterize the adjacent portions of Segment 1. Beyond the Kukanono pumping facility the vegetation changes from predominantly dense mixes of *hau* thickets and introduced species, to a more open canopy of predominantly *koa haole* with African tulip, monkey pod, Christmas berry, and banyan,. There is a low understory of grasses and shrubs, however, walking is much easier through this area, see Figure 18. This vegetation change is most likely related to the access of cattle to this portion of the Kukanono slope, immediately behind the Kukanono subdivision. The cattle of Martin Knott have kept the vegetation from taking over as it has in most portions of Segment 1. Mr. Knott's lease hold land extends along the Kukanono slope to the area of the Kukanono Pumping Facility. Trail construction and maintenance along Segment 2 will be much less difficult in relation to Segment 1 because of the more open vegetation and the lack of pronounced basalt boulders and outcrops.

Segment 2 should proceed from the western most extent of Segment 1, the end of the "loop" section that connects Ulupo *Heiau* to Feature 109 (historic house foundation and related features) of Site 50-80-11-3967, see discussion in the Segment 1 Assessment, above. The trail segment should proceed west from Feature 109, through the dense vegetation, to the vicinity of Site 50-80-11-3961 on the marsh side of the Kukanono pumping facility. The six features of Site 50-80-11-3961 are most likely historic agricultural features. These features will not be adversely affected by the trail segment. These features are not well suited for public interpretation and the trail segment should be aligned to by-pass them. This is best accomplished by having the trail alignment past between Site 50-80-11-3961 and the Kukanono pumping facility.

Further west, beyond Site 50-80-11-3961 and the Kukanono pumping facility, better views of the marsh are available and vegetation is more open. In the vicinity of Site 50-80-11-3959 the vegetation is open under a canopy of *koa haole* (Figure 18). At the base of the Kukanono slope are broad vistas of the marsh (Figure 19). It is recommended that an interpretive plaque, or series of plaques be installed along the trail in the vicinity of Site 50-80-11-3959. Public interpretation should highlight the results of archaeological research in vicinity at Sites 50-80-11-2029, 50-80-11-2031, 50-80-11-3959, and 50-80-11-3960 including the documentation of historic and prehistoric stacked stone features, prehistoric grinding stones for adz manufacture, and the documentation of buried prehistoric and historic agricultural field walls out in the level surface of the marsh itself (Site 50-80-11-2029--Allen-Wheeler 1981; Cordy 1977). The trail alignment can follow a direct route through the stacked stone features of Sites 50-80-11-3959, 50-80-11-3960, and 50-80-11-2031. With the exception of the adz grinding stones, these are modest stacked stone features and individually they are not particularly suited for public interpretation. The buried agricultural walls of Site 50-80-11-2029 are not visible on the marsh surface (see

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Figure 18 Shot West of Typical Vegetation Along Kukanono Slope, Segment 2, in the Vicinity of Sites 50-80-11-2031 and 50-80-11-3959

Figure 19 Shot NW from the Base of Kukanono Slope in the Vicinity of Site 50-80-11-3959 Showing the Open Vista of the Marsh

