

PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

VOLUME II OF II

APPENDICES

Pūlehunui Ahupua‘a, Kula Moku, Maui

PROPOSING AGENCY:



Department of Hawaiian Home Lands

PREPARED FOR:

Department of Hawaiian Home Lands
Department of Land and Natural Resources
Department of Accounting and General Services
Department of Public Safety

ACCEPTING AUTHORITY:

Governor, State of Hawai‘i

PREPARED BY:



Prepared pursuant to Chapter 343, Hawai‘i Revised Statutes,
and Chapter 11-200, Hawai‘i Administrative Rules

JUNE 2019

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BENEFICIARY CONSULTATION



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EVENT PŪLEHUNUI PLANNING WORKSHOP

DATE APRIL 21, 2018

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EVENT Pūlehunui Planning Charrette #2

DATE Saturday, April 28, 2018

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APPENDIX B-1

**ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE (EISPN) CONSULTATION**

Vera Koskelo

To Whom It May Concern:
Work related to the proposed Pulehunu Regional Infrastructure Master Plan may result in impacts to waters of the United States regulated by the U.S. Army Corps of Engineers and the work may require a permit from the Corps. The Corps requests the opportunity to comment on the DEIS when it is drafted.

Mahalo,
Vera Koskelo
Project Manager, Regulatory Branch
Honolulu District
U.S. Army Corps of Engineers



10/25/2018

Ms. Vera Koskelo
Project Manager
Regulatory Office
U.S. Army Corps of Engineers, Honolulu District
Building 252
Fort Shafter, HI 96858-5440

**SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION
NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER
PLAN, ISLAND OF MAUI**

Dear Ms. Koskelo,

Thank you for your review and comments (submitted January 22, 2018 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest. At this time, DHHL does not anticipate that work related to the proposed action will result in impacts to waters of the United States which are regulated by your agency. The forthcoming Draft Environmental Impact Statement (DEIS) addresses impacts to water resources and any mitigations that are planned. If the proposed action is anticipated to impact waters of the United States, DHHL acknowledges a permit will be required from the Corps. Pursuant to the Clean Water Act, a Section 401 Water Quality Certification from the State Department of Health, Clean Water Branch will be obtained if it is determined that the proposed action may result in any discharge into navigable waters or as otherwise triggered.

2. The Corps will be notified when the DEIS is available for review and comments.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming DEIS.

- THOMAS WITTEN, AIA, LEED-AP BD+C
Chairman / Principal
- R. JEAN BUNGAN, AIA, LEED-AP BD+C
President / Principal
- KIMBLE N. LEONG, AIA, LEED-AP BD+C
Executive Vice President / Principal
- VINCENT MAGERLIN
Vice President / Principal
- GRANT L. HAWKSWELL, AIA, LEED-AP BD+C
Vice President / Principal
- TOM SCHWELL, AIA, LEED-AP BD+C
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- KIMU MIKAMI YUEN, LEED-AP BD+C
Principal
- W. FRANK BRANTZ, AIA, LEED-AP BD+C
Chairman Emeritus
- ANN MICKEL BOWEN, LEED-AP BD+C
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General Sustainability Partner
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Ms. Vera Koskelo
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE
PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/2018
Page 2 of 2

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian
Home Lands at (808) 620-9481.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
 P.O. BOX 119, HONOLULU, HAWAII 96810-0119

DEC 29 2017

(01)398.7

DAVID Y. CHOI
 Director

RODRIGUEZ K. BUCKNER
 Deputy Director
 Deputy Commissioner

Ms. Selena Pang, Planner
 PBR Hawaii & Associates, Inc.
 1001 Bishop Street, Suite 650
 Honolulu, HI 96813-3484

Dear Ms. Pang:

Subject: Environmental Impact Statement Preparation Notice for Pulehuni Regional Infrastructure Master Plan, Wailuku, Maui, Hawaii T.M.K. # (2) 3-8-008:008, 034, 035, and 036; (2) 3-8-008:001, 020, 038; (2) 3-8-008:037 por.

Thank you for the opportunity to comment on the subject project. The proposed project does not impact any of the Department of Accounting and General Services' existing facilities. We will continue to coordinate our activities with the Department of Public Safety and the Department of Hawaiian Homelands in developing the Maui Regional Public Safety Complex.

If you have any questions, your staff may please contact Ms. Dora Choy of the Planning Branch at 586-0488.

Sincerely,

Keith S. Kogachi
 Acting Public Works Administrator

DC:lm

cc: Mr. Wade Shimabukuro, DAGS-MDO
 Mr. Kaleo Manuel, DHHL-Acting Planning Program Manager



10/25/2018

Mr. Keith S. Kogachi
 Acting Public Works Administrator
 State of Hawaii
 Department of Accounting and General Services
 P.O. Box 119
 Honolulu, HI 96810-0119

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Kogachi,

Thank you for your review and comment letter dated December 29, 2017 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest and your Department's determination that the proposed project does not impact any of your Department's existing facilities.

2. We acknowledge that your Department will continue to coordinate with the Department of Public Safety (PSD) and DHHL in planning for regional infrastructure, including that capable of supporting PSD's Maui Regional Public Safety Complex.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Draft Environmental Impact Statement (DEIS).

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,

Selena Pang
 PBR HAWAII

cc: Department of Accounting and General Services
 Department of Land and Natural Resources
 Department of Public Safety

O:\Job\33\3311.01_DHHL_Pulehuni_MP_Dev\Consultation\2017-12_EISP\Responses\IH-2_Dpt of Accounting & General Services revised.docx

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 25, 2018

PBR Hawaii & Associates, Inc.
Attention: Ms. Selena Pang, Planner
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

via email: D:HHL:Pulehunu@pbrhawaii.com

Dear Ms. Pang:

SUBJECT: Environmental Impact Statement Preparation Notice (EISP) for Pulehunu Regional Infrastructure Master Plan located at Pulehunu; Island of Maui; TMK: (2) 3-8-008:008, 034, 035, 036; 001, 020, 038 and 037 (por.)

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 comments.

At this time, enclosed are comments from the Engineering Division on the subject matter. Should you have any questions, please feel free to call Darlene Nakamura at (808) 587-0417. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure
cc: Central Files
Department of Hawaiian Home Lands (w/copies)
Attn: Mr. Kaleo Manuel (Via email: kaleo.l.manuel@hawaii.gov)
Acting Planning Program Manager



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 28, 2017

MEMORANDUM

- DLNR Agencies:**
- Div. of Aquatic Resources
 - Div. of Boating & Ocean Recreation
 - Engineering Division**
 - Div. of Forestry & Wildlife
 - Div. of State Parks
 - Commission on Water Resource Management
 - Office of Conservation & Coastal Lands
 - Land Division - Maui District
 - Historic Preservation

TO: Russell Y. Tsuji, Land Administrator
FROM: [Handwritten: FROM]
SUBJECT: An Environmental Impact Statement Preparation Notice (EISP) for Pulehunu Regional Infrastructure Master Plan
LOCATION: Pulehunu; Island of Maui; TMK: (2) 3-8-008:008, 034, 035, 036; 001, 020, 038 and 037 (por.)
APPLICANT: Department of Hawaiian Home Lands

Transmitted for your review and comment is information on the above-referenced project. Please submit any comments by **January 18, 2018**.

The EISP can be found on-line at: <http://health.hawaii.gov/oeq/> (Click on the Current Environmental Notice in the middle of the page.)

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 Lydia Morikawa at 587-0410. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed:
Print Name: Cary S. Chang, Chief Engineer
Date: 1/16/18

cc: Central Files

17 DEC 29 PM 10:35 ENGINEERING
LAND DIVISION

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji

Ref: An Environmental Impact Statement Preparation Notice (EISP/N) for Pulehuni Regional Infrastructure Master Plan, Pulehuni, Island of Maui; TMK: (2) 3-8-008:008, 034, 035, 036; 001, 020, 038 and 037 (por).

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high risk areas). Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (<http://gis.hawaiiifip.org/FHAT>).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- o Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- o Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- o Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- o Kauai: County of Kauai, Department of Public Works (808) 241-4846.

The applicant should include water demands and infrastructure required to meet project needs. Please note that the projects within State lands requiring water service from their local Department/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 is required to provide water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update projections.

Signed:  CARY S. CHANG, CHIEF ENGINEER

Date: 1/12/12



10/25/2018

Mr. Russell Y. Tsuji
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, HI 96809

ATTN: Cary S. Chang, Chief Engineer

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Tsuji,

Thank you for your review and comments dated January 25, 2018 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

Thank you for your review of the EISP/N and continued participation in this regional infrastructure planning effort.

In response to comments received from the Engineering Division:

1. We acknowledge the information provided regarding the rules and regulations set forth by the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR). We also acknowledge the information regarding the Flood Hazard Zone designations as identified through the Flood Insurance Rate Map (FIRM) provided by the NFIP. According to the FIRM, most of the DHHL Project Areas are designated Zone X, which denotes "areas of minimal flood hazard" outside the 500-year (0.2 percent annual chance) floodplain. The forthcoming Draft Environmental Impact Statement (DEIS) will address potential drainage infrastructure deficiencies in the Infrastructure Regional Study Area, and any mitigation measures.
2. The DEIS will include a discussion of water demands and infrastructure alternatives under consideration to meet the needs of the proposed action. We acknowledge the necessary resource development and other potential charges, if water will be supplied by the Maui County Department of Water Supply.
3. The forthcoming DEIS will include a discussion of the State Water Projects Plan Update. Water demands and calculations will be provided to the DLNR Engineering Division for inclusion in the State Water Projects Plan Update.

THOMAS WITTEN, AIA
Chairman / Principal

R. KEA BUNGAN, AIA
President / Principal

KIMBLE S. CHONG, AIA, LEED AP BD+C
Executive Vice President / Principal

VINCENT MCKERLIN
Vice President / Principal

GRANT I. HAWKMAN, AIA, LEED AP BD+C
Vice President / Principal

TOM SCHWELL, AEP
Principal

KATHI MURAKAMI YUEN, LEED AP BD+C
Principal

W. FRANK BRANTZ, AIA
Chairman / President

ANN MICKEL BORGES, PhD
Project Director

BARBARA B. M. TOWN
General Sustainability Planner

RAYMOND L. HIDA, AIA
Senior Associate

CARLE ELLISON, AEP
Senior Associate

MARC SHIMAZU, AIA
Senior Associate

EMILY CHONG, LEED AP
Senior Associate

SCOTT MURAKAMI, AIA, LEED AP
Associate

MICHAEL MULLEN, AIA, LEED AP
Associate

NATHALIE BAZO
Associate

HONOLULU OFFICE
100 Bishop Street, Suite 620
Honolulu, Hawaii 96813-1884
Tel: (808) 531-5611
Fax: (808) 531-5612
Email: evan@pbrhawaii.com

www.pbrhawaii.com

Mr. Russell Y. Tsuji
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 2

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming DEIS.

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



DAVID Y. IGE
GOVERNOR

DIR. CHRISTINA M. KISHIMOTO
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

January 22, 2018

TO: Kaleo Manuel
Acting Planning Program Manager
Department of Hawaiian Home Lands

FROM: Kenneth G. Masden, II
Public Works Manager, Planning Section, Facilities Development Branch

SUBJECT: **Pulehunui Regional Infrastructure Master Plan Environmental Impact Statement Notice (EISPN) Pulehunui Wailuku, Maui, TMK: 3-8-000: 001, 008, 020, 034, 035, 036, 037, 038, and 038**

The Department of Education (DOE) has the following comments for the Pulehunui Regional Infrastructure Master Plan EISPN (Project). According to the EISPN, the proposed Project is to facilitate development of state-owned lands and provide technical studies to identify programmatic land uses for Department of Hawaiian Home Lands on approximately 1,631 acres of lands located at Pulehunui, Island of Maui, TMK: 3-8-000: 001, 008, 020, 034, 035, 036, 037, 038, and 038.

The Draft Environmental Impact State (DEIS) should discuss whether the Project will support future residential development. This will allow the DOE to determine potential impacts to existing schools and facilities.

The Project is located within the Central Maui School Impact Fee District, Wailuku Cost Area. In 2007, the Hawaii State Legislature enacted the school impact fee program allowing for the collection of impact fees from residential projects within School Impact Fee Districts designated by the Board of Education (BOE). The Central Maui School Impact Fee District and impact fee amount was established by the BOE in 2009. A single family unit is assessed a fee of \$5,373 and a multi-family unit is assessed a fee of \$2,371.

Thank you for the opportunity to comment. Should you have any questions, please contact Heidi Mecker of the Planning Section, Facilities Development Branch at 784-5094

KGM/jmb

c: Ms. Selena Pang, PBR Hawaii & Associates, Inc.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER



10/25/2018

Mr. Kenneth G. Masden, II
Public Works Manager
Planning Section, Facilities Development Branch
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, HI 96804

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Masden,

Thank you for your review and memorandum dated January 22, 2018 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest. As requested, the forthcoming Draft Environmental Impact Statement (DEIS) will discuss the extent to which DHHL's lands may include residential development. DHHL acknowledges that this will allow the State Department of Education (DOE) to determine potential impacts to existing schools and facilities, and we look forward to further coordination with DOE.
2. We appreciate the information provided on the DOE School Impact Fee District and program. The forthcoming DEIS will address potential impacts to school facilities and any mitigations that are planned. DHHL will comply with any applicable School Impact Fees.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming DEIS.

THOMAS WITTON, AIA
Chairman / Principal

R. KEAN BUNGAN, AIA
President / Principal

KIMBLE N. J. CHONG, AIA, LEED-AP BD+C
Executive Vice President / Principal

VINCENT MICKELSON
Vice President / Principal

GRANT L. HAWKSWELL, AIA, LEED-AP BD+C
Vice President / Principal

TOM SCHWELL, AIA
Principal

KATHI MURAKAMI YUEN, LEED-AP BD+C
Principal

W. FRANK BRANDT, AIA
Chairman Emeritus

ANN MCKEEL BOGALD, PhD
Project Director

BARBARA B. M. TOWN
General Sustainability Planner

RAYMOND L. DEGA, AIA
Senior Consultant

CARLE ELLISON, AIA
Senior Associate

MARC SHIMAZU, AIA
Senior Associate

EMERSON DONG, LEED-AP
Senior Associate

SCOTT MURAKAMI, AIA, LEED-AP
Associate

MICHAEL MULLER, AIA, LEED-AP
Associate

NATHALIE BAZO
Assistant

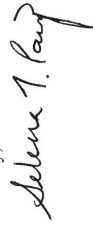
HONOLULU OFFICE
1001 Bishop Street, Suite 900
Honolulu, Hawaii 96813-1884
Tel: (808) 531-5611
Fax: (808) 531-5612
Email: evan@pbrhawaii.com

www.pbrhawaii.com

Mr. Kenneth G. Masden, II
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE
POLEHUUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 2

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian
Home Lands at (808) 620-9481.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

DAVID Y. IGE
GOVERNOR OF HAWAII



VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

REPLY BY DATE

EPO 17-329

January 18, 2018

Ms. Solena Pang
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813
Email: DHHL.Pulehunu@pbrhawaii.com

Dear Ms. Pang:

SUBJECT: Environmental Impact Statement Preparation Notice (EISP/N) for Pulehunu Regional Infrastructure Master Plan, Wailuku, Maui

TMK: (2) 3-8-008:001 (por.), 008, 020, 034, 035, 036, 037 (por.), 038

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your EISP/N to our office via the OEQC link:

http://oeqc2.doh.hawaii.gov/EA_EIS_Library/2017-12-23-MA-EISP/N-Pulehunu-Regional-Infrastructure-MasterPlan.pdf

We understand from the OEQC publication form project summary that *"The primary purpose is to undertake regional infrastructure master planning on behalf of the four agencies to facilitate the efficient development of these State-owned lands. This approach will facilitate development that is financially & environmentally efficient, maximizing the use of State funds while minimizing environmental impacts. Pursuant to DHHL's mission the secondary, supporting purpose is to further define the programmatic land uses anticipated on DHHL's lands in Pulehunu in conformance with DHHL's Maui Island Plan, to provide direct and indirect benefits to DHHL Beneficiaries and programs in the form of improved lands and opportunities to pursue revenue generating general leases."*

Hawaii's environmental review laws require Environmental Assessments (EAs) and Environmental Impact Statements (EISs) to consider health in the discussion and the mitigation measures to reduce negative impacts. In its definition of "impacts," §11-200-2, Hawaii Administrative Rules (HAR) includes health effects, whether primary (direct), secondary (indirect), or cumulative. Further, §11-200-12(b)(5), HAR, lists public health as one of the criteria for determining whether an action may have a significant impact on the environment.

We advocate that you consider health from a broad perspective: one that accounts for the social, economic, and environmental determinants of health and wellbeing. Community well-being can be impacted by access to physical activity, health care, feelings of social connectedness and safety. Design solutions that take these factors into consideration positively contribute to the social determinants of health in a community, improving the well-being of those who live there by influencing health promoting behaviors. Social determinants contribute to preventable chronic diseases such as asthma, diabetes, obesity, and cardiovascular disease.

An example of social influences include access to safe pedestrian corridors such as pathways, sidewalks, bike lanes, greenways and open space. §11-200-17(h), HAR, says EISs must discuss how proposed actions may conform or conflict with any policies for the affected area. This includes Hawaii's 2009 Complete Streets law, which requires the state and counties to establish policies to accommodate all users of the road, no matter age, ability, or mode of transportation. In 2015, Hawaii passed Act 97, which amended Hawaii's Renewable Portfolio Standards by setting a

Ms. Solena Pang
Page 2
January 18, 2018

goal for Hawaii to become one hundred percent renewable by the year 2045. To reach this goal Hawaii should transform its transportation sector from the use of fossil fuels to renewable fuel, electric vehicles (EVs), and public transit systems including bikeshare programs. To address "range anxiety" and facilitate the adoption of EVs, it is essential that EV charging stations be added to any planned parking areas open to the EV driving public. Plans should strive to encourage the use of personal bicycles through the development of designated bike lanes and class A bike trails. All efforts should be made to reduce harmful vehicle emissions, reduce vehicle miles travelled (VMT's), encourage alternative modes of transport and increase physical activity.

In the development and implementation of all projects, EPO strongly recommends regular review of State and Federal environmental health land use guidance. State standard comments to support sustainable healthy design are provided at: <http://health.hawaii.gov/epolanduse/>. Projects are required to adhere to all applicable standard comments. If you haven't already, EPO recommends that you view the free, on-demand, six part Plan4Health webinar series available on the American Planning Association website at: <https://www.planning.org/nationalcenters/healthplanners4health/>

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: <https://eha-cloud.doh.hawaii.gov/>. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

We suggest you review the requirements of the Clean Water Branch (Hawaii Administrative Rules (HAR), Chapter 11-54-1.1, -3, 4-8) and/or the National Pollutant Discharge Elimination System (NPDES) permit (HAR, Chapter 11-55) at: <http://health.hawaii.gov/cwb/>. If you have any questions, please contact the Clean Water Branch (CWB), Engineering Section at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov. If your project involves waters of the U.S., it is highly recommended that you contact the Army Corps of Engineers, Regulatory Branch at: (808) 835-4303.

Please note that all wastewater plans must conform to applicable provisions (HAR, Chapter 11-62, "Wastewater Systems"). We reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please review online guidance at: <http://health.hawaii.gov/wastewater> and contact the Planning and Design Section of the Wastewater Branch (WWB) at (808) 586-4294.

If temporary fugitive dust emissions could be emitted when the project site is prepared for construction and/or when construction activities occur, we recommend you review the requirements of the Clean Air Branch (CAB), Effective air pollution control measures need to be provided to prevent or minimize any fugitive dust emissions caused by construction work from affecting the surrounding areas. This includes the off-site roadways used to enter/exit the project. The control measures could include, but are not limited to, the use of water wagons, sprinkler systems, and dust fences. For questions contact the Clean Air Branch via e-mail at: Cab.General@doh.hawaii.gov or call (808) 586-4200.

Any waste generated by the project (that is not a hazardous waste as defined in state hazardous waste laws and regulations), needs to be disposed of at a solid waste management facility that complies with the applicable provisions (HAR, Chapter 11-58.1 "Solid Waste Management Control"). The open burning of any of these wastes, on or off site, is strictly prohibited. You may wish you review the Minimizing Construction & Demolition Waste Management Guide at: <http://health.hawaii.gov/shwb/files/2018/03/consolidem16.pdf>. Additional information is accessible at: <http://health.hawaii.gov/shwb/>. For specific questions call (808) 586-4226.