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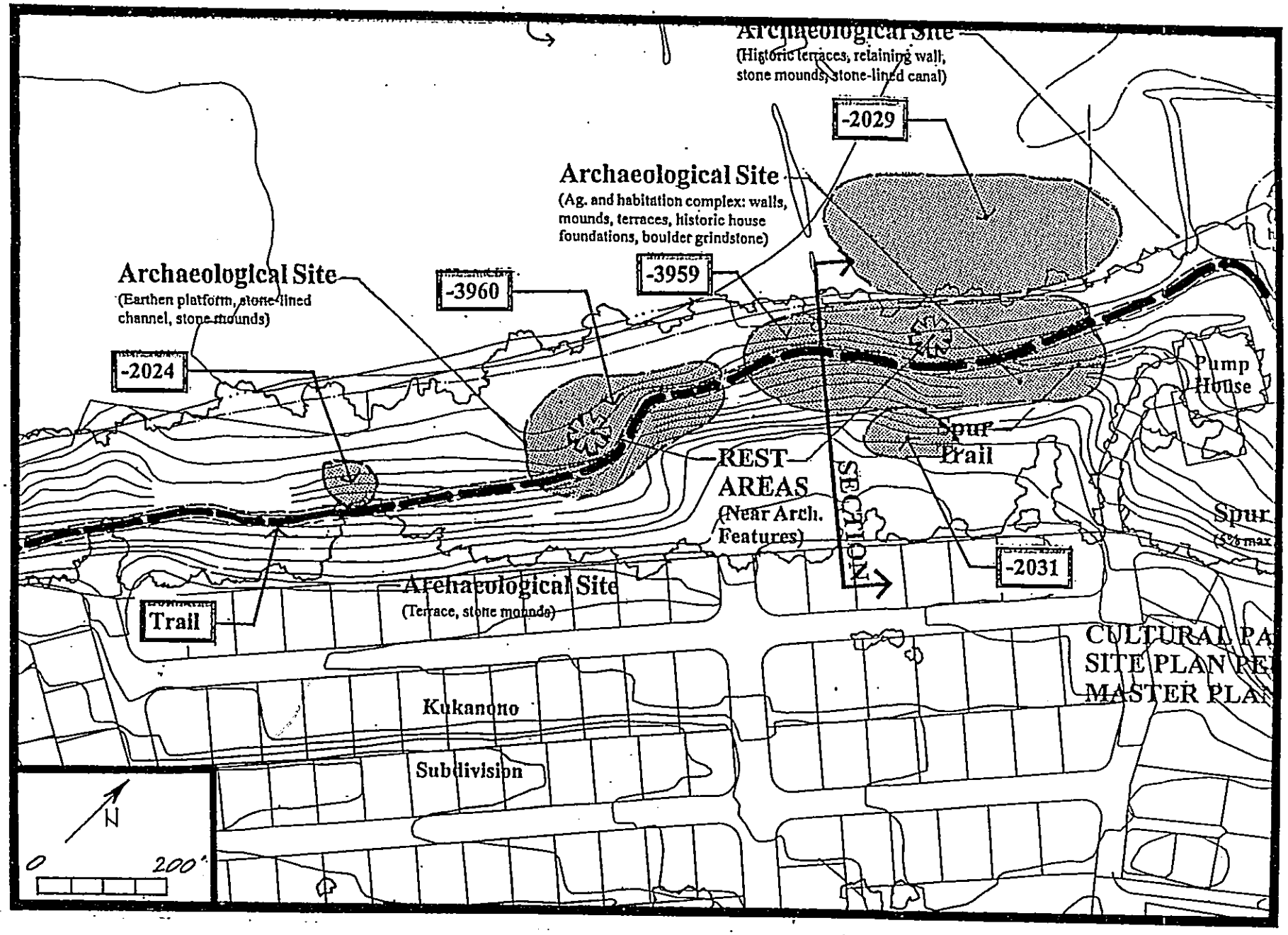

Figure 20 Clark's (1980) Map of Site 50-80-11-3959. Adz Grinding Stones are Located at Features 147 and at the Northern End of Feature 115.

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Figure 19). But as a whole the cultural landscape is representative of hundreds of years of land use along the margins of Kawai Nui Marsh. The adz grinding stones are more noteworthy features, and perhaps the signage would be best situated near these features. The stacked stone walls, terraces, and mounds of Sites 50-80-11-3959 and 50-80-11-2031 are unlikely to be adversely affected by the increased public access associated with the trail. Although small portable artifacts have been collected by past investigations at these sites, the danger of looting at these sites in not particularly great. Certainly the danger does not outweigh the benefit of public interpretation of the sites. Clark's (1980) map of site 50-80-11-3959 (Clark's cluster 4) is shown as Figure 20.

Further west the recorded sites along the Kukanono Slope are smaller, less distinct features on the landscape. Site 50-80-11-2024 consists of five small features, a terrace and a mound. This small site was not relocated during the assessment field work, however, it is likely that the mounds and terrace features are not particularly suited for public interpretation. They will most likely not be affected by increased pedestrian access in the vicinity related to the trail construction and use. The trail alignment should avoid this site. The vegetation in the vicinity is open and trail construction should not be hindered, see Figure 21. Many areas on the higher Kukanono Slope were clearly bulldozed as part of the grading related to the development of the Kukanono Subdivision. There are bulldozer push piles and mounds related to this earth moving activity.

The Kukanono Slope further west, beyond Site 50-80-11-2024 and continuing around in back of Castle Medical Center is steeper and more overgrown. Several large, irregular, linear alignments of boulders over 1 meter in diameter were noted, see Figure 22. These are the result of bulldozer clearance of the slope area. This bulldozer activity may be related to historic agriculture or ranching. Closer to the margin of the marsh, the land is cleared and fenced, with corrals and sheds. This is part of Mr. Martin Knott's ranching infrastructure. Three smaller historic properties, Sites 50-80-11-2028, 50-80-11-3962, and 50-80-11-3963, are located in the this vicinity. These sites could not be relocated during the assessment field inspection. It is unlikely, however, that these sites will be affected by the trail construction and use as the trail will not extend through this area. Instead the trail will connect with Ulukahiki Street to avoid the Knott ranch. Ulukahiki Street is one of the proposed entrances and exits to the trail system.

Figure 21 Shot West of Typical Vegetation Along Kukanono Slope, Segment 2, in the Vicinity of Sites 50-80-11-2024

Figure 22 Shot NW from Near the Base of Kukanono Slope in the Vicinity of Ulukahiki Street, Showing One of the Massive Boulder Alignments from Bulldozer Clearance in the Area.

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VI. ASSESSMENTS OF SEGMENTS 3 AND 4

There are no recorded historic properties within either Segments 3 or 4. Segment 3 extends from the end of Ulukahiki Street to Kahanaiki Stream near the corner of Kalanianaole Highway and Kapa'a Quarry Road. This segment of the trail will provide access to the Mokulana "Peninsula" area and cross both Maunawili and Kahanaiki Streams. The historic wooden structure at the end of Ulukahiki Street is the only known potential historic property within Segment 3. This structure is very rotted and termite infested. It may be beyond salvage. However, it is clearly over 50 years old and may be a significant historic property. If the trail system will impact this structure, through increased pedestrian use of the area, the State Historic Preservation Division should be consulted regarding the need for further documentation. Possible documentation might involve the drawing of elevations and floor plans and photographing the structure by an architectural historian. It may be that the site requires no further historic preservation documentation.

Vegetation and topography within Segment 3 should not hinder trail construction. Vegetation is grasses and dispersed trees for the most part. On Mokulana Peninsula itself there is a tall canopy of introduced trees. Beneath this canopy is limited undergrowth due to the cattle and horse grazing (see Figure 23). Where Segment 3 and 4 meet, adjacent to Kahanaiki Stream, the vegetation becomes more dense with stands of *hau*, introduced trees, and taller grass.

Mokulana Peninsula was used by the military during World War II (Chuck Burrows, personal communication, 2000). The area is used today by the Knott Ranch for cattle and horse pasturage (see Figure 23). Although no cultural deposits are known from the area, considering the location, it is likely that the area was used prehistorically and historically for both habitation and agriculture. It is as yet unclear if subsurface remnants of this past land use remain. It is unlikely, however, that the proposed trail construction will be of sufficient impact to damage as yet undetected subsurface cultural layers. However, if trail construction will involve substantial grubbing and grading of the trial route, it may be that further historic preservation work will be required. This could include an archaeological inventory survey and/or archaeological monitoring during trail construction.

Great vistas of the marsh are available from the Mokulana Peninsula area. Figure 24 is the view to the west from Mokulana towards Segments 4 and 5.

Vegetation is thicker in the vicinity of Segment 4. The relief is greater as well. The relatively short Segment 4 is the proposed site for the Kawai Nui Educational Center as outlined in the Kawai Nui Master Plan (1994). An educational structure and parking for 60 to 70 cars is proposed. Although there are no recorded historic properties within the proposed construction areas, it is likely that an archaeological inventory survey will be required as part of the permitting process for the educational center development. Again, consultation with SHPD/DLNR will resolve this matter.