10/25/2018

Dr. Keith Kawaoka

Deputy Director for Environmental Health Administration
State of Hawai'i, Department of Health

P.O. Box 3378

Honolulu, Hawai'i 96801

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Dr. Kawaoka,

Thank the Department of Health for reviewing and commenting on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed action (EPO 17-329, dated January 18, 2018).

As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

We reviewed the Environmental Planning Office's (EPO) standard comments relating to Environmental Health programs. We understand that all standard comments specifically applicable to the proposed action must be adhered to. The organization of this letter follows the list of standard comments on the DOH website.

Clean Air Branch

We acknowledge that there is a potential for fugitive dust emissions during all phases of construction. The Draft Environmental Impact Statement (DEIS) will address construction-related impacts related to fugitive dust, and all construction activities will comply with the provisions of Section 11-60.1-33, Hawai'i Administrative Rules (HAR) related to Fugitive Dust.

Clean Water Branch

We reviewed and understand the standard comments provided by the Clean Water Branch (CWB).

- Potential Impacts to State Waters.** The DEIS will address the water class of State waters offshore of the proposed action and will state that any potential impacts to Class A waters caused by the construction and/or operation of the proposed action will meet the provisions of the: a) anti-degradation policy (Chapter 11-54-1.1, HAR); b) designated uses (Chapter 11-54-3, HAR); and c) water quality criteria (Chapter 11-54-4 through 11-54-8, HAR).

- National Pollutant Discharge Elimination System permit coverage.** The DEIS will note that construction exceeding one acre is required to comply

Dr. Keith Kawaoka
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 3

with National Pollutant Discharge Elimination System (NPDES) permitting requirements.

- Clean Water Act.** The DEIS will note that pursuant to the "Clean Water Act," a Section 401 Water Quality Certification from the State Department of Health, Clean Water Branch will be obtained if it is determined that the proposed action may result in any discharge into navigable waters or as otherwise triggered.

- State Water Quality Standards (Chapter 11-54 and 11-55, HAR).** The DEIS will note that all discharges related to the construction and operation of the proposed action will comply with the State's Water Quality requirements contained in Chapters 11-54 and 11-55, HAR.

Hazard Evaluation and Emergency Response Office

The DEIS addresses man-made hazards and mitigation measures that are planned. The DEIS will note that the Hazard Evaluation and Emergency Response Office provides leadership, support, and partnership in preventing, planning for, responding to, and enforcing environmental laws relating to releases or threats of releases of hazardous substances. The DEIS will also note that if potentially hazardous substances, pollutants, or contaminants are identified, the HEER Office will be contacted to determine the appropriate actions to comply with the relevant environmental laws, including Chapters 11-260 to 11-280, HAR, relating to hazardous waste.

Indoor and Radiological Health (IRH) Branch

The DEIS will note compliance with all applicable provisions of Chapter 11-46, HAR regarding Community Noise Control. If noise created during the construction phase of the proposed action is expected to exceed the maximum allowable levels, then a noise permit will be obtained before the commencement of work.

Safe Drinking Water Branch

The DEIS will note anticipated permits and approvals administered by the Safe Drinking Water Branch. The DEIS will discuss whether a public water system will be developed as part of the proposed action. The proposed action may involve injection wells for the subsurface disposal of brine resulting from reverse osmosis treatment of brackish water. The DEIS will discuss water system alternatives and mitigations that are planned.

Solid and Hazardous Waste Branch

The DEIS will provide a discussion on solid waste management including construction waste, green waste, and operational waste after buildout.

The DEIS will state that if potential construction sites are found to be contaminated, then all removal and remedial actions to clean up hazardous substance or oil releases by past and present owners/tenants must comply with State Law (Hawaii Revised Statutes, Chapter 128D, "Environmental Response Law", Chapter 451, "State Contingency Plan").

Dr. Keith Kawaoka
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PŪLEHUINI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 3 of 3

Wastewater Branch

The DEIS will discuss wastewater alternative that are being considered. No cesspools are being proposed. All wastewater plans will conform to applicable provisions of Chapter 11-62, HAR, "Wastewater Systems". We acknowledge that DOH reserves the right to review the detailed wastewater plans for conformance to applicable rules.

Disability and Communication Access Board (DCAB)

DHHL acknowledges the requirements of the Americans with Disabilities Act of 1990, as amended (ADA). The DEIS will include a conceptual development plan for Pūlehuini North and a conceptual land use plan for Pūlehuini South. ADA requirements will be taken into consideration as plans for the DHHL Project Areas progress.

In addition to the State standard comments addressed above, we reviewed the Hawai'i Environmental Health Portal and its links to various sources of state environmental data. Additionally, we have reviewed the materials available on EJSGREEN, as well as the Healthy Communities Policy Guide and the Plan4Health website.

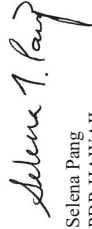
Additionally, the DEIS will state that since the biological survey found signs indicating the presence of rodents on the property, proper eradication will occur in compliance with HAR Chapter 11-26 prior to site clearing.

We concur with your Department's advice to consider health from a broad perspective ("...one that accounts for the social, economic, and environmental determinants of health and wellbeing"). The DEIS will address both the Hawaii's 2009 Complete Street law, and Act 97, which amended Hawaii's Renewable Portfolio Standards.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming Draft Environmental Impact Statement (DEIS).

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,


Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5087

February 6, 2018

IN REPLY REFER TO:
DIR 1611
STP 8.2302

JADE T. BUTAY
INTERIM DIRECTOR
Deputy Director
for Planning
RODNEY H. HIGASHI
EDWIN H. SHIFFRIN
DARRIEL T. YOUNG

Ms. Selena Pang
February 6, 2018
Page 2

DIR 1611
STP 8.2302

Highways Division

A Transportation Impact Analysis Report is typically required; however, a Transportation Master Plan (TMP) is requested since this is a Master Plan. The TMP should identify proposed land uses along with the supporting transportation infrastructure required for the subject master plan to be submitted for review by the Hawaii Department of Transportation, to include the following:

1. The TMP should include intersections:
 - a. Mokulele Highway/Puunene Avenue/Kuhelani Highway
 - b. Mokulele Highway/North Kihei Road
 - c. Any other intersections proposed to access the State Highway System
2. Discuss consistency with the Pulehunui Regional Infrastructure Master Plan.
3. Identify all modes of transportation.
4. Include a phasing plan and the transportation improvements of each phase.
5. The County's Mauka Collector Road should be considered.
6. The project stakeholders shall contribute their regional fair share allocations due to the cumulative traffic volume generated by the stakeholders development.

If there are any questions, please contact Mr. Norren Kato of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Sincerely,

JADE T. BUTAY
Interim Director of Transportation

Ms. Selena Pang
PBR HAWAII & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

Dear Ms. Pang:

Subject: Pulehunui Regional Infrastructure Master Plan
Environmental Impact Statement Preparation Notice
Honolulu, Oahu, Hawaii
TMK: (2) 3-8-008:001, 008, 020, 034 to 038

The Department of Hawaiian Home Lands (DHHL) is preparing a regional infrastructure master plan to serve certain State-owned lands located in Pulehunui, Maui. The primary purpose is to undertake regional infrastructure master planning on behalf of the four agency stakeholders to facilitate the efficient development of certain State-owned lands that will be managed by those agencies. The proposed action will involve a coordinated regional infrastructure alternatives analysis for water, wastewater, and key roadways. The Pulehunui Regional Infrastructure Master Plan will include technical studies for DHHL, Department of Land and Natural Resources, Department of Accounting and General Services and Department of Public Safety.

Our Department of Transportation (DOT) comments on the subject project are as follows:

Airports Division

The subject project site is approximately four miles from the end of Runway 2 at the Kahului International Airport. The site also underlies the precision instrument approach area established for the runway. The master plan development is within five miles from the airport and is therefore subject to the Technical Advisory Memorandum by the State of Hawaii, Office of Planning, which protects Hawaii State airports from developments that may conflict with airports' operations. You can find out more details through this link: <http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports-08-01-2016.pdf>.



10/25/2018

Mr. Jade Butay
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, HI 96813-0597

THOMAS WITTEN, ASLA
Chairman / Principal

R. KEVIN BUNGAN, ASLA
Principal / Principal

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Project Director

BARBARA B. M. TOWN
General Sustainability Planner

RAYMOND E. DUDA, ASLA
Senior Designer

LAURE ELLISON, AEP
Senior Associate

MARC BRIMMAYR, ASLA
Senior Associate

DANIEL DONG, LEED® AP
Senior Associate

ROFF MURKAMI, AIA, LEED® AP
Associate

MICHAEL MULLER, ASLA, LEED® AP
Associate

NATHALIE BAZO
Associate

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Mr. Jade Butay
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 2

impacted by the known developments within the master plan development area. The TIAR addresses impacts to the intersections mentioned in your letter, and discusses consistency with the anticipated developments served by the Pūlehuui Regional Infrastructure Master Plan. The DEIS discusses alternative modes of transportation and phasing will be addressed as plans progress for the MRPSC and DHHL properties. The County's Mauka Collector Road will be addressed in the TIAR and the State will contribute regional fair share allocations as requested.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming DEIS

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

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SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Butay,

Thank you for your review and comments dated February 6, 2018 (your reference code DIR 1611 STP 8.2302) regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

Airports Division

We acknowledge the information you provided regarding the proximity of the proposed action and the master plan development to the operational areas of Kahului International Airport. We have also reviewed the Technical Advisory Memorandum by the State of Hawaii Office of Planning. While aircrafts may transit over the Pūlehuui North site, they are not anticipated to restrict any proposed land uses on that site nor interfere with the existing airport operations. Additional discussion of the relationship of the master plan development to airport operations will be included in the forthcoming Draft Environmental Impact Statement (DEIS).

Highways Division

We acknowledge your request to provide a Transportation Management Plan (TMP). DHHL looks forward to coordinating with DOT and other regional stakeholders on a TMP as plans for the various State projects progress. Information that is available based on the anticipated land uses is presented in the forthcoming DEIS including a Traffic Impact Analysis Report (TIAR) which analyzes traffic impacts related to the proposed action and other anticipated regional developments.

The TIAR is included in the DEIS along with a summary of traffic impacts and recommended mitigations. The TIAR provides recommendations for roadway improvements to mitigate impacts of the anticipated land uses. The TIAR also discusses the intersections, roads, and modes of transportation anticipated to be



DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
HOUSING DIVISION
COUNTY OF MAUI

MILAN M. ARAKAWA
Mayor
CAROL K. REIMANN
Director
IAN SUHSHIDO
Deputy Director

35 LUNALILLO STREET, SUITE 102 • WAILUKU, HAWAII 96793 • PHONE (808) 270-2331 • FAX (808) 271-6284

December 28, 2017

Mr. Kaleo Manuel
Acting Planning Program Manager
State of Hawaii
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Manuel:

SUBJECT: Environmental Impact Statement Preparation Notice (EISP/N) for the Pulehunui Regional Infrastructure Master Plan, Maui, Hawaii
TMKs: (2) 3-8-008:001, 008, 020, 034, 035, 036, 037 and 038

The Department has reviewed the Environmental Impact Statement Preparation Notice (EISP/N) for the above subject project. Based on our review, we have determined that the subject project is not subject to Chapter 2.96, Maui County Code. The Department has no additional comments to offer.

Please call me at (808) 270-7355 if you have any questions.

Sincerely,

CLYDE "BUDDY" ALMEIDA
Housing Administrator

cc: Director of Housing and Human Concerns
PBR HAWAII & Associates, Inc.

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10/25/2018

Mr. Clyde Almeida
Housing Administrator
County of Maui
Department of Housing and Human Concerns
Housing Division
35 Lunaililo Street, Suite 102
Wailuku, HI 96793

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Almeida,

Thank you for your review and comment letter dated December 28, 2017 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest and your Department's determination that the proposed action is not subject to Chapter 2.96, Maui County Code, Residential Workforce Housing Policy.

2. We acknowledge that your Department has no additional comments to offer at this time.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming Draft Environmental Impact Statement (DEIS).

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

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County of Maui Department of Transportation

Thank you for the opportunity to comment on this project. We have no comments to make regarding this project at this time.

Please feel free to contact me if you have any questions.



10/25/2018

Mr. Don Medeiros
Department of Transportation
County of Maui
200 South High Street
Wailuku, HI 96793

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Medeiros,

Thank you for your review and comments dated January 4, 2018 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

We acknowledge that your department has no comments to offer on the proposed action at this time.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming Draft Environmental Impact Statement (DEIS).

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

O:\Jobs\33331\01_DHHL_Pulehunui_MP_Dev\Consultation\2017-12_EISP\NResponses\COM-1 DOT Response revised.docx

THOMAS WITFEN, AIA, LEED-AP
Principal / Principal

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Principal / Principal

KIMBLE N. LEONG, AIA, LEED-AP, BPC
Executive Vice President / Principal

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EMILY DONG, LEED-AP
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ALAN M. ARAKAWA
Mayor



DEPARTMENT OF PARKS & RECREATION
700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawaii 96793

KAYALA BUENCONSEJO
Director

BRIANNE L. SAVAGE
Deputy Director

(808) 270-7230
FAX (808) 270-7934

January 18, 2018

Ms. Selena Pang, Planner
PBR Hawaii & Associates, Inc.
1001 Bishop St., Suite 65
Honolulu, HI 96813

Dear Ms. Pang:

SUBJECT: PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

Thank you for the opportunity to comment on the Environmental Impact Statement Preparation Notice for the Pulehunui Regional Infrastructure Master Plan.

The Department of Parks and Recreation (DPR) is finalizing a master plan for the Pulehunui Motorsports Park which is located in the middle of the study area for the Infrastructure Master Plan. The motorsports park accommodates a variety of facilities and groups that hold events throughout the year with some attracting large numbers of people. The master plan projects a continuation of these uses along with the potential addition of another facility.

Despite the long-term use of the site, both historically and into the future, the motorsports park lacks an adequate infrastructure system. The site has no infrastructure for potable water, wastewater, electricity, storm water management, communication, or other basic services.

Because this project is intended as a Regional Infrastructure Plan, the DPR recommends that the needs of the motorsports park's users and facilities are considered as part of the project study area. Although the county does not currently have a funding source to develop the park's infrastructure; it would, nonetheless, be prudent and reasonable to integrate it into the calculation of infrastructure needs.

This approach would also be consistent with the Countywide Policy Plan, which includes the following:

Objective 5: Improve the planning and management of infrastructure systems.

Ms. Selena Pang
January 18, 2018
Page 2

Policy c: Improve coordination among infrastructure providers and planning agencies to minimize construction impacts.

Policy d: Maintain inventories of infrastructure capacity and project future infrastructure needs.

Should you have any question or need of additional information, please feel free to contact me, or Robert Halvorson, Chief of Planning & Development at robert.halvorson@mauicounty.gov or 808-270-7931.

Sincerely,

KAYALA BUENCONSEJO
Director

KB:RH:do

c: State Of Hawaii, Department of Hawaii Homelands



10/25/2018

Mr. Ka'ala Buenconsejo
Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoia Street, Unit 2
Wailuku, HI 96793

Attn: Mr. Robert Halvorson

**SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION
NOTICE FOR THE PULEHUINI REGIONAL INFRASTRUCTURE MASTER
PLAN, ISLAND OF MAUI**

Dear Mr. Buenconsejo,

Thank you for your review and comment letter dated January 18, 2018 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest and the information you provided on the proposed Pulehuini Motorsports Park master plan and the status of its infrastructure system.
2. We acknowledge your Department's recommendation that the needs of proposed Pulehuini Motorsports Park be considered as part of the study area in the Draft Environmental Impact Statement (DEIS). Given its proximity to the Infrastructure Regional Study Area and anticipated continued use as a motorsports park, DHHL's engineering and traffic studies for the Proposed Action will take into account the water, wastewater, and traffic demand generated by the Pulehuini Motorsports Park.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Draft Environmental Impact Statement (DEIS).

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,

Selena T. Pang
Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

O:\063331101 DHHL Pulehuini MP Dev\Consultation\2017-12 EISP\Responses\COM-3 Dept of Parks and Recreation revised.docx

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RANDY B. M. TWIN
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Mayor
DAVID C. GOODE
Director
ROWENA M. DAGDAG-ANDAYA
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7855



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

January 2, 2017

Mr. Kaleo Manuel, Acting Planning Program Manager
State of Hawaii
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawaii 96805

Ms. Selena Pang, Planner
PBR Hawaii & Associates, Inc
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Manuel and Ms. Pang:

SUBJECT: PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

Thank you for the opportunity to review the Environmental Impact Statement Preparation Notice (EISP/N) for the above-referenced project. We offer no comments at this time, however, we wish to provide comments during the review of the Draft Environmental Impact Statement.

Should you have any questions, please contact Deputy Director Rowena M. Dagdag-Andaya at (808) 270-7845.

Sincerely,

DAVID C. GOODE
Director of Public Works

DCG:jso
cc: Development Services Administration
s:trowena@kaleo.manuel & selena.pang_pulehunui regional infrastructure master plan

GLEN A. LUENO, P.E., P.L.S.
Development Services Administration
CARY YAMASHITA, P.E.
Engineering Division
JOHN R. SMITH, P.E.
Highways Division



10/25/2018

Mr. David C. Goode
Director of Public Works
County of Maui
Department of Public Works
200 High Street, Room No. 434
Wailuku, HI 96793

THOMAS WITTEN, ASLA
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- > #7) WHAT ARE THE BENEFITS TO THE PEOPLE OF MAUI?
- >
- > #8) ENGAGE THE AHA MOKU SYSTEM AS A CONSULTATION ORGANIZATION.
- >
- > MAHALO FOR LISTENING.
- >
- > BKO
- > AHA MOKU O MAUI
- > MUKU KULA MAKAI
- >

Pulehunui EISPN (DRAFT EIS) MOKU KULA MAKAI

 Basil Oshiro <soshiro17@hawaii.rr.com> Reply all | v
 Sat 1/20/2018 1:44 PM
 To: DHHLPulehunui; Kaleo.Lmanuel@hawaii.gov

Inbox

At Rappahock's AND THE WAPAHANOK AT MAUI CONCERN:

LIST OF OUR CONCERNS OF THE PROJECT AREA:

- #1) WATER: USE PER DAY?: IF MAUI HAS ENOUGH WATER TO MOVE THIS PROJECT FORWARD? WHERE THE WATER COMING FROM, (CENTRAL MAUI?), ABOUT 30 TO 35 YEARS AGO THE COUNTY OF MAUI COUNTY WATER WORKS ENGINEER AND FORMAN; WHEN ASKED ABOUT WATER IN THE FUTURE. MOKUHAU WELL RUNNING LOW AND SHOWING SIGNS OF SALT CONTAMINATION. "SO WHAT IS THE SOLUTION?" "STEAL FROM IAO STREAM" "AND WHEN IAO CANNOT HANDLE THE DRAIN?" "STEAL FROM WAIHEE" AS WE ALL CAN SEE, EXACTLY WHAT IS HAPPENING.
- I FEEL THIS WHY, WE HAVE, TWO LADIES CONTRACTED TO LOOK FOR WATER ON THIS ISLAND. AHA MOKU HAD A FEW MEETING ON THIS WATER ISSUE, WHICH I DON'T HEAR ANYTHING ABOUT AT THIS TIME.
- #2) THESE LANDS, ARE WETLANDS, MORE SO TO THE SOUTH, THE REASON FOR BUILDING MOKULELE HIGHWAY, (VETERANS HIGHWAY), EIGHT FEET HIGHER THAN THE ORIGINAL MOKULELE HIGHWAY.
- #3) THESE LANDS, WAS / WERE A NAVAL BASE YARD. THERE ARE STILL CONCRETE SITES / BUILDINGS STANDING AS SEEN FOR THE MOKULELE HIGHWAY. IN THE DRAG STRIP AREA, THERE ARE SITES FOR PROTECTING THE NAVAL AIRPLANES: THERE ARE SITES THAT NEEDS TO BE STUDIED FOR THERE, AS SEEN, ARE NOT PLOWED UNDER BY THE SUGAR PLANTATION, PAVED ASPHALT ROAD; WITH THIS BEING SAID, THERE ARE RUMORS THAT THERE IS / WAS A TUNNEL CONNECTING THE BASE YARD TO THE COMMUNICATION BUILDING TO THE MENTIONED AREA (CAN BE SEEN ON THE MAKAI SIDE OF THE HIGHWAY). THIS TUNNEL RUMOR SHOULD BE IN THE EIS TO MAKE SURE THERE ARE NO DANGER OF UNEXPLODED ORDNANCE IN THE AREA. ON THIS NOTE: THE MILITARY IS / WAS KNOWN TO BURY UNWANTED / UNUSED EQUIPMENT AND ORDNANCE. I WAS PART OF THESE TYPES OF PROJECT: ELIMINATING UNWANTED ORDNANCE / EQUIPMENT ETC, WHEN ON TOUR IN VIETNAM. (THE NEED TO KNOW?: IF THERE IS A TUNNEL; THERE WILL BE EQUIPMENT AND ORDNANCE IN IT; WHAT IS BURIED IN THE BASE YARD AREA NEEDS TO BE ADDRESSED.
- #4) POLLUTION; THE MILITARY WAS NOT THE BEST WHEN IT CAME TO POLLUTION IN THE YESTERYEARS. (STATSIDE AND OVERSEAS) IT WAS NOT A BIG THING AS IT IS TODAY. TIMES HAS CHANGED, AND IT HAS BECOME A REALLY ENGAGED EFFORT TO CONTAIN POLLUTANTS.
- #5) MAKAI OF MOKULELE HIGHWAY, (WEST) WHERE THE COMMUNICATIONS TOWER IS; I CAN REMEMBER WERE MILITARY BARRACKS: MY FATHER AND CHURCH MEMBERS USED THE REDWOOD SIDING TO BUILD HIS CHURCH. (RIN ZALZEN MISSION) ALL THIS HAPPENED IN THE LATE 1940s AND EARLY TO MID 1950s.
- #6) THE AREA AND HIGHWAY USED TO FLOOD WITH HEAVY RAINS. THE DRAG STRIP STILL FLOODS WITH THESE HEAVY RAINS. (I REMEMBER USING THE OLD PUNENE AIRPORT, AS KNOWN AT YESTER YEARS, CATCHING PROP AIR PLANES). THE MAIN BUILDING WAS LOCATED WHERE THE ARMERY IS AT. WE USED THE OLD BYPASS ROAD / ALTERNATE ROUTE, AS CALLED BEFORE MOKULELE HIGHWAY WAS REBUILT.

Environmental Impact Statement Preparation Notice (EISP/N)

Proposing Agency:
State of Hawaii
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805
Contact: Kaleo Manuel, Acting Planning Program Manager
Phone: (808) 620-9481

Environmental Planning Consultant:
PBR HAWAII & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813
Contact: Selena Pang
Phone: (808) 521-5631
Fax: (808) 523-1402

On behalf of the Department of Hawaiian Home Lands (DHHL), Department of Land and Natural Resources (DLNR), Department of Accounting and General Services (DAGS), and Department of Public Safety (PSD), DHHL is preparing a regional infrastructure master plan to serve certain State-owned lands located in Pulehuni, Maui. The proposed action will involve a coordinated regional infrastructure alternatives analysis for water, wastewater, and key roadways. The Pulehuni Regional Infrastructure Master Plan will include technical studies for DHHL's lands and will incorporate by reference information regarding proposed developments by DLNR and DAGS/PSD. The public may review and comment on the EIS Preparation Notice (EISP/N) online (<http://pulehuni.infrastructure.commentinput.com>) or may review a hard copy at any public library on Maui.

COMMENT

Name: Basil Oshiro
Mailing Address: P.O. Box 543
Kahului, HI 96733
Organization: Aha Moku o Maui
Kaha Moku

Comments: This is a former military Naval Base. We II cannot find any sites being it get plowed under by the plantation.
This area was used for barracks for the military.
Unapplied ordinance - paved
Water use/waste & solid & liquid
Flooding in the area - need to check possible ordinance if have a tunnel
Toxins in area. WWII sites/bunkers etc.

Please return to PBR HAWAII postmarked by December 22, 2018

Note: You must include your name and a mailing address if you wish to receive a written response to your comment. Please also note that your entire comment, including your personal identifying information (address, etc.), may become publicly available.

E-mail: soshiro17@kahului, hawaii, or, com



10/25/2018

Mr. Basil Oshiro
Aha Moku o Maui
P.O. Box 543
Kahului, HI 96733

THOMAS WITTEN, ASIA
Chairman / Principal
K. KEAN BUNGAN, ASIA
President / Principal
KIMBLE S. LEONG, ASIA, LEED® AP BD+C
Executive Vice President / Principal
VINCENT MICKERIN
Vice President / Principal
GRANT HAWAKAMU, ASIA, LEED® AP BD+C
Vice President / Principal
TOM SCHWELL, AEP
Principal

KATHI MIKAMI YUEN, LEED® AP BD+C
Principal
W. FRANK BRANTZ, ASIA
Chairman Emeritus
ANN MIKELD BORGSTROM, PhD
Project Director

BARBARA E. M. TOWN
General Sustainability Partner
RAYMOND J. DEGA, ASIA
Senior Associate
LARRY ELLISON, AEP
Senior Associate
MARC SHIMAZU, ASIA
Senior Associate
DAN CHING DONG, LEED® AP
Senior Associate

SCOTT MURAKAMI, ASIA, LEED® AP
Associate
MICHAEL MULLER, ASIA, LEED® AP
Associate
NATHANIEL BAO
Associate

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SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Oshiro,

Thank you for your review and comments dated January 18 and January 20, 2018 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. We acknowledge your comments regarding water supply, source, and quality. The Draft Environmental Impact Statement (DEIS) will include a discussion of water demands and infrastructure alternatives under consideration to meet the needs of the proposed action.
2. We acknowledge your comments regarding wetlands. The DEIS will discuss any anticipated impacts to wetlands and surface water, and any mitigation measures.
3. We acknowledge your comments on the former military uses of the site (Naval Air Station Pu'u'uēnē) and former use by the plantation.

EnviroServices & Training Center, LLC (ETC) conducted two Phase I Environmental Site Assessments (ESAs) which together cover the full area of the DHHL Project Areas. The Phase I ESAs will be summarized and included in the DEIS, including a map and discussion of potential health and safety issues.

Former land uses will be taken into consideration as plans for the DHHL Project Areas progress. DHHL's environmental consultant is aware of possible unexploded ordnance concerns and the Department of Health will be consulted prior to any ground disturbance in the vicinity of known former ordnance-related uses. As plans for the DHHL Project Areas progress, a Phase II ESA may be appropriate depending on site plans, building footprints, and other details.

We appreciate your comment about the tunnel in the area with possible ordnance. If it is located on DHHL lands or in an area that will accommodate

Mr. Basil Oshiro

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 3

regional infrastructure, it will be investigated prior to construction.

4. We acknowledge your comments regarding pollution from former uses. Please see Response #3 above.
5. Thank you for sharing your mana'o regarding the military barracks, and the redwood siding used to build Rinza'i Zen Mission. The DEIS will address the archaeological and cultural resources in the DHHHL Project Areas and any mitigations that are planned.
6. We acknowledge your comments regarding drainage and flooding concerns. The DEIS will address potential drainage infrastructure deficiencies in the Infrastructure Regional Study Area, and any mitigation measures.

We would also like to thank you for the comment card you provided at the public EIS scoping meeting held January 18, 2018. We provide the following responses to your comment card, some of which overlap with your subsequent comment letter.

1. Thank you for your comments on the former military uses of the site (Naval Air Station Pu'uhonē) and former use by the plantation. Please see Response #3 above.
2. Since the proposed action involves a regional infrastructure master plan, the forthcoming DEIS will address water use and waste.
3. We acknowledge your comments regarding drainage and flooding concerns. Please see Response #6 above.
4. We appreciate your comment about the tunnel in the area with possible ordnance. Please see Response #3 above.
5. We acknowledge your comments on the possible presence of "toxins in the area". Please see Response #3 above.
6. We will provide you with notification of the DEIS publication for your review and comment during the public review period.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming DEIS.

Mr. Basil Oshiro

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 3 of 3

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian Home Lands at (808) 620-9481.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

Environmental Impact Statement Preparation Notice (EISPN)

Proposing Agency:
State of Hawai'i
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawai'i 96805
Contact: Kaleo Manuel, Acting Planning Program Manager
Phone: (808) 620-9481

Environmental Planning Consultant:
PBR HAWAII & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813
Contact: Selena Pang
Phone: (808) 521-5631
Fax: (808) 523-1402

On behalf of the Department of Hawaiian Home Lands (DHHL), Department of Land and Natural Resources (DLNR), Department of Accounting and General Services (DAGS), and Department of Public Safety (PSD), DHHL is preparing a regional infrastructure master plan to serve certain State-owned lands located in Pulehuni, Maui. The proposed action will involve a coordinated regional infrastructure alternatives analysis for water, wastewater, and key roadways. The Pulehuni Regional Infrastructure Master Plan will include technical studies for DHHL's lands and will incorporate by reference information regarding proposed developments by DLNR and DAGS/PSD. The public may review and comment on the EIS Preparation Notice (EISPN) online (<http://pulehuni.infrastructure.commentinput.com>) or may review a hard copy at any public library on Maui.

COMMENT

Name: Blossom Feiteira
Mailing Address: P.O. Box 2603 Waiuku, HI 96793
Organization: Blossom Feiteira & Associates, Inc.
Organization: Department of Hawaiian Home Lands

Comments: This includes a detailed study on water source(s) and the potential impact on water source(s)
• UXO study will be necessary to ensure safety. Previous uses of the property includes a former naval air station.
• Soil analysis & remediation activities due to heavy use by military.
• Examine all past uses of the properties.

****Please return to PBR HAWAII postmarked by December 22, 2018****

Note: You must include your name and a mailing address if you wish to receive a written response to your comment. Please also note that your entire comment, including your personal identifying information (address, etc.), may become publicly available.



10/25/2018

Ms. Blossom Feiteira
Mokupuni Council of Hawaiian Homesteads of Maui/
Association of Hawaiians for Homestead Lands
P.O. Box 2963
Waiuku, HI 96793

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Ms. Feiteira,

Thank you for the comment card you provided at the public EIS scoping meeting held January 18, 2018 regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest in our project. As requested, the Draft Environmental Impact Statement (DEIS) will discuss potential sources of potable and non-potable water for various infrastructure alternatives, potential impacts, and mitigations that are planned.
2. We acknowledge your comments regarding unexploded ordnance (UXO). EnviroServices & Training Center, LLC (ETC) conducted two Phase I Environmental Site Assessments (ESAs) which together cover the full area of the DHHL Project Areas. The Phase I ESAs will be summarized and included in the DEIS, including a map and discussion of potential health and safety issues.
3. We acknowledge that further analysis and remediation may be needed to address prior military uses. Former land uses will be taken into consideration as plans for the DHHL Project Areas progress. DHHL's environmental consultant is aware of possible unexploded ordnance concerns and the Department of Health will be consulted prior to any ground disturbance in the vicinity of known former ordnance-related uses. As plans for the DHHL Project Areas progress, a Phase II ESA may be appropriate depending on site plans, building footprints, and other details.
4. We concur that all past uses of the project area should be examined prior to development. The DEIS will address historical uses of the property, potential impacts, and mitigation measures.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming DEIS.

- THOMAS WITTEN, ASLA
Principal / Principal
- R. KEAN BUNGAN, ASLA
Principal / Principal
- KIMBERLY CHONG, ASLA, LEED® AP BD+C
Executive Vice President / Principal
- VINCENT MICKELIN
Vice President / Principal
- GRANTI HAWAKAMU, ASLA, LEED® AP BD+C
Vice President / Principal
- TOM SCHWELL, ACP
Principal
- KATHI MIKAMI YUEN, LEED® AP BD+C
Principal
- W. FRANK BRANTZ, ASLA
Chairman Emeritus
- ANN MICKEL BOWLING, PhD
Project Director
- RANDY B. M. TOWN
General Sustainability Partner
- RAYMOND I. HIDA, ASLA
Senior Associate
- CARLE ELLISON, ACP
Senior Associate
- MARC SHIMAZU, ASLA
Senior Associate
- EMERSON DONG, LEED® AP
Senior Associate
- SCOTT MURAKAMI, ASLA, LEED® AP
Associate
- MICHAEL MULLER, ASLA, LEED® AP
Associate
- NATHALIE BAZO
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-1884
Tel: (808) 521-5631
Fax: (808) 523-1402
Email: evan@pbrhawaii.com

Ms. Blossom Feiteira
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 2

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian
Home Lands at (808) 620-9481.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

Clifton M. Hasegawa

President and CEO

Clifton M. Hasegawa & Associates, LLC

1322 Lower Main Street A5

Wailuku, Hawaii 96793

Mobile: (808) 419-5481

Email: clifhasegawa@gmail.com

LinkedIn: <https://www.linkedin.com/in/cliftonhasegawa>

VIA EMAIL

[<governor.ige@hawaii.gov>](mailto:governor.ige@hawaii.gov), [<cindy.mcmillan@hawaii.gov>](mailto:cindy.mcmillan@hawaii.gov)

[<kaleo.l.manuel@hawaii.gov>](mailto:kaleo.l.manuel@hawaii.gov), [<DHHL@pulehunui.com>](mailto:DHHL@pulehunui.com)

December 31, 2017

The Honorable David Y. Ige

Governor, The State of Hawaii

Hawaii State Capitol

Honolulu, Hawaii 96813

Mr. Kaleo Manuel

Department of Hawaiian Home Lands

State of Hawaii

P.O. Box 1879

Honolulu, Hawaii 96805

Ms. Selena Pang

PBR HAWAII & Associates, Inc.

1001 Bishop Street, Suite 650

Honolulu, Hawaii 96813

Re: Comments. Pulehunui Regional Infrastructure Master Plan--(EISPN).
December 23, 2017, accessed December 31, 2017

Dear Governor Ige, Mr. Manuel, and Ms. Pang,

The development Pulehunui comprised of ceded lands managed by the Department of Hawaiian Homelands, including land currently designated agricultural to be re-zoned Urban M-1 and Light Industrial, is not supported by current market, economic conditions, available inventories and vacancy rates for retail, office, commercial, and industrial properties. Please refer to Background Material.

The opportunity was explored in 2012. The passage of time has diminished the likelihood of an acceptable Rate of Return (ROI). Moreover, development by DHHL at this time will contribute to the market glut in vacant retail, office, commercial, and industrial properties on Maui.

Job opportunities in the planning, design and construction phases will grow however this growth is only short term and will evaporate once construction is completed.

“The County of Maui as a whole had a 2.0% unemployment rate (non seasonally adjusted) for October 2017, down from the 2.6% rate in September 2017, and down from the 3.2% rate at the same time last year.” Source: MauiNow. November 16, 2017, accessed December 31, 2017 <<http://mauiNOW.com/2017/11/16/2-2-hawaii-unemployment-rate-lowest-on-record/>>

DHHL has explored opportunities in energy projects on Maui. These projects are in various stages of completion.

We recommend DHHL re-evaluate and consider keeping managed lands as agricultural and/or mixed-use incorporating affordable housing with rents that are truly affordable and within the economic and financial reach of working people and people on fixed-incomes. Rent for affordable housing under current guidelines are out-of-range of the majority of working individuals and families and for people on fixed incomes. Specifically, Maui County - U.S. Census, July 1, 2017, accessed December 31, 2017 <<https://www.census.gov/quickfacts/fact/table/mauicountyhawaii/PST045216#viewtop>>

Population estimates, July 1, 2016, (V2016)
165,386

Persons 65 years and over, percent, July 1, 2016, (V2016)
16.6%

DLNR INDUSTRIAL AND BUSINESS PARK AT PULEHUNUI, MAUI

Posted on Dec 11, 2017, accessed December 31, 2017
<<https://dlnr.hawaii.gov/ld/proposed-dlnr-industrial-and-business-park-at-pulehunui-maui/>>

Project Overview

The State of Hawaii, Department of Land and Natural Resources (DLNR) is proposing a light industrial and commercial business park at Pulehunui, Maui. The proposed 280 acre DLNR Industrial and Business and Park, situated on land under the jurisdiction of the DLNR, Land Division, is located in the Pulehunui area of central Maui, directly north of the Hawaii Air National Guard Armory and Maui Raceway Park on Mokulele Highway, on a portion of the parcel identified as Tax Map Key (2) 3-8-008:001. The project site is located within the Urban Growth Boundary of the Maui Island Plan, indicating that the lands are suitable and envisioned for development.

The proposed project will include small, medium and large lots utilized for light industrial, commercial, non-profit and public/quasi-public uses, along with necessary infrastructure.

Environmental Review and Entitlements

The project will be subject to extensive regulatory oversight and approvals. As this is a proposed use of State lands, an Environmental Impact Statement (EIS) is required pursuant to Chapter 343, Hawaii Revised Statutes. An EIS Preparation Notice for the project was published on March 8, 2017 and the Draft EIS is currently under preparation. Various technical studies will be prepared as part of the EIS process.

Upon completion of the EIS, the project will require a State Land Use District Boundary Amendment from the State Land Use Commission and a Community Plan Amendment and Change of Zoning from the Maui County Council. Specifically, the following land use designations will be requested:

| | | |
|-----------------------------|---------------------|-----------------|
| <u>Land Use Designation</u> | <u>Current</u> | <u>Proposed</u> |
| State Land Use District | Agricultural | Urban |

In civilian labor force, total, percent of population age 16 years+, 2012-2016
67.8%

In civilian labor force, female, percent of population age 16 years+, 2012-2016
65.1%

Native Hawaiian and Other Pacific Islander alone, percent, July 1, 2016
11.0%

Median selected monthly owner costs with a mortgage, 2012-2016
\$2,279 per month \$27,348 per year

Median gross rent, 2012-2016
\$1,308 per month \$15,696 per year

Median household income (in 2016 dollars), 2012-2016
\$68,777

Per capita income in past 12 months (in 2016 dollars), 2012-2016
\$30,599

Persons in poverty, percent
9.5%

Thank you very much for the opportunity to comment.

Respectfully,



Clifton M. Hasegawa

Background Material

Kihei-Makena Community Plan Project District 10
and Agriculture Light Industrial

Zoning Agricultural M-1, Light
Industrial

Pūlehuui Regional Infrastructure Master Plan--(EISPN) 2017

http://oecq2.doh.hawaii.gov/The_Environmental_Notice/2017.12.23:TEEN.pdf
http://oecq2.doh.hawaii.gov/EAL_EIS_Library/2017.12.23:MA_EISPN_Pulehuui_Regional_Infrastructure_Masterplan.pdf

DATE: August 31, 2012

**SUBJECT: Pūlehuui Master Plan (Revisions to Maui Island Plan,
Puunene Industrial Planned Growth Area) (GP-2(2))**

**TO: Honorable Gladys C. Baisa, Chair
General Plan Committee
Maui County Council**

**On behalf of the State of Hawaii (Department of Hawaiian Home Lands,
Department of Land and Natural Resources, Department of Public Safety, and
Department of Accounting and General Services) we are submitting the Pūlehuui
Master Plan for your Committee's review.**

Gwen Ohashi Hiraga
Senior Vice President
Muneloyo & Hiraga, Inc

cc: Jobie Masagatani, State Department of Hawaiian Home Lands (w/attachment)
William Aila, Jr., State Department of Land and Natural Resources (w/attachment)
Ted Sakai, State Department of Public Safety (w/attachment)
Dean Seki, State Department of Accounting and General Services (w/attachment)
Jesse Souki, State Office of Planning (w/attachment)
William Spence, County of Maui Department of Planning (w/attachment)

**MAUI'S RETAIL, OFFICE SPACE VACANCY RATES CLIMB IN 2016
BUT MORE PROJECTS IN THE WORKS FOR CENTRAL, SOUTH MAUI**

By Brian Perry, City Editor. The Maui News
April 6, 2017, accessed December 31, 2017
<http://www.maui.news.com/news/local/news/2017/04/mauis-retail-office-space-vacancy-rates-climb-in-2016/>

Alexander & Baldwin is moving ahead with its 94,000-square-foot Ho'o-kele Shopping Center near Target — a development with a Safeway store anchor expected to put more pressure on an already soft market.