Figure 23 Shot South Beneath the High Canopy on Mokulana Peninsula, Showing Vegetation and Current Land Use (Horse Grazing).

Figure 24 Shot West from Mokulana Peninsula Towards Segments 4 and 5, Showing Vegetation and One of the Marsh Vistas from the Peninsula

VII. ASSESSMENT OF SEGMENT 5

Segment 5 extends along Kapa'a Quarry Road, from it's intersection with Kalanianaole Highway, to the vicinity of the Honolulu City and County's Model Airplane Park. Current trail planing calls for the Circle Kawai Nui Trail to utilize the marsh-side shoulder of the Kapa'a Quarry Road as the primary alignment of Segment 5. The dense vegetation between the Quarry Road and the marsh will preclude marsh vistas. Accordingly, Segment 5 will be the most removed contextually from the marsh of all the proposed trail segments. To minimize this contextual disassociation, two branch trail segments are proposed for Segment 5 from Quarry road down to the marsh edge. These spur-trails will incorporate high spots in the natural topography, thereby providing broad marsh vistas. They will also meander along the slope down from Quarry Road to reach the marsh, providing access to the natural and cultural environment of the marsh itself as well as it's periphery.

There is only a single known historic property along the proposed alignment of Segment 5 with its associated spur-trails (Site 50-80-11-2023 *Na Pohaku o Hauwahine*--see discussion below). Several other sites are located in the vicinity that are of archaeological interest and that could be trail destinations for public interpretation related to Segment 5. The five historic properties along the Segment 5 route, from south to north are: 50-80-11-2026 (agricultural terrace); 50-80-11-3965 (small presumably agricultural terrace); 50-80-11-3739/360 Holomakani *Heiau*; 50-80-11-50-80-11-2023 *Na Pohaku o Hauwahine*; and 50-80-11-359 Pahukiki *Heiau* (see Figure 3).

Sites 50-80-11-2026 (Clark 1980) and 50-80-11-3965 (Ewart and Tuggle 1977), both stacked stone terraces, were not relocated during the field inspection along the marsh margins. The general location of these apparent agricultural terraces are shown on Figure 3. These features are unlikely to be affected by the relatively slight increase of pedestrian traffic along this margin of the marsh that will come with use of Segment 5. Vegetation between Kapa'a Quarry road and the marsh in this southern portion of the Segment 5 is a dense mix of introduced species including Banyan, Monkey Pod, Octopus Tree, Christmas Berry, and *Hau*. Topography is even and slopes gradually towards the marsh from Quarry Road. There are several intermittent drainages that descend this slope perpendicular to Quarry road, however, for the most part construction of spur-trails in this are would not be greatly hampered by either vegetation or topography.

The southern most of the two proposed spur trails will ascend to one of the highest points along the marsh side of Quarry road and descend to the marsh below. This high point will provide good views of the marsh once the predominantly Christmas Berry vegetation has been cleared. From this high point the proposed spur-trial will descend with many switch-backs to the marsh below. No previously located historic properties are known for this area. During the field inspection several older barbed wire fences from cattle ranching were noted. There is also an old road cut that extends perpendicular to the slope. This road cut is located in the vicinity of the spur trail, mid-way between Quarry Road and the marsh edge. It descends across the slope toward the marsh and has recently

been cleared of vegetation. As this former road cut has already been crudely graded, it could easily be incorporated into at least a part of the route of the spur-trail. Nearer to the marsh edge, where the road cut descends to the marsh edge, are several areas of old mango trees that would be good locations for rest areas and picnic tables. Board walks out into the marsh could be built from these areas for wildlife viewing. Topography and vegetation should not hamper the construction of this southern spur-trial.

The proposed northern spur-trail along Segment 5 will utilize the already existing trail system that connects Site 50-80-11-2023 *(Na Pohaku o Hauwahine)* to the Quarry road. The existing trail system at Site 50-80-11-2023 was constructed and is maintained by Mr. Chuck Burrows and the volunteers that work with him from Kamehameha School and the Kawai Nui Heritage Foundation. As the site description in the previous archaeology section, above, points out, there are good views of the marsh from this site; see Figure 25. The natural rock outcrop is a dramatic setting to appreciate the natural environment of the marsh. There are several legends about *Hauwahine* and Kawai Nui marsh that could be the subject of signage along the spur trail and at the *Na Pohaku* overlook; see the historic background section above.