The Colliers report shows that Central Maui had an inventory of 1,429,243 square feet of retail and 206,314 square feet of available office space in 2016, leaving it with a **vacancy rate of 14.44 percent, a record high. And there was 90,052 square feet less occupied retail space in Central Maui in 2016 than the year before.**

Alexander & Baldwin is moving ahead with its 94,000-square-foot Ho'o-kele Shopping Center near Target — a development with a Safeway store anchor expected to put more pressure on an already soft market.

The Colliers report shows that Central Maui had an inventory of 1,429,243 square feet of retail and 206,314 square feet of available office space in 2016, leaving it with a vacancy rate of 14.44 percent, a record high. And there was 90,052 square feet less occupied retail space in Central Maui in 2016 than the year before.

Overall, Maui has an inventory of 5,905,858 square feet of industrial space of which 83,241 was available, leaving a vacancy rate of 1.41 percent.

Commercial real estate investment activity came to nearly \$475 million in 2016, although that was a 34.6 percent nosedive from \$726 million in 2015, Colliers reported. Prime resort and retail properties together made up \$380 million in sales, or more than 80 percent of the dollar value for the year.

Offshore money amounted to \$397.7 million, or 82.5 percent, of total investment in commercial real estate, the report says. The average transaction amount for offshore buyers was \$55.93 million, or nearly 20 times larger than the average transaction size for local buyers, \$2.97 million.

Additional References

COMMERCIAL PROPERTIES OF MAUI

Available Listings (33) [12/31/2017]

<http://www.maui.biz.com/vi/availablelistings.php?offset=0#listings>

REALTORS Association of Maui

Available Listings (88) [12/31/2017]

<http://www.rmaui.com/Results.php?MLS=&WhatPropType=551>

<http://www.rmaui.com/Results.php?MLS=&WhatPropType=551>
%5D=Commercial&WhatStartPrice=&WhatEndPrice=&WhatDistrict=5&5D=Kahului&WhatLoss&WhatDistrict=5B

<http://www.rmaui.com/Results.php?MLS=&WhatPropType=551>
%5D=Waituku&WhatStartBed=&WhatEndBed=&WhatStartBath=&WhatEndBath=&WhatStartArea=&WhatEndArea=&WhatStartExArea=&WhatEndExArea=&WhatSortType=1=ListPrice&WhatSortDirection=ASC&WhatSortType=2=&WhatSortDirection=ASC&Task=Search&WhatPage=1>

HOME LANDS DEPARTMENT

PREPARING MASTER PLAN FOR PROJECT IN PULEHUNUI

The Maui News, December 31, 2017

<http://www.maui.news.com/news/local/news/2017/12/home-lands-department-preparing-master-plan-for-project-in-pulehunui/>

The project would generate revenue through leases and support retail, agribusiness processing, packaging and/or marketing of agricultural goods produced at Pulehunui South and throughout Central Maui, according to plans published by the DHHL [Emphasis Supplied]

“Maui’s retail horizon appears hazy as two large blocks of space will likely become available in the near term future in Central Maui. The pending closure of Kmart and the relocation of Lowe’s Home Improvement Center from the Maui Marketplace will add nearly 150,000 square feet of additional available space and boost Central Maui’s retail vacancy to 15.5 percent by year-end 2017. Maui’s vacancy rate could exceed 16 percent should these spaces remain vacant through 2017.”

Source: Maui News, April 16, 2016, Cited above.

Notes, Supplied:

1. Kmart in Kahului officially closed its doors on Sunday, June 18, 2017.
2. Lowe’s Home Improvement Center opened at Maui Business Park August 20, 2017.



10/25/2018

Mr. Clifton M. Hasegawa
President and CEO
Clifton M. Hasegawa & Associates, LLC
1322 Lower Main Street A5
Wailuku, HI 96793

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI

Dear Mr. Hasegawa,

Thank you for your review and comments dated December 31, 2017 regarding the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your comments and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your interest in our project and for the various information provided in your letter.

2. We acknowledge your assertion that industrial and retail uses in the proposed project would not be supported by "...current market, economic conditions, available inventories and vacancy rates..."

The forthcoming Draft Environmental Impact Statement (DEIS) addresses socio-economic impacts including population, regional growth, and economic impacts. The DEIS also includes an Economic and Fiscal Impact Assessment conducted by PBR HAWAII.

3. We acknowledge your recommendation that "...DHHL re-evaluate and consider keeping managed lands as agricultural and/or mixed-use incorporating affordable housing..."

The DEIS presents a proposed development plan for Pulehunui North and a conceptual plan for land uses at Pulehunui South. The DEIS considers several alternatives to the proposed uses.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming DEIS.

THOMAS WITTEN, FASLA
Principal / Principal

R. KEVIN BUNGAN, ASLA
Principal / Principal

KIMBERLY S. JORDAN, ASLA, LEED® AP BD+C
Executive Vice President / Principal

VINCENT WINGERTINI
Vice President / Principal

GRANT L. HAWKINS, ASLA, LEED® AP BD+C
Vice President / Principal

TOM SCHWELL, ACP
Principal

KATHI MIKAMI YUEN, LEED® AP BD+C
Principal

W. FRANK BRANTZ, FASLA
Chairman Emeritus

ANN MIKELI BOASLOG, PhD
Project Director

BARBARA B. M. TOWN
General Sustainability Planner

RAYMOND L. BIDA, ASLA
Senior Consultant

LAURE ELLISON, ACP
Senior Associate

MARC BRIMMATEL, ASLA
Senior Associate

EMILY DONG, LEED® AP
Senior Associate

ROBERT MURAKAMI, ASLA, LEED® AP
Associate

MICHAEL MULLER, ASLA, LEED® AP
Associate

NATHANIEL BAZO
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 600
Honolulu, Hawaii 96813, USA
Tel: (808) 531-5011
Fax: (808) 531-5012
Email: evan@pbrhawaii.com

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Mr. Clifton M. Hasegawa
SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
THE PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI
10/25/18
Page 2 of 2

If you have any questions, please contact Mr. Kaleo Manuel of the Department of Hawaiian
Home Lands at (808) 620-9481.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

📧 Reply all | 🗑️ Delete | 🗑️ Junk | ⋮

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI



DHHL Pulehunui

Today, 11:41 AM

Colleen Curran <ccurran27@sbcglobal.net>; Basil Oshiro <soshiro17@hawaii.rr.com>

📧 Reply all | ⌵

Sent Items

ORG-1 Aha Moku o Ma...
501 KB

📄 Show all 1 attachments (501 KB) Download

Aloha Ms. Curran,

Attached is a copy of the response that was mailed to Aha Moku o Maui on October 25, 2018 at the address provided in Mr. Basil Oshiro's comment letter. Since you provided a comment in support of the letter, you are receiving a courtesy copy of DHHL's response.

Thank you for your participation,

Selena Pang
Planner

PBR HAWAII

Land Planning | Landscape Architecture
Environmental Planning | Land Use Entitlements
1001 Bishop Street Suite 650
Honolulu, HI 96813
Phone: 808-521-5631
www.pbrhawaii.com

📧 Reply all | 🗑️ Delete | 🗑️ Junk | ⋮

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, ISLAND OF MAUI



DHHL Pulehunui

Today, 11:40 AM

Lucienne de Naie <laluz@maui.net>; + 3 more

📧 Reply all | ⌵

Sent Items

ORG-1 Aha Moku o Ma...
501 KB

📄 Show all 1 attachments (501 KB) Download

Aloha Ms. de Naie,

Attached is a copy of the response that was mailed to Aha Moku o Maui on October 25, 2018 at the address provided in Mr. Basil Oshiro's comment letter. Since you provided a comment in support of the letter, you are receiving a courtesy copy of DHHL's response.

Thank you for your participation,

Selena Pang
Planner

PBR HAWAII

Land Planning | Landscape Architecture
Environmental Planning | Land Use Entitlements
1001 Bishop Street Suite 650
Honolulu, HI 96813
Phone: 808-521-5631
www.pbrhawaii.com

APPENDIX B-2*

DRAFT ENVIRONMENTAL IMPACT STATEMENT
(DRAFT EIS) CONSULTATION

*All attachments to response letters are included at the end of Appendix B-2.

ALAN M. ARAKAWA
Mayor
STEWART STANT
Director
MICHAEL M. MIYAMOTO
Deputy Director



COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2050 MAIN STREET, SUITE 2B
WAILUKU, MAUI, HAWAII 96793

December 24, 2018

PBR HAWAII & Associates, Inc.
ATTN: Selena Pang, Planner
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

**SUBJECT: PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
DRAFT ENVIRONMENTAL IMPACT STATEMENT
PULEHUNUI, WAILUKU, MAUI**

We reviewed the subject application and have the following comments:

1. Solid Waste Division comments:
 - a. None.
2. Wastewater Reclamation Division (WWRD) comments:
 - a. None.

If you have any questions regarding this letter, please contact me at 270-8230.

Sincerely,

MICHAEL M. MIYAMOTO
Deputy Director of Environmental Management

cc: Department of Hawaiian Home Lands

MICHAEL P. RATTE
Solid Waste Division
ERIC NAKAGAWA, P.E.
Wastewater Reclamation Division
TAMARA FARNSWORTH
Environmental Protection &
Sustainability Division



PBR HAWAII
& ASSOCIATES, INC.

June 14, 2019

Mr. Eric Nakagawa, Director
County of Maui
Department of Environmental Management
2050 Main Street, Suite 2B
Wailuku, HI 96793

THOMAS WITEN, ASLA
Chairman / Principal

R. JEN BIRNBAUM, ASLA
President / Principal

BRUNO L. CHUNG, ASLA, LEED AP BD+C
Executive Vice President / Principal

VINCENT MURKIN
Senior Vice President / Principal

GRANT MURKIN, ASLA, LEED AP BD+C
Vice-President / Principal

TOM SCHWELL, AEP
Principal

KIM SUKAM IYEN, LEED AP BD+C
Principal

W. FRANK BRANTZ, ASLA
Chairman Emeritus

ANN MIKRO BOSKOG, PhD
Project Director

ROSELYN M. M. THOM
Chairman, Sustainability Planner

RAYMOND T. BICA, ASLA
Senior Associate

CARIE CHILDS, AEP
Senior Associate

MARC SHIMMERS, ASLA
Senior Associate

DACHUNG DONG, LEED AP
Senior Associate

MICHAEL MCELLEN, ASLA, LEED AP
Associate

NATHALIE BAZO
Associate

DEWEZ BING, ASLA, LEED AP, SITES AP
Associate

BRIAN WOLF, ASLA, LEED AP
Associate

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Fax: (808) 521-5032
E-mail: ys@pbrhawaii.com

www.pbrhawaii.com

ALAN M. ARAKAWA
Mayor



DEPARTMENT OF TRANSPORTATION

COUNTY OF MAUI
2145 Kaohu Street, Suite 102
Wailuku, Hawaii, USA 96793

December 4, 2018

Department of Hawaiian Home Lands
State of Hawaii
ATTN: Kaleo Manuel, Acting Planning Program Manager
State of Hawaii, Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, HI 96805

PBR HAWAII & Associates, Inc.
ATTN: Selena Pang, Planner
1001 Bishop St., Suite 650
Honolulu, HI 96813

Subject: Draft EIS for Pulehunu Regional Infrastructure Master Plan

Dear Mr. Manuel & Ms. Pang,

Thank you for the opportunity to comment on this project. We have no comments to make regarding this project at this time.

Please feel free to contact me if you have any questions.

Sincerely,

Don Medeiros
Director

DON MEDEIROS
Director
JOHN L. BUCK III
Deputy Director
(808) 270-7511



PBR HAWAII
& ASSOCIATES, INC.

June 14, 2019

Mr. Marc Takamori, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, HI 96793

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR
THE PULEHUNUI INFRASTRUCTURE REGIONAL
MASTER PLAN, ISLAND OF MAUI**

Dear Mr. Takamori,

Thank you for your department's review and letter dated December 4, 2018 regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL) and on behalf of the Proposing Agency DHHL and regional State agency stakeholders, we acknowledge that you have no comments to offer on the Proposed Action at this time.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

- THOMAS WITEN, ASLA
Chairman / Principal
- R. KEA PINCAK, ASLA
President / Principal
- ROSELYN L. CHUNG, ASLA, LEED® AP BD+C
Executive Vice President / Principal
- VINCENT MURKUMI
Senior Vice President / Principal
- GRANT LAURASAMI, AIA, LEED® AP BD+C
Vice-President / Principal
- TOM SCHWELL, AEP
Principal
- KIMI SUKAMI YEN, LEED® AP BD+C
Principal
- W. FRANK BRANTZ, ASLA
Chairman Emeritus
- ANN MIKRO BOSS, LOC, PhD
Project Director
- RAMONA P. M. THOM
Chairman, Sustainability / Planner
- RAYMOND T. HIGA, ASLA
Senior Associate
- CARIE CHELSON, AEP
Senior Associate
- MARC SHIMMERS, ASLA
Junior Associate
- DACHUNG DONG, LEED® AP
Senior Associate
- MICHAEL MCELLEN, ASLA, LEED® AP
Associate
- NATHALIE RAZO
Associate
- DRAGITZBERG, ASLA, LEED® GA, SITES® AP
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Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

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COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

December 14, 2018

Ms. Selena Pang, Planner
PBR HAWAII & ASSOCIATES, INC.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

Mr. Kaleo Manuel, Acting Planning Program Manager
STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. Box 1879
Honolulu, Hawaii 96805

Dear Ms. Pang and Mr. Manuel:

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR PULEHUNUI REGIONAL INFRASTRUCTURE
MASTER PLAN
TMK: (2) 3-8-008:POR. 001, 008, 020, 034, 035, 036, 037, 038**

We reviewed the subject application and have no comments at this time.

If you have any questions regarding this memorandum, please call Rowena
Dagdag-Andaya at 270-7845.

Sincerely,

DAVID C. GOODE
Director of Public Works

DCG:RMDA:da
xc: Engineering Division
38008001.009.020.034-038_pulehunu_reg_infrastr_master_plan_deis.rtf

GLENA UENO, PE, PLS.
Development Services Administration

CARY YAMASHITA, PE
Engineering Division

JOHN R. SMITH, PE
Highways Division



PBR HAWAII
& ASSOCIATES, INC.

June 14, 2019

Ms. Rowena Dagdag-Andaya, Director
County of Maui
Department of Public Works
200 South High Street
Wailuku, HI 96793

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Chairman / Principal

R. JEAN PINCAN ASLA
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TOM SCHWELL, AEP
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**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

Dear Ms. Dagdag-Andaya,

Thank you for your department's review and letter dated December 14, 2018 (your reference code: DCG:RMDA:da) regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL) and on behalf of the Proposing Agency DHHL and regional State agency stakeholders, we acknowledge that you have no comments to offer on the Proposed Action at this time.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

ALANI W. ARAKAWA
Mayor
MICHELE CHOUTEAU MCLEAN
Director



COUNTY OF MAUI
DEPARTMENT OF PLANNING

December 18, 2018

Mr. Kaleo Manuel
Planning Program Manager
Department of Hawaiian Homes Lands
64-786 Māmālahoā Highway
Waimea, Hawaii 96743

Ms. Selena Pang
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

Dear Mr Manuel and Ms. Pang:

SUBJECT: COMMENTS ON DRAFT ENVIRONMENTAL IMPACT ASSESSMENT (EIS) FOR PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN, KIHĒI, ISLAND OF MAUI, HAWAII; TMK: (2) 3-8-008:001 (POR.), 008, 020, 034, 035, 036, 037, (POR.), 038 (EAC 2018/0013)

The Department of Planning (Department) is in receipt of the above-referenced Draft EIS for the Pulehunui Regional Infrastructure Master Plan. For preparation of the Final EIS, the Department provides the following comments:

1. A Draft EIS for the Department of Land & Natural Resources (DLNR) Industrial and Business Park was received by our office in May, 2018 and as you note, they too are proposing commercial and industrial uses on their lands. There is no market study included with the Draft EIS. For the Final EIS, please include a market study that includes demand and occupancy numbers for commercial and industrial space. We note that in Kahului alone, there are numerous empty commercial spaces. We would like to see numbers to gauge the need.
2. The location is not ideal. Pulehunui is miles away from most population and business centers. Business owners would have to determine whether it makes sense to locate their operation out there when there are many commercial and industrial space vacancies in Central Maui alone. In addition, given the climate conditions of the area, there will be an impact on what types of businesses are located within the area. Some businesses may not want to operate there.

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Mr. Kaleo Manuel and Ms. Selena Pang
December 18, 2018
Page 2

3. The Maui Island Plan discusses "Smart Growth" principles, locating jobs near population centers and existing infrastructure. The proposed commercial and industrial uses are in conflict with "Smart Growth" principles.
4. For the Final EIS, please include a statement that it is anticipated that the Maui County Code (MCC), Title 19 will likely undergo revision in the next few years. The Department does not favor stacking uses and M-1 Light Industrial zoning consists of many different types of uses. When Title 19 is revised, the permitted uses within the M-1 Light Industrial zoning may also be amended so that it is just light industrial.
5. We note that the project area is designated 'Prime,' according to the Agricultural Lands of Importance to the State of Hawaii. We note that your proposed development includes agriculture, diversified agriculture and agricultural homesteads, and that there is a need for locally grown products, as well as great community support. Instead of the proposed industrial and commercial uses, would the Applicant consider a project consisting solely of agricultural uses?
6. We note that you mention that as your project area progresses, you will explore multimodal transportation networks. We ask that you please develop it with consideration of the *Central Maui Pedestrian and Bicycle Master Plan for 2030*.
7. The proposed Industrial and Business Park is to be about the proposed Maui Regional Public Safety Complex, which is the site of the new prison, and is shown in some of your figures. For the Final EIS, please include a disclaimer that the County of Maui objects to the correctional facility location. Please also note that it is 'proposed,' as its development status is unknown.
8. We note there was a 'no comment' letter from the Maui Department of Transportation. Please continue to coordinate with them on the possible creation of a bus stop(s) near the project site to serve area employees, as well as potential lessees, their customers and homesteaders.
9. We note that ATA is also the traffic engineer for the DLNR project. This project's Traffic Impact Assessment Report includes discussion of two (2) new traffic signals to be located at: 1) Maui Veteran's Highway/DHHL access/DLNR area. 2) Maui Veteran's Highway/Mehameha Loop and 3) Maui Veteran's Highway/Mehameha Loop/Maui Raceway Park. This would make for many stops within this area, along a State Highway. Has this been discussed with the State Department of Transportation? We highly encourage the traffic engineer and the Applicant to consider other options, perhaps with less stop-and-go. We note that on page 46, it says

that roundabouts and two-way stops were not considered because it would create lengthy delays and capacity issues; however, we believe that it should be studied and considered as an alternative to new traffic signals.

10. We did not see that the Maui Metropolitan Planning Organization (MPO) was consulted with regarding the long-term transportation plan for the region and we highly encourage that you consult with them prior to publication of the Final EIS.
11. In the Biological Resources Survey, it said that Blackburn sphinx moths eggs or larvae were found in the area and that the tobacco plants should be examined during the wet season to determine their presence or absence. We encourage you to have the area re-examined during the rainy season. Also, the study noted that native seabird may fly over the area. Because the birds are attracted to bright lights and become disoriented by them, we encourage the shielding of outdoor lighting throughout the project area.
12. We note that on page 218, it says that Special Flood Hazard Development Permits may be required, if applicable. We would like to inform you that you will be required to apply for a Flood Development Permit for any parcel that is not located within Flood Zone X or XS.
13. On page 112 and throughout the document, there are error messages, saying that the reference source is not found. For the Final EIS, please ensure that this is fixed.

Thank you for the opportunity to comment. Please include the Department on the distribution list for the new Final EIS. Should you require further clarification, please contact Staff Planner Tara Furukawa by email at tara.furukawa@maulicounty.gov or by phone at (808) 270-7520.