There are also archaeological features, including stacked-stone retaining walls, modified outcrops, and a adze grinding stone (Figure 26). The archeological remains at the site are fairly modest and, with the exception of the grinding stone, are not particularly suited for public interpretation. It is unlikely that the archaeological remains at Site 50-80-11-2023 will be negatively affected by increased pedestrian traffic in the area following the implementation of Segment 5.

The *Na Pohaku* Site is a good location for general Kawai Nui Marsh interpretation. With the broad vistas, the area is well suit for discussions of the marsh's geology and formation chronology, natural environment, legends and oral traditions, and history and prehistory. A series of interpretive signs could be situated along the outcrop, each related to a different topic. It is recommended that Mr. Chuck Burrows of the Kawai Nui Heritage Foundation be consulted before any trail development proceeds in the vicinity of the *Na Pohaku* Site.

Two *heiau* are located in the general vicinity of Segment 5, Site 50-80-11-3739/360 Holomakani *Heiau* and Site 50-80-11-359 Pahukiki *Heiau*. Each is located a considerable distance up-slope from the Quarry Road and the proposed alignment of Segment 5; see Figure 3. However, there is potential for spur-trials that connect these two significant prehistoric sites with the Segment 5 alignment. Both *heiau* sites are good locations for public interpretation through signage.

Holomakani *Heiau* (Site 50-80-11-3739/360) is currently accessible from Kapa'a Quarry Road by a steep earthen pathway that is primarily the result of off-road vehicle use of the hill-slope above Quarry Road. Holomakani *Heiau* is located on private land, but perhaps an arrangement could be worked out with the land owner to allow public access to the site. A graded spur trail with switch backs could be made that would mitigate the otherwise steep slope.

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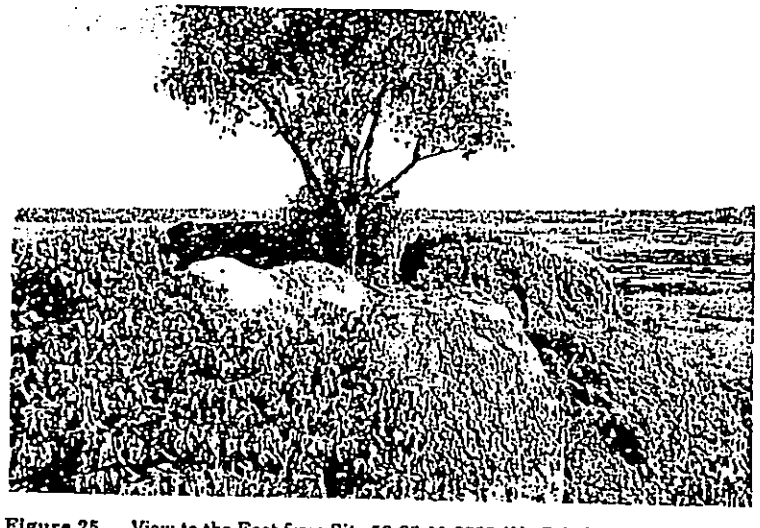

Figure 25 View to the East from Site 50-80-11-2023 (*Na Pohaku o Hauwahine*)

Figure 26 Reported Adze Grinding Stone at Site 50-80-11-2023 (*Na Pohaku o Hauwahine*)

Pahukiki *Heiau* (Site -50-80-11-359) is located within the Kapa`a Land Fill and is most easily accessed by the roadways in the land-fill. It is possible that a trail segment could be constructed that connects Pahukini and Holomakani. However, this route would cover some fairly steep slopes and rough terrain. It would be difficult to make this route suitable for wheel-chairs.