Sincerely,

MICHELE MCLEAN
Planning Director

- cc: Clayton I. Yoshida, AICP, Planning Program Administrator (PDF)
John S. Rapacz, Planning Program Administrator (PDF)
Pam Eaton, Planning Program Administrator (PDF)
Kathleen Aoki, Planning Program Administrator (PDF)
Tara K. Furukawa, Staff Planner (PDF)
Project File

MCM:TKF:ma
K:\WP_DOCS\PLANNING\EAC\2018\0013_Pulehunu\RegionalInfrastructure\FOR AXID\#EISComments.doc



June 14, 2019

Ms. Michele McLean, Director
County of Maui
Department of Planning
200 South High Street
Wailuku, HI 96793

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

Dear Ms. McLean,

Thank you for your review and letter dated December 18, 2018 regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. We acknowledge your comment. To support the primary and secondary purposes of the Proposed Action, the anticipated demand for water, wastewater, drainage, and traffic infrastructure is consistent with projections provided by DHHL, DLNR and DAGS/PSD. For its part, DHHL's anticipated land uses are consistent with long-term sustainability of DHHL's programs and the interests of DHHL beneficiaries.

The primary purpose of the Proposed Action described in the EIS is to undertake regional infrastructure master planning on behalf of DHHL, Department of Land and Natural Resources (DLNR), and Department of Accounting and General Services on behalf of Department of Public Safety (DAGS/PSD), to facilitate the efficient development of certain lands managed by those agencies in Pūlehuunui, Central Maui. DHHL is coordinating this effort to consider regional alternatives for water, wastewater, drainage, and key roadways, and to comprehensively plan for the long-term potential infrastructure requirements of these State agency stakeholders. The intent is to ensure that the long-term State developments in the region are financially and environmentally efficient, maximizing the use of State funds while minimizing environmental impacts to the extent practicable.

Pursuant to DHHL's mission, the secondary, supporting purpose of this action is to further define the programmatic land uses anticipated on DHHL's two lands in Pūlehuunui ("Pūlehuunui North" and "Pūlehuunui South") through the Beneficiary Consultation process and technical studies, to ensure conformance with the Maui Island Plan (Department of Hawaiian Home Lands, 2004), and to provide direct and indirect benefits to DHHL beneficiaries and programs in the form of improved lands, homesteading opportunities, and opportunities to pursue revenue generating general leases at Pūlehuunui North.

Ms. Michele McLean
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
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We acknowledge your request for a market study. DHHL determined that the findings of a market study would be of limited value in the instance of the Proposed Action, since Pūlehuunui North is intended for general lease and development assumptions such as the possible hotel and visitor attraction are ultimately at the discretion of (as yet unidentified) future developers. Furthermore, DHHL anticipates a DHHL beneficiary priority policy for certain uses on DHHL lands. Therefore, substantial portions of DHHL's lands currently designated for Commercial/Light Industrial use may not be subject to or have a predictable relationship with market conditions.

DHHL anticipates up to 250 acres of commercial and light industrial uses (up to 135 at Pūlehuunui North and 115 at Pūlehuunui South), with full buildout by 2038. Of this total, approximately 40 acres at Pūlehuunui North are assumed to be developed as a cultural center/visitor attraction. Commercial and light industrial uses at Pūlehuunui South may be partly or wholly dedicated to use by DHHL beneficiaries.

Although DHHL's commercial and light industrial lands may not have a predictable relationship with market conditions, these anticipated uses are consistent with the findings of DLNR's December 2017 market study¹. That study found that Maui's urban growth may be shifting towards Central Maui and Kihei. The study also found a shortage of light industrial/commercial lands, and a probable continuing shortage given recent and planned developments. The DLNR study came to these conclusions even accounting for commercial and light industrial development both on DHHL lands and at DLNR's Industrial and Business Park.

2. We acknowledge your comment regarding the appropriateness of Pūlehuunui for the anticipated uses. The potential uses of DHHL's lands consider site conditions such as weather patterns and the property's location on a major highway that connects to both resident and visitor populations. The location is therefore easily accessible to many visitors and residents, and yet is outside of the higher priced resort areas. Moreover, making relatively large tracts of commercial use lands available in this location could support the development of facilities that generate broad-based economic activity and employment. Example facilities are the possible cultural center/visitor attraction and hotel.

We reiterate that Pūlehuunui North is designated for commercial/light industrial uses under the DHHL Maui Island Plan. The property is intended for general lease. Development assumptions made for the possible hotel and visitor attraction will ultimately be determined by future developer(s). However, DHHL believes that the anticipated uses are realistic in the long-term and therefore long-term environmental impacts should account for these uses. With respect to industrial-type uses, it was also noted that the "stacked" zoning that applies to

¹ DLNR's market study is presented as Appendix A of the DLNR Industrial and Business Park Final EIS. The Pūlehuunui Regional Infrastructure Master Plan EIS incorporates by reference project information provided by DLNR and DAGS/PSD, for their respective proposed developments.

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Ms. Michele McLean

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

6/14/19

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industrial areas in Kahului and Wailuku have encouraged higher order retail- and professional-related uses. Therefore in those areas, more traditional industrial, warehouse, and baseyard uses tend to get priced out, and are reported to be seeking alternative locations.

At Pūlehuui South, development assumptions are the result of outreach to the DHHL beneficiary community. Recent feedback from beneficiaries indicated overwhelming support for subsistence agricultural, diversified agriculture, and other community uses. Beneficiaries expressed a strong preference for agricultural homesteads, agricultural support, and community uses such as cultural education and a central community gathering space. The EIS for the Pūlehuui Regional Infrastructure Master Plan details the process by which DHHL consulted its beneficiary community and determined beneficiary demand for the anticipated uses.

3. We acknowledge your comment regarding DHHL's proposed commercial and industrial uses, in relation to Smart Growth principles. To address your comment, Section 6.3.2 of the EIS (County's Maui Island Plan) will be revised as shown on the attachment labeled County's Maui Island Plan.

4. We acknowledge your comment regarding future revisions to the Maui County Code. To address your comment, Section 5.10.2 of the EIS (Kīhei-Mākena Community Plan) will be revised as shown on the attachment labeled Kīhei-Mākena Community Plan.

5. We acknowledge your comment regarding agricultural uses, and your question as to whether DHHL would consider accommodating solely agricultural uses of the DHHL Project Areas.

To address your comment, Sections 4.3.3 (Agricultural Lands of Importance to the State of Hawai'i) and 5.9 (Impact to Existing Agricultural Use) will be revised to include this language:

The Hawaiian Homes Commission Act (§§204 and 206), which has been incorporated into Article XII of the Hawai'i State Constitution, vests DHHL with exclusive authority to control its lands, and the anticipated land uses are generally consistent with the Department's existing Maui Island Plan. The anticipated amendment to the Department's Maui Island Plan is being sought to refine the plan for agriculture and supporting uses at Pūlehuui South, based on outreach to DHHL beneficiaries which is detailed in Section 9.2. As noted in Section 1.1.2 and pursuant to DHHL's mission, the secondary supporting purpose of the Proposed Action is to further define the programmatic land uses anticipated on DHHL's two lands in Pūlehuui ("Pūlehuui North" and "Pūlehuui South") through the Beneficiary Consultation process and technical studies, to ensure conformance with the Maui Island Plan (Department of Hawaiian Home Lands, 2004), and to provide direct and indirect benefits to DHHL beneficiaries and programs in the form of improved lands, homesteading opportunities, and opportunities to pursue revenue generating general leases at Pūlehuui North. Changing the proposed land use in Pūlehuui North to solely agricultural uses would generate substantially

Ms. Michele McLean

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

6/14/19

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lower revenue, negatively impacting DHHL's ability to fulfill the Department's mission in the long term. Moreover, excluding agricultural supporting uses would go against the outcome of DHHL's public engagement and consultation as outlined in Section 9.0. Generally, the anticipated land uses at the DHHL Project Areas are the product of extensive outreach to the DHHL beneficiary community, in line with our Department's mission.

6. We acknowledge your comment regarding the Central Maui Pedestrian and Bicycle Master Plan. To address your comment, Section 5.11.5 of the EIS (Public Transportation) will be revised to state:

The Central Maui Pedestrian and Bicycle Master Plan for 2030 was reviewed and it did not appear to extend to the Infrastructure Regional Study Area (State of Hawai'i DOH - Healthy Hawai'i Initiative, 2012). However, Pūlehuui North's internal roadways will be designed and built to meet County standards and should be able to accommodate the County's public bus transit service. It is hoped that when there is sufficient demand that either the #10 ("Kīhei Islander") or #15 ("Kīhei Villager") bus routes can be extended into the property, as a means of reducing private vehicular trips on area roads and highways (promoting transportation energy savings), and to provide better transportation and mobility options for those who can and cannot drive.

7. We acknowledge your comment, however the details of the anticipated Maui Regional Public Safety Complex (MRPSC), including its location, are outside the purview of DHHL and are not part of the Proposed Action under this EIS. The EIS incorporates by reference project information provided by DLNR and DAGS/PSD, for their respective proposed developments. As the Draft EIS noted (and the Final EIS will note), this includes the Maui Regional Public Safety Complex Environmental Impact Statement Preparation Notice.

The assumed location of the MRPSC shown in the Pūlehuui Regional Infrastructure Master Plan is consistent with the site identified in the MRPSC EISPN. As the Draft EIS states: "The Maui Regional Public Safety Complex (MRPSC) is proposed to be located on 40-45 acres mauka of the Army HI/ARNG Pu'unēne Armory facility (Wilson Okamoto Corporation, 2010). It is noted that while the DLNR had contemplated an alternative site for the proposed MRPSC within the 280-acre DLNR Industrial and Business Park in the past, the Department of Accounting and General Services (DAGS) and the Department of Public Safety (PSD) have not expressed interest in the alternative site. DAGS and PSD are the lead agencies with respect to the proposed MRPSC; DHHL will continue to coordinate with all State agencies proposing developments within the Pūlehuui region."

We note that the alternative location contemplated for the MRPSC is also located within the Infrastructure Regional Study Area; the site selection for the MRPSC within the Infrastructure Regional Study Area does not affect the overall environmental impacts of this Proposed Action, the purpose of which is stated clearly in the EIS in Section 1.1.

Ms. Michele McLean

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

6/14/19

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To address your comment, EIS Section 3.3.2 Surrounding Proposed Land Uses will be revised to state:

The details of the anticipated MRPSC (including its location) are outside the purview of DHHL and are not part of the Proposed Action under this EIS. This EIS incorporates by reference project information provided by DLNR and DAGS/PSD, for their respective proposed developments.

The assumed location of the MRPSC shown in this EIS is consistent with the site identified in the MRPSC EISP. DAGS and PSD are the lead agencies with respect to the proposed MRPSC; DHHL will continue to coordinate with all State agencies proposing developments within the Pūlehunui region.

8. We acknowledge your comment and will continue to coordinate with DOT.

9. We acknowledge your question regarding coordination with DOT regarding traffic signals. Various coordination efforts and meetings with HDOT have been ongoing throughout the planning process. HDOT has reviewed the TIAR's for both the DHHL and DLNR projects, which recommends signalization of the three mentioned intersections (one existing, two proposed). In comments dated 12/20/18, HDOT noted that, "Three proposed access points on Maui Veterans Highway were presented and agreed upon for the DLNR Business Park and DHHL Pūlehunui North, which was consistent with the DLNR's DEIS and its TIAR dated March 2018." HDOT has also acknowledged that signalization of the Maui Veterans Highway/DHHL/DLNR access intersection is consistent with prior meeting discussions.

We acknowledge your comment regarding roundabouts and two-way stops. If a single lane roundabout is implemented, Maui Veterans Highway will need to be reduced from its existing four-lane roadway to a two-lane roadway. Based on national guidance, the vehicular capacity for a single-lane roundabout is generally up to 25,000 vehicles/day. Maui Veterans Highway currently services between 30,000-35,000 vehicles/day. Therefore, a single-lane roundabout would likely operate overcapacity and cause lengthy delays and congestion.

Analysis shows that Base Year 2038 Without Project conditions with double-lane roundabouts at each of the three main Project intersections named above will result in overcapacity conditions at all intersections along the critical mainline Maui Veterans Highway. Additionally, there are currently no double-lane roundabouts operational in the State of Hawai'i, so there will be a steep learning curve for these drivers in a relatively high-volume area upon implementation. Therefore, double-lane roundabouts are considered to be infeasible at the three main Project intersections.

Based on the relatively high turning movement at the three main Project intersections, two-way stop control would cause lengthy delays and queues for these turning movements. Signals

Ms. Michele McLean

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

6/14/19

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are forecast to be warranted at these Project access intersections, so traffic signals were recommended. Stop-and-go traffic can be accommodated through optimized signal timing measures, such as implementing signal coordination at these three intersections and providing longer green times along the mainline through movements to provide longer continuous flows along Maui Veterans Highway.

To address your comment, the TIAR (refer to Appendix H of the Final EIS) will be revised as follows: A new appendix (Appendix H) will be inserted in the TIAR to discuss the infeasibility of roundabouts in the study intersections. The new Appendix H of the TIAR will include a level of service and capacity analysis for double-lane roundabouts under the Base Year 2038 scenario.

Section 5.3 of the EIS (Roadways and Traffic) will be revised as shown on the attachment labeled Roadways and Traffic.

10. We acknowledge your comment regarding consultation with MPO. MPO was consulted regarding the Draft EIS and did not offer comments. DHHL is open to further coordination with MPO.

11. We acknowledge your comment regarding biological resources. To address these comments and those received from other agencies on a similar topic, the Final EIS Section 4.7 (Fauna Resources) will be revised as shown on the attachment labeled Fauna Resources.

12. We acknowledge your comment. To address your comment, EIS Sections 5.8.4 (Drainage System) and 6.4 (Approvals and Permits) will be revised to state: "As noted by the County of Maui Planning Department, a Flood Development Permit will be applied for any parcel that is not located within Flood Zone X or XS." EIS Table 6-5 (Anticipated Permits and Approvals) and the corresponding table in the EIS Summary Sheet will be updated accordingly to refer to a "Flood Development Permit" rather than "Special Flood Hazard Development Permits".

13. Thank you for your comment regarding error messages. The two error messages have been removed and the EIS will be revised to state:

The PER prepared for the Proposed Action assessed four alternatives for wastewater management (see ~~Error Reference source not found~~ Figure 5-10 through Figure 5-18)...Pump Station No. 2 would then transfer the wastewater to the County's upgraded system on South Kihet Road (see ~~Error Reference source not found~~ Figure 5-10).

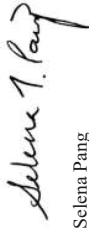
We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands

Ms. Michele McLean
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUINI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
Page 7 of 7

at (808) 620-9500.

Sincerely,



Selena Pang
PBR HAWAII

Attachments:

County's Maui Island Plan
Kihei-Mākena Community Plan
Roadways and Traffic
Fauna Resources

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



June 14, 2019

Ms. Kekoa Enomoto
393 Pucio Drive
Kula, HI 96790

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUHUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

Dear Ms. Enomoto,

Thank you for your review and letter dated December 24, 2018 regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

Thank you for your comment regarding agricultural homesteads. As noted in the Draft EIS, DHHL Beneficiary Consultation regarding land use programs at the DHHL Project Areas was conducted through a public EIS Scoping Meeting, an online survey, two Beneficiary Planning Workshops held on April 21 and 28, 2018, and a follow-up meeting on September 5, 2018, where the Pūlehuhi South Conceptual Plan was received with majority support for the purposes of the EIS.

We acknowledge that you personally participated in these events, and we thank you for your contributions to the planning process. As part of these events, you will recall that attendees were made aware of site access, site conditions, and potentially disruptive land uses on surrounding properties which may constrain land uses at Pūlehuhi. The noticeable refinement of the Pūlehuhi South Conceptual Plan and less-refined Pūlehuhi North Development Plan are the product of these site conditions, combined with the input DHHL sought from its beneficiaries. Similarly, the Draft EIS assesses impacts regarding existing and proposed use of surrounding lands, acoustics, natural and man-made hazards, historical uses, agricultural feasibility, and other site considerations.

As noted in the Draft EIS, the anticipated land use programs in DHHL Project Areas will inform the regional infrastructure analysis which also accounts for regional infrastructure demand generated by other State projects in the region. The Hawaiian Homes Commission Act (§§204 and 206) vests DHHL with exclusive authority to control its lands; we acknowledge that the Pūlehuhi South Conceptual Plan may undergo further refinement as plans for the region progress and more information becomes available.

We appreciate your comment regarding the placement of "light industrial on trust acres". Commercial/industrial use provides for the most flexible use of the DHHL Project Areas and could support retail, agribusiness processing, packaging, and/or marketing of agricultural goods produced at Pūlehuhi South and throughout Central Maui. In addition to revenue generation to support DHHL activities, DHHL proposes to provide commercial/light industrial use areas in Pūlehuhi South devoted to use by smaller

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Chairman / Principal

R. STEV PUNCAK, ASLA
President / Principal

ROSSELL J. CHUNG, ASLA, LEED® AP BD+C
Executive Vice President / Principal

VINCENT MIREKIAN
Senior Vice President / Principal

GRANT MURKAMBA, AIA, LEED® AP BD+C
Vice-President / Principal

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Project Director

BARBARA F.M. THOM
Chairman, Sustainability / Planner

RYMOND T. HIGA, ASLA
Senior Associate

CARIE CHELSEAK, AEP
Senior Associate

MARC SHIMMERS, ASLA
Senior Associate

DACHUNG DONG, LEED® AP
Senior Associate

MICHAEL MCELLEN, ASLA, LEED® AP
Associate

NATHALIE RAZO
Associate

DRAGUZHENG, ASLA, LEED® GA, SITESP AP
Associate

BRIAN WOLF, ASLA, LEED® AP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484
Tel: (808) 521-5031
Fax: (808) 521-5032
E-mail: ysv@pbrhawaii.com

www.pbrhawaii.com

Kekoa Enomoto

I would like to see perhaps 10 times more agricultural beneficiaries at Pūlehuhi North and/or South than proposed in the Pūlehuhi draft EIS, to mitigate the list of 4,663 beneficiaries waiting for Maui ag homestead awards.

I propose that some 800 beneficiaries live on and cultivate two-thirds of the Pūlehuhi acreage, or 556 acres, versus the proposed 80 to 110 beneficiaries on 29 percent of the land, or 238 acres.

To wit, Page 1-3 (digital Page 332) of Austin, Tsutsumi & Associates' Preliminary Engineering Report in the draft EIS states, "The agricultural homestead area, located on the mauka portion of the site, will feature approximately 80-110 homestead lots for DHHL. Beneficiaries with the intent of agricultural use. These agricultural units will typically have an area of up to two acres with an overall area totaling 238 acres" of the total 830 Pūlehuhi North (184 acres)/South (646) acres.

On my proposed two-thirds, or 556 homesteaded acres, there could be from 278 two-acre farms up to 1,112 half-acre farmlets, or some 800 mixed half- to two-acre-sized farms. After all, the mission of the 1921 Hawaiian Homes Commission Act federal trust is to reconnect native Hawaiians with their 'aina, not place light industrial on trust acres. Under my proposal, the remaining 274 non-homesteaded Pūlehuhi acres would feature roads, parks, education, culture, cooperative farming, community pasturing of livestock and mercantile/retail.

For Pūlehuhi North/South, my mana 'o is that beneficiary-driven, community-based planning that involves community hikes and focus-group discussions should follow the EIS.

Moreover, my mana 'o is that Pūlehuhi ag-homestead awardees should be required to 1) reside on the subsistence-ag lots, and 2) submit, and within two years abide by, an ag plan.

Ms. Kekoa Enomoto
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
Page 2 of 2

businesses including those of DHHL beneficiaries, to support beneficiary economic development initiatives. Activities in this area will build capacity in the small business community by providing a space for individual businesses or beneficiary individuals or organizations to produce and sell products and services in a highly-visible and central location off Maui Veterans Highway.


We acknowledge your comment regarding steps that should follow the EIS process. The key elements of the proposed uses have been largely influenced by beneficiary feedback. DHHL will continue to involve and consult beneficiaries during future planning efforts regarding Pūlehunui, including incorporating your suggestion for community site visits of the DHHL Project Areas and focus groups.

Mahalo for your mana'o on Agricultural Homestead lease conditions. Please note Homestead lease conditions must be consistent with Hawai'i Administrative Rules §10-3-6.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,



Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

P.O. BOX 110, HONOLULU, HAWAII 96810-0110

NOV 29 2018

HODERICK K. BECKER
COMPTROLLER
AUDREY HIDANO
DEPUTY COMPTROLLER

(P) 596-1111

Ms. Selena Pang, Planner
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

Dear Ms. Pang:

Subject: Draft Environmental Impact Statement (EIS) for
Pulehunui Regional Infrastructure Master Plan
Pulehunui, Maui, Wailuku, Hawaii
TMK: (2) 3-8-008:001 (por.), 008, 020, 034, 035, 036, 037, and 038

Thank you for the opportunity to comment on the subject project. The proposed project does not impact any of the Department of Accounting and General Services' existing facilities. We will continue to coordinate our activities with the Department of Public Safety and the Department of Hawaiian Homelands in developing the Maui Regional Public Safety Complex.

If you have any questions, your staff may call Ms. Dora Choy of the Planning Branch at 586-0488.

Sincerely,

KEITH S. KOGACHI
Acting Public Works Administrator

DC:mo
c: Mr. Wade Shimabukuro, DAGS, MDO
Mr. Kaleo Manual, DHHL, Acting Planning Program Manager



June 14, 2019

Mr. Curt Otaguro, Comptroller
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, HI 96810-0119

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

ATTN: Mr. Keith Kogachi
Dear Mr. Otaguro,

Thank you for your department's review and letter dated November 29, 2018 (your reference code (P)1596.8) regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

We acknowledge your comment that the Pulehunui Regional Infrastructure Master Plan does not impact any of DAGS' existing facilities. We acknowledge that DAGS will continue coordination with its fellow State agencies regarding the anticipated Maui Regional Public Safety Complex.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484
Tel: (808) 521-3031
Fax: (808) 521-3032
E-mail: ysashim@pbrhawaii.com

photos are not real people



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 14, 2018

MEMORANDUM

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division**
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Maui District
- Historic Preservation
- Infrastructure Master Plan**

TO: FROM: [Handwritten signature]

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (EIS) for the Pulehunui Regional Infrastructure Master Plan

LOCATION: Pulehunui, Wailuku, island of Maui; TMK: (2) 3-8-008: Various
APPLICANT: PBR Hawaii & Associates, Inc. on behalf of DHHL

Transmitted for your review and comment is information on the above-referenced subject matter which can be found at:

1. <https://hawaii.dlnr.gov/sites/dlnr-id> (using the Chrome browser)
2. Username: your Hawaii.gov email address
3. Password: outlook password (if you do not know it, please contact IT by email to reset and get a new password)
4. Click on: Request for Comments, then click on the subject link.
5. If you cannot access the document, please scan this Memo and email to Quoc Le at quoc.le@hawaii.gov to grant you access.

We would appreciate your comments by **December 20, 2018**. 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 Darlene Nakamura at 587-0417. Thank you.

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: [Handwritten signature]
Print Name: Cary S. Chang, Chief Engineer
Date: 12/11/18

Attachment(s)
cc: Central Files



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 21, 2018

via email: DHHL.Pulehunui@pbrhawaii.com

PBR Hawaii & Associates, Inc.
Attention: Ms. Selena Pang, Planner
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

State of Hawaii
Department of Hawaiian Home Lands
Attention: Mr. Kaleo Manuel
Acting Planning Program Manager
P.O. Box 1879
Honolulu, Hawaii 96805

via email: kaleo.l.manuel@hawaii.gov

Dear Ms. Pang and Mr. Manuel:

SUBJECT: Draft Environmental Impact Statement (EIS) for the **Pulehunui Regional Infrastructure Master Plan** located at Pulehunui, Wailuku, island of Maui; TMK: (2) 3-8-008: Various

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

At this time, enclosed are comments from the (a) Engineering Division and (b) Commission on Water Resource Management on the subject matter. Should you have any questions, please feel free to call Darlene Nakamura at (808) 587-0417. Thank you.

Sincerely,

[Handwritten signature]
Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files

18 NOV 14 PM 11:42 ENGINEERING



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 631
HONOLULU, HAWAII 96809

RECEIVED
COMMISSION ON WATER
RESOURCE MANAGEMENT
2018 NOV 14 PM 2:52

November 14, 2018

MEMORANDUM

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - Maui District
- Historic Preservation
- John Henry*

FROM: Russell Y. Tsuji, Land Administrator
Draft Environmental Impact Statement (EIS) for the Pulehunu Regional Infrastructure Master Plan
Pulehunu, Wailuku, Island of Maui; TMK: (2) 3-8-008: Various
PBR Hawaii & Associates, Inc. on behalf of DHHL

TO: *FR*
TD

LOCATION: Pulehunu, Wailuku, Island of Maui; TMK: (2) 3-8-008: Various
APPLICANT: PBR Hawaii & Associates, Inc. on behalf of DHHL

Transmitted for your review and comment is information on the above-referenced subject matter which can be found at:

1. <https://hawaiioint.sharepoint.com/sites/dlnr-ld> (using the Chrome browser)
2. Username: your Hawaii.gov email address
3. Password: outlook password (if you do not know it, please contact IT by email to reset and get a new password)
4. Click on: Request for Comments, then click on the subject link.
5. If you cannot access the document, please scan this Memo and email to Quoc Le at quoc.le@hawaii.gov to grant you access.

We would appreciate your comments by **December 20, 2018**. 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 Darlene Nakamura at 567-0417. Thank you.

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: /s/ Jeffrey T. Pearson, P.E.
Print Name: Deputy Director
Date: December 12, 2018

Attachment(s)
cc: Central Files

FILE ID: RFD-1753.6
DOC ID: 20654



DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Draft Environmental Impact Statement (EIS) for the Pulehunu Regional Infrastructure Master Plan, Pulehunu, Wailuku, Island of Maui;
TMK: (2) 3-8-008: Various

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (<http://gis.hawaiiinfip.org/FHAT>).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- o Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- o Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- o Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- o Kauai: County of Kauai, Department of Public Works (808) 241-4846.

The applicant should include water demands and infrastructure required to meet project needs. Please note that the projects within State lands requiring water service from their local Department/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 is required to provide water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update projections.

Signed: *Carmy Chan*
CARMY S. CHAN, CHIEF ENGINEER
Date: 12/11/18



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
HONOLULU, HAWAII 96809

SIOBHAN CASE
Chairperson
BRUCE S. ANDERSON, PH.D.
WILLIAM O. BALFOUR, JR.
KATHLEEN M. BARNETT, PH.D.
MICHAEL G. BLICK
MEL J. HAMMERS
PAUL J. MEYER
JEFFREY T. PEARSON, P.E.
Interim Director

December 12, 2018

REF: RFD 4753.6

TO: Mr. Russell Tsuiji, Administrator
Land Division

FROM: Jeffrey T. Pearson, P.E., Deputy Director
Commission on Water Resource Management

SUBJECT: Draft Environmental Impact Statement (EIS) for the Pulehuluhui Regional Infrastructure Master Plan

FILE NO.: RFD 4753.6
TWK NO.: (2) 3-8-008:001, (2) 3-8-008:008, (2) 3-8-008:034, (2) 3-8-008:035, (2) 3-8-008:036, (2) 3-8-008:037, (2) 3-8-008:038

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWPRM) 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. CWPRM 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://dlnr.hawaii.gov/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>.
- 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://planning.hawaii.gov/cz/initiatives/low-impact-development/>.
- 6. We recommend the use of alternative water sources, wherever practicable.
- 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at <http://energy.hawaii.gov/green-business-program>.
- 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at

Mr. Russell Tsuiji
Page 2
December 12, 2018

- 9. http://www.hawaiiiscope.com/wp-content/uploads/2013/04/LCH_LIrrigation_Conservation_BMPs.pdf. 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.
- 10. 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. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- 11. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.
- 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- 13. 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.
- 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.
- 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 18. 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:

Three alternatives for regional potable water service are discussed. The first alternative is to connect to the existing municipal system. It is anticipated that new water source would be needed to support the average day demand of 1.36 mgd. The Preliminary Engineering Report suggests that up to three new wells in the Waiehe Aquifer System Area (AYSA) be developed. Reported 12-MAY numpage from the Waiehe AYSA from April 2017 to December 2017 was consistently 5.6 mgd, which together with the projected demand of 1.36 mgd, would bring total withdrawals to a little less than 7 mgd. This is within the 8 mgd sustainable yield of the Waiehe AYSA but 88% of the Waiehe AYSA sustainable yield and mostly concentrated near the border between the Iao and Waiehe AYSAs rather than spread throughout the Waiehe AYSA, which may trigger information mitigative measures. The Maui Department of Water Supply and U.S. Geological Survey developed a numerical groundwater model for the Waiehe area (Ground-Water Availability in the Waiehe Area, Maui, Hawaii, SIR 2008-0226) that covers the Iao and Waiehe AYSA and should provide insight into impacts from the proposed MDWS wells.

The second alternative is to treat and use surface water from the East Maui Irrigation (EMI) System. The DEIS should discuss the interim instream flow standards (IFS) for East Maui streams that supply the EMI system and whether the IIFS accommodates the proposed development.

The third alternative is to use cracked wells in the Kahului ASYA. The Kahului AYSA has been artificially recharged with return irrigation water from sugarcane agriculture. Now that the sugarcane plantation has closed, irrigation has been substantially reduced, and some restoration of East Maui streams has been ordered by the Commission, the impact on the water availability in the Kahului ASYA is uncertain. In addition, sea level rise may further exacerbate rising saltwater in the ground water. These issues should be further discussed in the DEIS.

A separate non-potable system is also proposed to supply irrigation water for agricultural needs and landscaping. An existing HCS system is identified as an option to meet the estimated demand of 0.784 mgd. Similar to Alternative 2, a discussion of the streams to be impacted and compliance with IIFS should be included in the DEIS.

If you have any questions, please contact Lenore Ohye of the Planning Branch at 587-0216 or W. Roy Hardy of the Regulation Branch at 587-0225.

174-82

BEZANNE D. CAMP
CHAIRPERSON, RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 611
HONOLULU, HAWAII 96809

November 14, 2018

MEMORANDUM

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - Maui District
- Historic Preservation

David Y. Ige
Russell Y. Tsuji, Land Administrator

Draft Environmental Impact Statement (EIS) for the Pulehunui Regional Infrastructure Master Plan

Pulehunui, Wailuku, Island of Maui; TMK: (2) 3-6-008; Various PBR Hawaii & Associates, Inc. on behalf of DHHH

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (EIS) for the Pulehunui Regional Infrastructure Master Plan

LOCATION: Pulehunui, Wailuku, Island of Maui; TMK: (2) 3-6-008; Various PBR Hawaii & Associates, Inc. on behalf of DHHH

Transmitted for your review and comment is information on the above-referenced subject matter which can be found at:

1. <https://hawaiiointel.harepoint.com/sites/dlnr/dlnr> (using the Chrome browser)
2. Username: your Hawaii.gov email address
3. Password: outlook password (if you do not know it, please contact IT by email to reset and get a new password)
4. Click on: Request for Comments, then click on the subject link.
5. If you cannot access the document, please scan this Memo and email to Quoc Le at quoc.le@hawaii.gov to grant you access.

We would appreciate your comments by **December 20, 2018**. 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 Darlene Nakamura at 587-0417. Thank you.

- We have no objections.
- We have no comments.
- Comments are attached.

Signed:

Print Name:

Date:

David G. Smith
DAVID G. SMITH, Administrator

DEC 24 2018

Attachment(s)
cc: Central Files

Doc Review (2) RFD.4989.3 Waikupanaha Agricultural Lots Project; RFD.4753.6 DEIS for the Pulehunui Regional Infrastructure Master Plan

Adobe Sign Document History 12/17/2018

| | |
|-----------------|--|
| Created: | 12/12/2018 |
| By: | Kathy Yoda (kathy.s.yoda@hawaii.gov) |
| Status: | Signed |
| Transaction ID: | CEUCHBCA4EA4888G16VpSCQgY7nCWwY0AeZDYTKsJf |

"Doc Review (2) RFD.4989.3 Waikupanaha Agricultural Lots Pro ject; RFD.4753.6 DEIS for the Pulehunui Regional Infrastructure Master Plan" History

- Document created by Kathy Yoda (kathy.s.yoda@hawaii.gov)
12/12/2018 - 3:03:54 PM HST - IP address: 132.160.239.30
- Document emailed to Jeffrey Pearson (jeff.pearson@hawaii.gov) for signature
12/12/2018 - 3:06:30 PM HST
- Document viewed by Jeffrey Pearson (jeff.pearson@hawaii.gov)
12/17/2018 - 7:38:15 AM HST - IP address: 174.239.38.71
- Document e-signed by Jeffrey Pearson (jeff.pearson@hawaii.gov)
Signature Date: 12/17/2018 - 7:40:09 AM HST - Time Source: server - IP address: 174.239.38.71
- Signed document emailed to all eligible parties.
12/17/2018 - 7:40:09 AM HST





STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

DEC 24 2018

MEMORANDUM

TO: RUSSELL Y. TSUIJI, Administrator
Land Division

FROM: DAVID G. SMITH, Administrator
Division of Forestry and Wildlife

SUBJECT: Division of Forestry and Wildlife Comments on the Draft Environmental Impact Statement for the Pūlehuui Regional Infrastructure Master Plan

The Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW) has received your inquiry regarding the draft Environmental Impact Statement (EIS) for the Pūlehuui Regional Infrastructure Master Plan for Pūlehuui in the District of Wailuku, Maui, TMKS: (2) 3-8-008; various. The draft EIS has been prepared in anticipation of potential regional infrastructure improvements that may facilitate development of lands managed by the Departments of Hawaiian Home Lands, Land and Natural Resources, and Accounting and General Services on behalf of Department of Public Safety. Potential regional infrastructure improvements include to water, wastewater, drainage, and roadways over 830 acres of vacant, generally unimproved land.

The State and Federal listed Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in trees. To avoid the potential for impacts to this tree-roosting species, site clearing should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be avoided woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW. Barbed wire should be avoided for any construction because bat mortalities have been documented as a result of becoming ensnared by barbed wire during flight.

We note that artificial lighting can adversely impact seabirds that may pass through the area at night causing disorientation that could result in collision with manmade artifacts or grounding of birds. For nighttime lighting that might be required at the facility, DOFAW recommends that any lights be fully shielded to minimize impacts. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15. This is the period when young seabirds take their maiden voyage to the open sea.

The State and Federal listed Blackburn's Sphinx Moth (BSM; *Manduca blackburni*) has a historic range that encompasses the project area. Larvae of BSM feed on many nonnative hostplants that include tree tobacco (*Nicotiana glauca*) which grows in disturbed soil. We recommend contacting our Maui DOFAW office at (808) 984-8100 for further information about where BSM may be present and whether a vegetation survey should be conducted to determine the presence of plants preferred by BSM.

SUZANNE B. CLAY
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPARTMENT OF WATER RESOURCES MANAGEMENT

ROBERT K. MASUDA
DIRECTOR

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR, WATER

QUALITY SERVICES
CONSULTING ENGINEERS
1000 W. KALANANĪ'ŪI
CORNER KALANANĪ'ŪI AND COURT ST. LANDS
UNIVERSITY OF HAWAII
1550 MAHEA DRIVE, HONOLULU, HI 96813
HAWAIIAN TELECOMMUNICATIONS COMMISSION
STATE PARKS

DOFAW recommends surveying for rare and endangered plants that historically occur in the area. If any of these species are found, please notify our Maui DOFAW office at (808) 984-8100.

We recommend using native plant species for landscaping that are appropriate for the area (i.e. climate conditions are suitable for the plants to thrive, historically occurred there, etc.). Please do not plant invasive species. DOFAW recommends consulting the Hawai'i-Pacific Weed Risk Assessment website to determine the potential invasiveness of plants proposed for use in the project (<https://sites.google.com/site/weedriskassessment/home>).

You should avoid moving soil or other plant material between the islands due to the potential presence of pathogens. We recommend consulting the Hawai'i Interagency Biosecurity Plan at <http://dlnr.hawaii.gov/hisc/plans/hibp/> in planning, design, and construction of the project.

Finally, DOFAW is concerned about attracting vulnerable birds to areas that may host non-native predators such as cats, rodents, and mongoose. We recommend taking action to minimize predator presence; remove cats, place bait stations for rodents and mongoose, and provide covered trash receptacles.

We appreciate your efforts to work with our office for the conservation of our native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Jim Cogswell, Wildlife Program Manager at (808) 587-4187 or James.M.Cogswell@hawaii.gov.



June 14, 2019

Mr. Russell Y. Tsuji, Land Administrator
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

Dear Mr. Tsuji,

Thank you for your various divisions' review and letters dated December 21, 2018 (CWRM reference code RFD 4753.8) and December 24, 2018 regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

Engineering Division

1. We acknowledge your comment regarding the National Flood Insurance Program (NFIP) and DHHL will consult with the applicable County NFIP coordinating agency at the appropriate time in the development process.
2. We acknowledge your comment regarding water demands and infrastructure requirements. The EIS includes water demands and infrastructure required to meet project needs. Refer to EIS Section 5.8.1 (Water System), 5.8.2 (Irrigation Water System), and Appendix C (Preliminary Engineering Report).
3. The EIS discusses the relationship of the Proposed Action to the State Water Projects Plan. Refer to EIS Section 5.8.1.5 (Relationship to State Water Projects Plan).

Commission on Water Resource Management

1. We acknowledge your comment regarding the Waie'e AYSA. To address your comment, Section 5.8.1.1 of the EIS (Water System Alternative 1) will be revised to state: "DHHL will work with CWRM during the well installation permitting process to ensure that DHHL groundwater use does not adversely affect the long-term sustainability of the aquifer."
2. We acknowledge your comment regarding IIFS. To address your comment, EIS Sections 4.5 (Streams and Surface Water), 5.8.1.2 (Water System

Mr. Russell Y. Tsuji
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
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Alternative 2), and 5.8.2 (Irrigation Water System) will be revised to state: "None of the water or irrigation alternatives for the Proposed Action propose any amendment or alteration to the existing IIFS. The contemplated alternatives would service the Infrastructure Regional Study Area without preventing attainment of the IIFS."

3. We acknowledge your comment regarding the Kahului AYSA. To address your comment, Section 5.8.1.3 of the EIS (Water System Alternative 3) will be revised to state: "DHHL will work with CWRM during the well installation permitting process to ensure that DHHL groundwater use does not adversely affect the long-term sustainability of the aquifer."
4. We acknowledge your comment regarding IIFS. As noted above, to address your comment, EIS Sections 4.5 (Streams and Surface Water), 5.8.1.2 (Water System Alternative 2), and 5.8.2 (Irrigation Water System) will be revised.

Division of Forestry and Wildlife

1. We acknowledge and agree with your statements about the Proposed Action.
2. We acknowledge your comments regarding listed species. To address these comments and those received from other agencies on a similar topic, the Final EIS Section 4.7 (Fauna Resources) will be revised as shown on the attachment labeled Fauna Resources.
3. We acknowledge your comments regarding rare and endangered plants. As noted in the EIS, walk-through biological surveys of the DHHL Project Areas were conducted by Robert Hobby in 2011 (Pūlehuui North) and 2017 (Pūlehuui South). Refer to the Final EIS Section 4.7 (Fauna Resources).
4. We acknowledge your comments regarding the use of native plants, and the risk of moving soil and plant material between the islands. To address your comment, Section 4.6 (Flora Resources) of the EIS will be revised to include this statement:

As noted in Section 5.8.1, DHHL will embrace the use of native plants as a means of water conservation and to support cultural practices. DHHL will also adhere to all applicable requirements of §103D-408, HRS Hawaiian plants; use in public landscaping which stipulates that all plans, designs, and specifications for new or renovated landscaping of any building, complex of buildings, facility, complex of facilities, or housing developed by the State with public moneys shall incorporate Hawaiian plants. The statute requires Hawaiian plants to constitute a minimum of 25 percent of the total plant footprint for landscaping designs, plans, and specifications by 2025, and 35 percent by 2030. In general, DHHL embraces the use of native plantings and acknowledges the risks of moving soil and plant material between the islands.

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- CARIE CHELSEAS, AEP
Senior Associate
- MARC SHIMIZU, ASLA
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- DACHUNG DONG, LEED AP
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Mr. Russell Y. Tsuji
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
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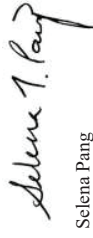
5. We acknowledge your comment regarding cats, rodents, and mongoose. Section 4.7 (Fauna Resources) of the Draft EIS stated: "Since the biological survey found signs indicating the presence of rodents on the property, proper eradication will occur in compliance with HAR Chapter 11-26 prior to site clearing." The Final EIS will retain this language.