VIII. ASSESSMENT OF SEGMENT 6

The Segment 6 alignment offers the least potential for cultural/historical public interpretation of all the Circle-Kawai Nui Trail segments. Segment 6 extends from the Honolulu City and County's model airplane park to the Oneawa Canal and the northern end of the Kawai Nui Dike Road in the northeast corner of Kawai Nui Marsh. The exact configuration of Segment 6 has yet to be determined. However, the route under consideration will utilize portions of the shoulder of the Kapa'a Quarry Road as well as spur trails that extend through portions of the marsh and inland of the marsh on the adjacent slopes. This portion of the Kapa'a Quarry Road, and its immediate vicinity, have been heavily affected by modern land alteration. This includes the excavation of drainage canals along both sides of Quarry Road, and the cutting and filling of large land areas related to the construction of the adjacent H-3 Freeway; see discussion in Kelly and Nakamura (1981). It is very unlikely that any significant historic properties will be affected by the construction and use of the Segment 6 Trail alignment, whether it stays on the shoulder of Kapa'a Quarry Road, extends through the marsh on boardwalks to the east of the road, or extends along a prepared pathway through the disturbed land areas on the west and north side of Quarry Road.

The field inspection of the southern portion of the proposed alignment of Segment 6, from the model airplane park to the eastern bend in Kapa'a Quarry Road, found no indication that historic properties might be affected by the construction and utilization of the trail. Drainage canals have been excavated along both sides of Quarry Road. West of Quarry Road the land surface has been bulldozed extensively. East of Quarry Road beyond the drainage canal, there is only open marsh. Vegetation consists of introduced, disturbance-loving, species.

Field inspection along the northern portion of Segment 6 from the eastern bend in Quarry Road to the Oneawa Canal, found no indication of significant historic properties. The area to the north of Quarry road consists of undulating slopes that were affected by land alteration related to the construction of the adjacent H-3 Freeway. Vegetation consists of *Hau*, Christmas Berry, Monkey Pod, *Koa Haole*, and grasses and vines. Several intermittent drainages, derived from drainage culverts off of the H-3 Freeway, cut down through this slope. The south side of Quarry road consists of fill land that was reclaimed from the marsh with excavated material from the construction of the H-3 Freeway (Kelly and Nakamura 1981). This area was formerly the site of an auto-wrecking yard. Car parts, and oil stains are still visible on the land surface. Vegetation is predominantly *Koa Haole* and Monkey-pod trees. There is an abrupt boundary with the marsh vegetation and standing water to the south of this portion of Segment 6.

There is only a single recorded historic property in the vicinity of Segment 6, Site 50-80-11-3964, the Kaeleuli House site (Ewart and Tuggle 1977). This site is not shown on Figure 3, but its location is indicated on the U.S.G.S. map that is the basis for Figure 3. Ewart and Tuggle (1977) describe the site as two house remnants, which, because of their associated modern materials, appeared to have been inhabited until recently (the survey

work of Ewart and Tuggle was done in the mid to late 1970s). On the U.S.G.S. (See Figure 3), in the northwest corner of "Kawainui Swamp", adjacent to the eastern bend in Kapa'a Quarry Road, are two square dots representing houses or structures. These two structures match the location of the two house remnants that make up Site 50-80-11-3964 as reported by Ewart and Tuggle (1977). During the field inspection this area was investigated. No remnants of Site 50-80-11-3964 were found, however, it was noted that the area had been greatly disturbed by bulldozing and dumping of construction materials. It is likely that these house remnants have been removed since the work of Ewart and Tuggle in the 1970s.

Chuck Burrows, of the Kawai Nui Heritage Foundation, related that there had once been a historic rice-mill in the vicinity of Site 50-80-11-3964 (Chuck Burrows, personal communication, 2000). During the field inspection of this area, no remnants of a rice mill were located. As with Site 50-80-11-3964, it is likely that the historic rice mill remnants were removed or covered by recent land disturbance.

IX. RECOMMENDATIONS

The archaeology and history of the Kawai Nui Marsh area have been well documented in numerous previous studies. Many of the marsh's historic properties have good public interpretive potential. They represent the physical record of centuries of changing land-use around the margin of Kawai Nui Marsh. There are prehistoric and historic habitation, agricultural, and irrigation features. There are prehistoric grinding stones for adz manufacture. There are also historic features related to large-scale commercial rice and sugar cultivation. An interpretive trail through these historic properties would be a history lesson on Kawai Nui specifically and Kailua in general.