6. Should the scope of the Proposed Action significantly change, DHHL will contact you.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,



Selena Pang
PBR HAWAII

Attachment: Fauna Resources

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



STATE OF HAWAII
DEPARTMENT OF EDUCATION

P.O. BOX 2380
HONOLULU, HAWAII 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

December 24, 2018

DIR. CHRISTINA A. KISHIMOTO
SUPERINTENDENT

Kaleo Manuel
December 24, 2018
Page 2

Chapter 302A-1606, Hawaii Revised Statutes requires the developer of new residential development with 50 or more units, to execute an agreement with the HIDEO. The DHHL is encouraged to meet with the HIDEO as early as possible to execute an Educational Contribution Agreement.

Thank you for the opportunity to comment. Should you have questions, please contact Robyn Loudermilk, School Lands and Facilities Specialist of the Facilities Development Branch, Planning Section at 784-5093, or via email at robyn_loudermilk@notes.k12.hi.us.

KGM:rl

cc: Kathleen Dimino, Complex Area Superintendent, Baldwin/Kekaulike/Maui Complex
Selena Pang, PBR Hawaii & Associates, Inc.
Office of Environmental Quality Control

TO: Kaleo Manuel
Acting Planning Program Manager
Department of Hawaiian Homelands

FROM: Kenneth G. Masden II
Public Works Manager, Planning Section
Facilities Development Branch

SUBJECT: **Draft Environmental Impact Statement for the Pulehuui Regional Infrastructure Master Plan, Wailuku, Maui, TMK: 3-8-008: 001.008, 020, 034, 035, 036, 037 por., and 038**

The Hawaii State Department of Education (HIDOE) has the following comments for the Draft Environmental Impact Statement (DEIS) for the proposed Pulehuui Regional Infrastructure Master Plan (Project). According to the DEIS, the proposed Project is to facilitate development of state-owned lands and provide technical studies to identify programmatic land use for the Department of Hawaiian Homes Lands (DHHL Project) on approximately 1,631 acres of land located at Pulehuui, Wailuku, Island of Maui, Hawaii, TMK: 3-8-008: 001.008, 020, 034, 035, 036, 037 por., and 038.

The DEIS incorporates HIDOE previous comments on the Environmental Impact Statement Preparation Notice (EISP/N), by memorandum dated January 22, 2018, regarding the Project location within the Central Maui School Impact Fee District. Since the EISP/N, the DHHL Project has been refined to include the development of approximately 80 to 100 agricultural homestead lots at Pulehuui South. When the DHHL Project is mature and unit turn over stabilized, we would expect approximately 49 HIDOE students will reside there.

The HIDOE schools currently servicing the proposed DHHL Project are Kitei Elementary, Lokelani Intermediate, and Maui High. Kitei Elementary and Lokelani Intermediate schools have capacity for roughly 200 and 125 students, respectively. This excess capacity is expected to remain the same over the next five years. Maui High School is over capacity by approximately 400 students. This over capacity is expected to remain the same over the next five years. Though Kitei High School is anticipated to open during this time period, no immediate decrease in student population at Maui High School is anticipated.

Ground breaking occurred earlier this year for the initial phase of the new Kitei High School. This first phase will provide classroom capacity for approximately 800 students; with a maximum design capacity for approximately 1,600 students. The HIDOE anticipates opening this first phase for the 2021/2022 school year. Once opened, it is anticipated that the high school will gradually reduce the number of students attending Maui High School.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER



June 14, 2019

Dr. Christina Kishimoto, Superintendent
State of Hawai'i
Department of Education
P.O. Box 2360
Honolulu, HI 96804

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PŪLEHUHUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

ATTN: Mr. Kenneth Masden II

Dear Dr. Kishimoto,

Thank you for your review and letter dated December 24, 2018 regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. Thank you for your comment regarding the projected number of HIDEO students that may live at Pūlehuhi South. DHHL will continue to coordinate with HIDEO regarding potential residents on DHHL's lands at Pūlehuhi. Construction on agricultural homesteads is optional. So as not to underestimate the impacts of the Pūlehuhi Regional Infrastructure Master Plan, it was assumed that all 100 planned lots would be improved with homes.
2. Thank you for providing the status of HIDEO schools that serve the DHHL Project Areas. To address your comment, Section 5.11.1.1 of the EIS (Schools) will be revised as shown on the attachment labeled Schools.
3. DHHL will coordinate with HIDEO to execute an Educational Contribution Agreement as applicable. To address your comment, in EIS Section 5.11.1 (Schools) the following text will be added to "Potential Impacts and Mitigation Measures":
DHHL Project Areas will comply with any applicable impact fee requirements (including an Educational Contribution Agreement, as applicable).

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

THOMAS WITEN, ASLA
Chairman / Principal

R. JEN PUNGAN, ASLA
President / Principal

ROSSELL C. CHUNG, FASLA, LEED® AP BD+C
Executive Vice President / Principal

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Chairman, Sustainability Alliance

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Dr. Christina Kishimoto
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUHUI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
Page 2 of 2

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena Pang
PBR HAWAII

Attachment: Schools

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3376
HONOLULU, HI 96801-3376

BRUCE S. ANDERSON, Ph.D.
DIRECTOR OF PUBLIC HEALTH

In reply, please refer to:
File #
2016-356 SL

November 21, 2018

Mr. Kaleo Manuel
Acting Planning Program Manager
State of Hawaii, Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

AND

Ms. Selena Pang, Planner
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii

Facility/Site: **Pūlehuunui Regional Infrastructure Master Plan, Pūlehuunui
Abupua'a, Kula Moku, Maui, Hawaii**
Subject: **Comments on the Draft Environmental Impact Statement; dated
November 2018**

Dear Mr. Manuel and Ms. Pang:

The Hawaii Department of Health (HDOH), Hazard Evaluation and Emergency Response (HEER) Office has reviewed the subject document and has the following comments:

1. The former Pu'unēne Naval Air Station (NAS) reportedly had a complement of over 3,300 personnel, 271 aircraft, and over 300 permanent structures. Several fuel storage tanks with hundreds of thousands of gallons of capacity were reportedly associated with the former NAS. The recognized environmental conditions reported in the two Phase I Environmental Site Assessments presented with the Draft Environmental Impact Statement (DEIS) may not be the only sources of contamination at the site associated with this historical use. Additional investigation to identify other sources and delineate the extent of contamination is recommended. Coordination with the U.S. Army Corps of Engineers (USACE) to understand the historical use of the property and the total area of the Formerly Used Defense Site (FUDS) is recommended.
2. Much of the site appears to have been historically used for sugar cane cultivation. Residual pesticides in former agricultural lands could pose potential risks to human health and the environment in a residential setting. HEER Office guidance recommends

Mr. Kaleo Manuel and Ms. Selena Pang
November 21, 2018
Page 2 of 2

that sites with known pesticide-related contamination and also those where pesticides were regularly applied be evaluated for residual contamination prior to re-development (HDOH Technical Guidance Manual [TCGM] Interim Final, 2014, Section 9.1). A Sampling and Analysis Work Plan should be submitted to the HEER Office for review and approval prior to conducting such an evaluation. Where soil contamination concentrations exceed HDOH Tier 1 Environmental Action Levels (EALs), land use restrictions or remedial action may be required.

Should you have any questions regarding this matter, you may contact me at (808) 586-5815 or send me an email message at sven.lindstrom@doh.hawaii.gov.

Sincerely,

Sven Lindstrom
Remedial Project Manager
Hazard Evaluation and Emergency Response Office



June 14, 2019

Ms. Fenix Grange
State of Hawai'i

Department of Health
Hazard Evaluation and Emergency Response Office
P.O. Box 3378
Honolulu, HI 96801-3378

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PŪLEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

ATTN: Mr. Sven Lindstrom

Dear Ms. Grange,

Thank you for your review and letter dated November 21, 2018 (your reference code 2018-356 SL) regarding the Draft Environmental Impact Statement (EIS) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. We acknowledge your comment that the recognized environmental conditions reported in the two Phase I Environmental Site Assessments may not be the only sources of contamination at the DHHL Project Areas. To complete the Phase I ESA, the environmental consultant requested and reviewed numerous documents from the DOH as well as HC&S archives, including several FUDS documents. In the course of research, the environmental consultant also contacted the most recent FUDS consultant via personal communication. At the appropriate stage in the development process, DHHL will coordinate with the DOH and USACE regarding other possible former uses at the former NAS Pu'unenē and will adhere to applicable technical guidance if residential or other sensitive uses will be developed.

2. We acknowledge your comment regarding historical use of the property for sugar cultivation. Per the Phase I Environmental Site Assessments included in the Draft EIS, a review of the HEER Office's Summary of Pesticide and Dioxin Contamination Associated with Former Sugarcane Operations indicated that elevated concentrations were not reported in surface soils of fields associated with the Pu'unenē Sugar Mill. No known pesticide mixing areas were located in the DHHL Project Areas. The Phase I ESAs note that former agricultural use of the property is therefore considered a de minimis condition.

We note, per the TGM, that arsenic has been identified in some fields at concentrations marginally above DOH action levels for residential exposure. We acknowledge that as such arsenic may be a potential concern in areas intended for residential use, and DHHL will coordinate with DOH regarding potential residential and/or other sensitive uses of the DHHL Project Areas, and will adhere to applicable technical guidance.

Ms. Fenix Grange
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
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The majority of anticipated land uses at Pūlehuui should not be considered residential or sensitive uses. Construction on agricultural homesteads is optional. So as not to underestimate the impacts of the Pūlehuui Regional Infrastructure Master Plan, it was assumed that all 100 planned lots would be improved with homes.

To respond to your comments, Section 5.6 (Man-Made Hazards) will be revised to state: As plans for the DHHL Project Areas progress, a Phase II may be appropriate depending on site plans, building footprints, and other details. At the appropriate stage(s) in the development process, DHHL will coordinate with the DOH and USACE regarding other possible former uses at the former NAS Pu'unenē and will adhere to applicable technical guidance. DHHL will consult the DOH regarding any anticipated residential or other sensitive uses of the DHHL Project Areas.

If you have any questions, please contact Julie Ann Cachoia of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



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Chairman / Principal

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Executive Vice President / Principal

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TOM SCHWELL, AEP
Principal

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Project Director

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Chairman, Sustainability / Planner

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DAVID Y. IGE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
889 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5087

December 20, 2018

TO: THE HONORABLE JOBIE MASAGATANI, CHAIRPERSON
DEPARTMENT OF HAWAII HOME LANDS (DHHL)

ATTN: KALEO MANUEL
ACTING PLANNING PROGRAM MANAGER

FROM: JADE T. BUTAY
DIRECTOR OF TRANSPORTATION

SUBJECT: PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
DRAFT ENVIRONMENT IMPACT STATEMENT (DEIS)
PULUNE, PULEHUNUI, MAUI, HAWAII
TMK NOS: (2) 3-8-008: 001 (POR.), 008, 020, 034 THRU 038

The State of Hawaii, Department of Transportation (DOT), understands the DHHL is preparing a regional infrastructure master plan for certain State-owned lands located in Pulehunui, Maui. The project led by the DHHL, also represents three other State agency stakeholders: Department of Land and Natural Resources (DLNR), Department of Accounting and General Services, and Department of Public Safety. The project areas identified as Pulehunui North and Pulehunui South are designated for commercial and industrial uses and are generally accessible off Mokulele Highway/Maui Veteran Highway.

DOT comments on the subject project are as follows:

Airports Division (DOT-AIR)

1. The proposed Pulehunui development is approximately four miles from the end of Runway 2 at Kahului Airport (OGG). Pulehunui North also lies below the imaginary transitional airspace surface for OGG. Safety concerns for aircraft operations mandates the DOT-AIR to review all proposed development projects within five miles from airports, as prescribed in the Technical Assistance Memorandum of 2016, created for DOT-AIR with assistance by the Federal Aviation Administration (FAA), Honolulu Airports District Office and the Hawaii State Office of Planning.

JADE T. BUTAY
DIRECTOR

DEBILY CHEN
ROSS W. HUGHES
BONNIE R. SAMPSON
DANIELL T. YOUNG

IN REPLY REFER TO:
DIR 1255
STP 8.2568

The Honorable Jobie Masagatani
December 20, 2018
Page 2

DIR 1255
STP 8.2568

2. Section 5.8.4 of the DEIS, pages 131-136, discusses new retention basins for mitigation to retain storm water at both sites (Pulehunui North and Pulehunui South), independent of outside flows from other properties. Standing water creates a potential wildlife attractant and therefore creates a bird-strike risk to aircrafts flying over the property.

DOT-AIR requests that design and landscaping for the Pulehunui project do not create conditions to attract wildlife. If wildlife is attracted to the project site and poses a potential hazard to aircrafts, the DHHL is requested to take appropriate measures to ensure the proper mitigation of the potential wildlife hazard. FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

3. The proposed development may be exposed to fumes, smoke, noise, vibrations, odors, etc., resulting from aircraft flight operations. The DEIS report adequately addressed noise mitigation and disclosure issues, pending actual implementation.

4. FAA regulation requires the submittal of FAA Form 7460-1, Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet.

5. Large-scale photovoltaic (PV) panel installations have the potential to create glint and glare hazard conditions for aircraft pilots. If the proposed project includes PV installation, it is recommended that the project proponent conduct a glint and glare analysis to ensure that the solar energy installation will not create hazardous conditions to OGG flight operations. Please see the following website for more information: www.sandia.gov/glare. Large-scale solar energy installations also have the potential to emit radio frequency interference (RFI).

Glint, glare, RFI, PV panels and tall equipment such as cranes that may be used during construction can create hazardous conditions to pilots. Any such PV system, construction equipment, and/or other structure that creates a hazardous condition for pilots, must be immediately mitigated by the owner upon notification by the DOT-AIR and/or by FAA.

If there are any questions, please contact Mr. Blayne Nikaïdo of the DOT Statewide Transportation Planning Office at (808) 831-7979 or by email at blayne.h.nikaïdo@hawaii.gov.

Attachment

✓ Selena Pang, PBR Hawaii & Associates, Inc.

Highways Division

The Transportation Impact Analysis Report (TIAR) dated October 24, 2018 is not acceptable for the following reasons:

1. A preliminary meeting on October 18, 2018 was coordinated between the DHHL, Austin, Tsutsumi & Associates, Inc. and the DOT staff. It was explained to the DHHL that the DOT's Federal Aid Highways 2035 Transportation Plan for the District of Maui dated July 2014 (hereinafter referred to as "HDOT 2035 Transportation Plan") to widen Maui Veterans Highway from a 4-lane into a 6-lane configuration as mentioned in the TIAR, is not programmed nor funded to date; therefore, the TIAR should be revised to delete this assumption. Additionally:
 - i. The Figure 5.3 and 5.5 in the TIAR should be revised to depict future configuration to remain as four-lanes; Without Background Mitigation and to include as a four-lane configuration; With Project/With Mitigation.
 - ii. Table 5.8 of the TIAR should be revised to reflect Base Year Conditions "Without" Background Mitigation Conditions and Future Year 2038 Conditions to be consistent with the change.
 - iii. Should the HDOT 2035 Transportation Plan on Maui Veterans Highway as mentioned in the DEIS and the TIAR be deferred or not implemented, all necessary mitigations may be the responsibility of the Master Plan project.
 - iv. The revised TIAR should consider pro-rata shares identified for each of the four agencies and its proposed land uses.
2. We note that an earlier pre-consultation joint meeting with emphasis on the DLNR Business Park was also held on June 5, 2017 with DHHL and the three agencies. Three proposed access points on Maui Veterans Highway were presented and agreed upon for the DLNR Business Park and DHHL Pulehunui North, which was consistent with the DLNR's DEIS and its TIAR dated March 2018 (reference attached letter STP 8.2468).
3. Petitioner shall fund and implement transportation improvements, mitigation measures, and pro-rata contributions that will alleviate the impacts generated by the project as recommended by the revised TIAR and by any required updates, and as accepted by the DOT.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
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DIRECTOR

Deputy Directors
ROY CATALANI
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EDWIN H. SHIFFEN
DAPHNE L. YOUNG

W. RENEY REBER, JR.
DIR 0625
STP 8.2468

The Honorable Suzanne D. Case
July 16, 2018
Page 2

DIR 0625
STP 8.2468

- 2. Features of the proposed business park (open swales, storm drains, retention and detention basins, wastewater treatment facilities or associated settling ponds) have the potential to attract hazardous wildlife. The Federal Aviation Administration (FAA) discourages projects that attract wildlife near airports.

In order to mitigate potential wildlife hazards, the applicant shall prepare a plan to control the presence of any hazardous wildlife at the business park. FAA Advisory Circular 150/5200-33B Hazardous Wildlife Attractants, provides guidance regarding wildlife management on or near airports.

The Airports Division, recommends no standing water in the open swales, storm drains, or detention/retention basins within 48 hours after storm event. Furthermore, all efforts should be taken to discourage wildlife from taking up habitat or refuge on the proposed project site.

Highways Division

A pre-consultation meeting was held on June 5, 2017 between DOT, DLNR and Department of Hawaiian Home Lands (DHHL) and their consultants to discuss the subject project. Three access points on Maui Veterans Highway was presented and agreed upon, and the study area include the Maui Veterans Highway intersections from Naki Road to Kihei Road. A new signalized intersection is proposed along the Maui Veterans Highway, between Kamaaina Road and Mchameha Loop/Maui Raceway Park Access Road as a shared access intersection for the future DHHL's Pulehunui North project. We appreciate these items mentioned have been reflected in the subject Traffic Impact Analysis Report (TIAR), which are generally consistent with the meeting discussions.

DOT's comments on the TIAR are as follows:

- 1. The TIAR shall be revised because it should be based on the existing road network without any projected improvements by others, unless their commitments are verifiable. The TIAR also inferred future improvements will be done by DOT, which are not programmed. Therefore, the revised TIAR should delete these assumptions.
- 2. The TIAR provides the proposed project generated trips; however, based on the preliminary meeting discussions, the actual variety of land uses have not been set, and inherently the TIAR's traffic distribution as proposed may be uncertain. Therefore, the proposed improvements will likely be revisited during our review of subsequent revised TIARs with updated improvements to be completed and accepted by the DOT.
- 3. The DOT agrees the three proposed accesses on Maui Veterans Highway for the project be full-intersections and to be shared by the proposed DHHL, Pulehunui North development accesses. We recommend the intersections be designed and constructed for the build-out for both the subject project and the DHHL project.

TO: THE HONORABLE SUZANNE D. CASE, CHAIRPERSON
DEPARTMENT OF LAND AND NATURAL RESOURCES (DLNR)

ATTN: IAN HIROKAWA
LAND DIVISION

FROM: JADE T. BUTAY
DIRECTOR OF TRANSPORTATION

Jade T. Butay

SUBJECT: DLNR INDUSTRIAL AND BUSINESS PARK
DRAFT ENVIRONMENTAL IMPACT STATEMENT
PUUNENE, PULEHUNUI, MAUI, HAWAII
TMK: (2) 3-8-008:001 (POR.)

The Department of Transportation (DOT) understands, the DLNR proposes a mix of light industrial, commercial, and public/quasi-public uses at Pulehunui, Maui (also referred to as Puunene). The proposed action encompasses approximately 280 acres, including a 20.3 acre site for the proposed Division of Forestry and Wildlife administrative facilities and baseyard in the northeast portion of the project area. Infrastructure to service the proposed project, including drainage improvements, water, and wastewater infrastructure will also be developed. Internal roadway networks will be developed as part of DLNR Industrial and Business Park which will be accessed via a proposed signalized intersection off of Maui Veterans Highway (formerly Mokulele Highway), as well as from Kamaaina Road, South Firebreak Road, and the Maui Raceway Park Access Road.

DOT's comments on the subject project are as follows:

Airports Division

- 1. The DLNR Industrial and Business Park is located approximately 4.24 miles from the end of Runway 2 of the Kahului Airport. The applicant needs to be aware of the duties of state and county agencies to implement the State of Hawaii, Office of Planning, Technical Assistance Memorandum related to this project and all projects within five miles of an airport: http://files.hawaii.gov/dhhd/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

4. The Applicant is responsible for its fair share of transportation improvements due to the subject project that includes the three full-intersections and impacts to the Maui Veterans Highway.
5. The DHHL Pulehunui South is identified as the future development that will be completed prior to the build-out year 2038. Although it was consolidated in the background traffic of the TIAR and its intersections, this intersection was omitted or missing from the Tables or Figures.