A. State Historic Preservation Review Process

According to State of Hawaii historic preservation guidelines, before trail construction can begin the project should pass through the State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR) historic preservation review process. The usual first step in the SHPD review process in an undertaking such as this trail construction would be an archaeological inventory survey of the proposed trail route. Typically, archaeological inventory survey would include:

1) Systematic inspection of the project area and the documentation of all historic properties located with scale maps, written descriptions, and limited test excavations;.

2) Evaluation of feature function and age based on available archaeological, ethnohistoric, and historic evidence;

3) Significance evaluations of the recorded sites based on the significance criteria of the State and National Registers of Historic Places; and finally,

4) Recommendations regarding how to mitigate the impact of trail construction and use on the historic properties in the vicinity of the trail.

Following review and approval by SHPD of the project area's archaeological inventory survey, it is possible that a data recovery phase of archaeological/historical investigation would be required. Data recovery is a form of mitigation. It negates or lessens the impacts of project development by collecting available information before historic properties are affected.

Whether or not data recovery investigation is required, if significant historic properties are located within the project area, a preservation plan for the project must be prepared. The plan would detail the construction methods, the proposed mitigation of impact on historic properties, and both the long and short term preservation measures for the project area's historic properties. The plan would also specify how the historic properties would be interpreted and protected.

B. Special Circumstances for the Kawai Nui Trail Alignment

Outlined above are the steps of the historic preservation review process that are typical for development projects. The Kawai Nui Trail development project is out of the ordinary in the amount of previous archaeological and historical work that has been undertaken in the vicinity of the marsh. Although this work was not done as an inventory survey, it has resulted in the systematic pedestrian inspection of large portions of the marsh periphery, the documentation of sites and features with scale maps and written descriptions, and the subsurface testing of many archaeological features (items 1 and 2 from above). As this document demonstrates, there is a substantial amount of information regarding the sites on the periphery of the marsh. This information includes site maps, excavation results, sedimentological analysis, and ^{14}C dating results. What are lacking for these sites are significance evaluations and mitigation recommendations (items 3 and 4 from above).

It is recommended that SHPD be consulted regarding the proposed trail construction and the requirements to fulfill the historic preservation review process. During initial consultation regarding this project, SHPD was sympathetic and well aware of the time and monetary constraints associated with archaeological inventory survey of the entire marsh periphery. In consultation with SHPD it may be possible to work out a scope of work for the inventory survey of a specific trail alignment. As the pedestrian inspection and site recording for much of the marsh periphery has already been accomplished, this scope of work could focus on supplying the missing significance evaluations and mitigation recommendations for the sites along the trail alignment. With these evaluations and recommendations SHPD would have the information to evaluate the impacts of the trail alignment on historic properties. SHPD would also have the information needed to evaluate the required trail preservation plan. It may even be possible, in consultation with SHPD, to create a single document that includes the site significance evaluations, mitigation recommendations, and the trail preservation and interpretive plan.

Cultural Surveys Hawaii, Inc. cannot speak for SHPD. The specifics of the historic preservation review process will have to be worked out in consultation with Dr. Sara Collins, the O'ahu Island SHPD archaeologist. Although the proposed trail alignments and information summaries presented in this document will be useful during consultation with SHPD, it would be best to have a specific trail alignment. This facilitates decisions regarding what sites will be affected directly by trail construction and what sites will be affected by increased pedestrian traffic associated with the trail.

C. Recommendation for Route Selection

For selection of the specific trail alignment, it is recommended that the proposed routes be walked, evaluated, and discussed by the consulting archaeologist, land surveyor, trail construction company representative, trail architect, and any other parties whose input will be important to the specific trail alignment. Once the route is agreed upon, it should be recorded and marked with survey stakes by land surveyors. These survey points can then be used as locator points to complete the historic preservation scope of work that is worked out with SHPD.

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Appendix E
Cultural Impact Evaluation

Cultural Surveys Hawaii, Inc.

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