If there are any questions, please contact Mr. Blayne Nikaido of the DOT Statewide Transportation Planning Office at (808) 831-7979 or by email at blayne.h.nikaido@hawaii.gov.

c: Tessa Munekiyo Ng, Munekiyo Hiraga



June 14, 2019

Mr. Jade Butay, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

Dear Mr. Butay,

Thank you for your review and letter dated December 20, 2018 (your reference code DIR 1255 STP 8.2568) regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

DOT – Airports

1. We acknowledge your comments regarding airspace and mandated review by DOT-AIR.

As the EIS Section 5.11.7 (Airports and Airfields) states:

To prevent potential impacts to airport activities from wildlife, glint/glare hazards, obstructions and other issues, the Federal Aviation Administration (FAA) is being consulted to ensure compliance with any applicable rules and laws including those outlined in the State Office of Planning's technical assistance memorandum regarding airports in the state (State Office of Planning, 2016).

DHHL and/or the future developer(s) at Pulehunui North will contact DOT-AIR regarding proposed development projects in the DHHL Project Areas.

2. We acknowledge your comment regarding wildlife and potential bird-strike risk to aircrafts. To address your comment, Section 5.11.7 of the EIS (Airports and Airfields) will be revised as shown on the attachment labeled Airports and Airfields. Section 4.7 Fauna Resources will be revised consistent with the revisions to Section 5.11.7.
3. We acknowledge your comment regarding potential impacts from aircraft operations. To address your comment, Section 5.11.7 of the EIS (Airports and Airfields) will be revised as shown on the attachment labeled Airports and Airfields.

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R. ANA PINCAN, ASLA
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4. We acknowledge your comment regarding FAA Form 7460-1. DHHL and/or developers for the Proposed Action will submit all required forms at the appropriate time in the development process.
5. We acknowledge your comment regarding photovoltaic panels and glare. If solar energy installations are being seriously considered as a viable option for the DHHL Project Areas, DHHL will adhere to all applicable technical guidance and consult further with DOT-AIR and FAA.

DOT – Highways

1. We acknowledge your comment and concur; as Footnote 1 of the TIAR (published in the Draft EIS) stated:

This Maui Veterans Highway Widening improvement is currently not a DOT-funded or approved project and is only an identified roadway capacity solution for long range planning purposes. This TIAR does not assume the Maui Veterans Highway Widening improvement project will be implemented by Year 2038.

To address your comment, the TIAR (refer to Appendix H of the Final EIS) will be revised as follows: Mention of the HDOT 2035 Transportation Plan and widening of Maui Veterans Highway from a 4-lane to 6-lane configuration will be removed in the TIAR as requested by DOT.

Section 5.3 of the EIS (Roadways and Traffic) will be revised as shown on the attachment labeled Roadways and Traffic.

- i. We acknowledge your comment regarding Figures 5.3 and 5.5 of the TIAR.

With a 20-year build-out to Year 2038, ambient growth and numerous background projects in the Kihei and Pūlehuui area increased traffic for this Year 2038 projection. Accounting for these background projects and subsequent traffic growth, partial widening of Maui Veterans Highway is likely needed even without the anticipated land uses in the DHHL Project Areas, which is what is depicted in Base Year 2038 Without Project (Figure 4.4 of the TIAR). This partial widening of Maui Veterans Highway and other roadway improvements shown in Figure 4.4 were carried over into the Future Year 2038 WITH Project (without mitigation) scenario (Figure 5.3 of the TIAR). Figure 5.3 shows that with all background projects and with the DHHL project, various movements will still operate at unacceptable overcapacity conditions with partial widening of Maui Veterans Highway. Therefore, full widening of Maui Veterans Highway from four lanes to six lanes (Figure 5.5 of the TIAR) is needed to accommodate all anticipated projects in the study area.

To address your comment, the TIAR (refer to Appendix H of the Final EIS) will be revised as follows: The TIAR will be revised to include additional scenarios showing only four lanes on Maui Veterans Highway without any widening for the Base Year 2038 Without Project and Future Year 2038 With Project scenarios. A new appendix (Appendix G) will be inserted in the TIAR to show this scenario. In general, these additional requested scenarios will show significantly worsened levels of service and overcapacity conditions, in comparison to the “Without Mitigation” scenarios shown in TIAR Figures 4.3 and 5.3.

Section 5.3 of the EIS (Roadways and Traffic) will be revised as shown on the attachment labeled Roadways and Traffic.

- ii. We acknowledge your comment regarding scenarios evaluated in the TIAR. To address your comment, the TIAR (refer to Appendix H of the Final EIS) will be revised as follows:

A new appendix (Appendix G) will be inserted in the TIAR to show this scenario. The TIAR will be revised to include these scenarios in the overall LOS Table. Table 5.8 in the TIAR will be revised and will compare the following scenarios:

- Future Year 2038 no mitigations (with some MVH widening as part of BY 2038 Mitigation only)
- Future Year 2038 with mitigations for DHHL (with full MVH widening)
- Future Year 2038 no MVH widening (maintain 4-lanes throughout)

Section 5.3 of the EIS (Roadways and Traffic) will be revised as shown on the attachment labeled Roadways and Traffic.

- iii. We acknowledge your comment regarding traffic mitigations. DHHL will work with DOT to fulfill its fair share of improvements in the study area, commensurate with impacts, and any required TIAR updates in the future.

As our traffic engineer observes, cumulative impacts from non-DHHL projects (including non-Pūlehuui projects) are driving some traffic conditions. To address your comment, the TIAR (refer to Appendix H) will be revised as follows:

Section 5.3 of the EIS (Roadways and Traffic) will be revised as shown on the attachment labeled Roadways and Traffic.

- iv. We acknowledge your comment regarding pro rata shares. DHHL traffic constitutes approximately 14% of all forecast Year 2038 traffic, as stated on pages 32 and 58 of the TIAR and in Section 5.3 of the Draft EIS. DHHL and its traffic consultant will coordinate with DOT on pro-rata shares for the various agencies and land uses for nearby developments.

Mr. Jade Butay
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
Page 4 of 4

2. We acknowledge your comment regarding previous consultation.
3. We acknowledge your comment regarding traffic mitigations. DHHL will coordinate with DOT on fulfilling its fair share of improvements in the study area and any required TIAR updates in the future.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,



Selena Pang
PBR HAWAII

Attachments:

Airports and Airfields
Roadways and Traffic

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



**OFFICE OF PLANNING
STATE OF HAWAII**

235 South Bererania Street, 6th Floor, Honolulu, Hawaii 98813
Mailing Address: P.O. Box 2355, Honolulu, Hawaii 98804

DAVID Y. IGE
GOVERNOR
LEO R. ABUNCON
DIRECTOR
OFFICE OF PLANNING

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DTS201901030948BE

December 21, 2018

Ms. Selena Pang, Planner
PBR HA WAI II & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

Dear Ms. Pang:

Subject: Pulehuniui Regional Infrastructure Master Plan
Draft Environmental Impact Statement
TMK: (2) 3-8-008:001 (por), 008, 020, 034, 035, 036, 037 (por), and 038
Wailuku District, Pulehuniui, Maui

Thank you for the opportunity to review the Draft Environmental Impact Statement (Draft EIS). The Department of Hawaiian Home Lands (DHHL) is developing programmatic land uses for Pulehuniui North and South, a total of 830 acres. Commercial and light industrial uses are anticipated for Pulehuniui North, and commercial, light industrial, diversified agricultural, and subsistence agricultural uses, including agricultural homesteads are anticipated for Pulehuniui South. The Department of Land and Natural Resources (DLNR) is proposing an industrial and business park on a 286-acre site and an additional 429 acres in the area that is anticipated to remain fallow. The Department of Accounting and General Services (DAGS) is proposing a Maui Regional Public Safety Complex on behalf of the Department of Public Safety on a 40-45-acre site.

The proposed Pulehuniui Regional Infrastructure Master Plan will involve a coordinated regional infrastructure alternatives analysis for water, wastewater, and key roadways. The Master Plan will include technical studies for DHHL's lands and incorporate by reference information on proposed developments by DLNR and DAGS/PSD. The secondary, supporting purpose is to further define the programmatic land uses on DHHL's lands in Pulehuniui.

The project study area includes DHHL's Pulehuniui North parcel on the western side of Mokulele Highway, State Route 311; Mehamela Loop is the western boundary of the parcel. All remaining parcels in the study area are on the eastern side of Mokulele Highway. All parcels are in the State Agricultural District. Lands adjacent to Pulehuniui North (TMK 3-8-008:008) on the west and southwest are State Important Agricultural Land (IAL). The Land Study Bureau classifies the soil conditions as "A" or "B" for these lands. The remaining agricultural lands in the project study area are classified as "E". Less than one mile southwest of Pulehuniui South is Kealia Pond National Wildlife Refuge. The 700-acre refuge is one of the few natural wetlands remaining in the Hawaiian

Ms. Selena Pang,
December 21, 2018
Page 2

Islands, and is a natural basin for a 56-square mile watershed in the West Maui Mountains. A privately-owned irrigation ditch runs along the western border of Pulehuniui North, roughly following Mehamela Loop, and terminates at Kealia Pond. In addition, the study area is a minimum of one mile from the nearest coastline at Maalaea Bay, a Class A State water.

The Office of Planning (OP) offers the following comments:

1. The regional infrastructure study area is entirely within the State Agricultural District. At some point in the future, the study area will require a State Land Use District Boundary Amendment. OP represents the State as a mandatory party in proceedings before the Land Use Commission (LUC). In developing its position, OP evaluates whether the project meets the LUC decision-making criteria in HRS § 205-17, as well as its conformance with Coastal Zone Management (CZM) objectives and policies in HRS § 205-A-2.

The LUC is obligated under Article XII, Section 7 of the Hawaii State Constitution to protect the reasonable exercise of customarily and traditionally exercised native Hawaiian rights. To fulfill its duty to preserve and protect customary and traditional native Hawaiian rights to the extent feasible, pursuant to the Hawaii Supreme Court's holding in *Ka Paakai O Ka Aina v. Land Use Commission, State of Hawaii*, specific findings are required as to the following:

- a. The identity and scope of valued cultural, historical, or natural resources in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area.
- b. The extent to which those resources — including traditional and customary native Hawaiian rights — will be affected or impaired by the proposed action; and
- c. The feasible action, if any, to be taken by the petitioner to reasonably protect native Hawaiian rights if they are found to exist.

Section 5.1 of the Draft EIS identifies several historic sites on DHHL's lands in Pulehuniui, discusses potential impacts, and proposes mitigation measures; this is consistent with the Ka Paakai requirements. The Draft EIS also discusses the cultural resources and history in the DHHL project areas in Section 5.2. However, the Draft EIS fails to make specific findings regarding the exercise of traditional and customary native Hawaiian rights in these areas as required under the Ka Paakai decision. Section 6.0 and Section 7.0 in the Cultural Impact Assessment (Appendix M) provide more detail, but still does not constitute a specific statement identifying any traditional and customary native Hawaiian rights and their scope in the area, assessing the potential impact of the project, and proposing mitigation measures.



Ms. Selena Pang,
December 21, 2018
Page 3

- The Maui County Department of Water Supply (DWS) currently provides water to the area via two transmission waterlines. Both waterlines draw water from the Iao Aquifer. The Iao Aquifer is designated as a groundwater management area by the State of Hawaii Commission on Water Resource Management which means that the current withdrawal from the aquifer has reached 90 percent of sustainable yield. Consequently, securing sufficient water resources for any development in the area is an issue of concern. The Draft EIS discusses five alternatives (Section 5.8.1, p. 95, and Appendix C Preliminary Engineering and Drainage Report). The preferred alternative is for the DWS to provide water to the study area via a connection to its existing system. However, this would require development of a new water source and improvements to the system. The Draft EIS discusses this issue in detail.
- Stormwater runoff from Pulehunui North generally flows to the south or southwest towards an existing offsite drainage ditch that runs along the west edge of Mehamethia Loop on State-designated Important Agricultural Lands (IAL) and terminates at Kealia Pond (Section 5.8.4 Drainage System, p. 131, and Figure 5-19.) There is no drainage system along most of Mehamethia Loop and stormwater must surface flow across the road. Pulehunui North is adjacent to designated IAL lands to the northwest, west, and southwest. Since commercial and light industrial uses are anticipated for the parcel, it is important that stormwater runoff from Pulehunui North does not enter the IAL lands or Kealia Pond. The Draft EIS recommends localized basins within each area to manage stormwater. New retention basins are proposed for Pulehunui North to retain stormwater, and roadway runoff will also be retained and managed onsite (p.134 and Figure 5-21.) The Draft EIS discusses this issue in detail.
- The Draft EIS addresses the project's consistency with the Hawaii State Plan in detail in Section 6.2.4, pages 171-197.
- CZM objectives and policies are addressed in Section 6.2.3, and Table 6-1, pages 166-177.

Thank you for the opportunity to review this project. If you have any questions, please call Aaron Setogawa of our Land Use Division at (808) 587-2883.

Sincerely,

Leo R. Asuncion
Director

June 14, 2019

Mary Alice Evans, Director
State of Hawaii
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, HI 96804

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI

Dear Ms. Evans,

Thank you for your office's review and letter dated December 21, 2018 (your reference code DTS201901030948BE) regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

- We acknowledge your comment regarding permits and approvals needed for specific projects serviced by the Proposed Action regional infrastructure. In the Final EIS Section 6.4 (Approvals and Permits) will be revised as shown on the attachment labeled Approvals and Permits.
We value your comments regarding the reasonable exercise of customarily and traditionally exercised native Hawaiian rights. To address this comment, the Cultural Impact Assessment was revised accordingly (refer to Appendix M). In the Final EIS Section 5.2 (Cultural Resources) the following text will be added to "Potential Impacts and Mitigation Measures":

In response to the Department of Public Safety's and the State Office of Planning's comments, several revisions will be made to Sections 6.0 and 7.0 of the Cultural Impact Assessment (Appendix M) including the following language:

While the biological resources survey completed for the proposed project identified two indigenous native plants, 'uhaloa (*Waltheria indica*) and 'i'ima, within the project footprint (Hobby 2011-4), there were no on-going traditional and customary practices within the current project area that are reliant on gathering these plants from within the proposed project footprint. Additionally, while the central isthmus, including the section of Pulehunui Ahupua'a where the proposed project is located, was once known for trails between the mauika reaches and the shoreline, as well as, the central isthmus via foot trails were not mentioned by respondents to the DHHL beneficiary survey, participants in Cultural Impact Assessment studies completed for projects directly adjacent to the current project area, or during consultation with Kula Makai Moku representative Mr. Vernon Kalanikau. Given the above, there

- THOMAS WITEN, ASLA
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Ms. Mary Alice Evans
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PŪLEHUNUI
INFRASTRUCTURE REGIONAL MASTER PLAN, ISLAND OF MAUI
6/14/19
Page 2 of 2

are no anticipated impacts or adverse effects to either specific traditional cultural resources that are related to on-going traditional and customary practices within the proposed footprint of the current project area, or the ability to carry-out traditional and customary practices via access through the current project area.

[...]

In response to the aforementioned CIA revisions, two cultural mitigations were added and are summarized below.

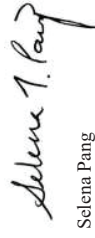
- Embrace the re-introduction and cultivation of suitable native plants, in support of la'au lapa'au (traditional Hawaiian medicine) practices and traditional crafts.
- Consider traditional trail systems during lot design. The DHHL Project Areas have not been used for traditional trail access within the last century; this mitigation embraces a revival of trail system access to the shoreline, as well as between Waikapū and upland Kula.

2. We acknowledge your comment regarding the water source for the Project Area. DHHL continues to coordinate with the Department of Water Supply regarding Water Alternative 1.
3. We acknowledge your comment regarding stormwater runoff.
4. We acknowledge your comment regarding the Project's consistency with the Hawai'i State Plan.
5. We acknowledge your comment regarding CZM objectives and policies addressed in the Draft EIS.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,


Selena Pang
PBR HAWAII

Attachment: Approvals and Permits

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

First Name: Harold

Last Name: Alejandro

Address: 919 Ala Moana Blvd. Room 413

City: Honolulu

State: Hawaii

ZIP: 96706

Email: harold.b.alejandro@hawaii.gov

Submitted By: Department of Public Safety

4. Section 6.0, Subsection 6.3 County of Maui

Comment: Missing discussion for Future Jails and/or Correctional Facilities if a County Special Use Permit (CUP) needs to be filed with the Maui County, Dept. of Planning. Please also discuss possible additional permits associated with the Land Use Commission with the State of Hawaii need to also be filed?

Ref: Chapter 19.510.010 MCCC Application and Procedures;
Chapter 19.510.020 MCCC, Application for Public Hearing;
Chapter 19.501.070 Special Use Permit

Nothing Follows: End PSD Comments.

¹ Noise exposure assessment and abatement.pdf

¹ 2013-104.pdf

Pulehunui Regional Infrastructure Master Plan DEIS

Comments by: Harold Alejandro, PSD CIP Coordinator/Facility Engineer
Office: Administrative Services Offices (ASO)

ph: (808) 587-1239

For and On Behalf of: The Dept. of Public Safety

TMKs: 3-8-008:037 (222.63 Acres); 3-8-008:001 (398.1 Acres)

Project Area: 40-45 Acres

REVIEW NOTES:

1. Section 5.0, Subsection 5.1 Archeological and Historical Resources-AND-Subsection Cultural Resources

Comment: Missing discussion on potential Gathering Rights Concerns at the affected property.

2. Section 5.0, Subsection 5.8 Infrastructure and Utilities

Comment: Missing discussion to bring Utility Gas to the property, as well as discussion on other alternative renewable energy sources such as Solar and Wind Power.

3. Section 5.0, Subsection 5.4 Sound

Comment: No discussion on impact of background noise from the adjacent Active National Guard Armory. Additionally, it should be noted in the Draft EIS that the PSD is proposing at the DAGS/PSD MRPSC Site plans to construct an either an Indoor or Outdoor Firing Range for Weapons Qualification Purposes. Anticipated noise levels for Fire Ranges range from 78 decibels which can reach to 122 decibels but according to NIOSH 1998 cannot exceed 140 decibels. Please provide discussion if warrant an impact to the surrounding development.

WORKPLACE SOLUTIONS

From the National Institute for Occupational Safety and Health

Reducing Exposure to Lead and Noise at Outdoor Firing Ranges

Summary

The National Institute for Occupational Safety and Health (NIOSH) recently published recommendations for reducing exposure to lead and noise at indoor firing ranges [NIOSH 2009]. However, workers and users of outdoor firing ranges may be exposed to similar hazards. This follow-up document examines exposures at these ranges and recommends steps to reduce such exposures.

Exposure Sources

Several studies of outdoor firing ranges have shown that exposure to lead and noise can cause health problems, particularly among employees and instructors [NIOSH 2011; Tripathi et al. 1991; Goldberg et al. 1991]. Lead exposure occurs mainly through inhalation of lead dust, skin contact with lead from bullets, or ingestion (e.g., eating or drinking with contaminated hands) [NIOSH 2009]. Workers and shooters involved in shooting, cleaning and operations, collecting casings, and handling spent bullets may also be exposed to lead.

Exposure Limits

Lead

OSHA has established two different limits for airborne exposure to lead [29 CFR 1910.1025]. The action level for airborne lead exposure is 30 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) as an 8-hour time weighted average (TWA). The OSHA PEL for airborne exposure to lead is 50 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA. For workers exposed to airborne lead above the action level for more than 30 days per year, OSHA requires blood lead monitoring every 6 months. If an employee's blood lead level (BLL) exceeds 60 $\mu\text{g}/\text{lead}/100\text{ g}$ of whole blood (or the average of the last 3 BLLs is greater than 50 $\mu\text{g}/\text{lead}/100\text{ g}$), the employee must be removed from further exposure until BLLs decline to 40 $\mu\text{g}/\text{lead}/100\text{ g}$ or less.

The NIOSH REL for airborne lead is 50 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA. The U.S. Department of Health and Human Services recommends that BLLs among all adults be reduced to <10 $\mu\text{g}/\text{dL}$ [DHHS 2011].

Noise

For noise exposure, the OSHA PEL is 90 decibels, A-weighted (dBA), and the action level is 85 dBA both as an 8-hour TWA. See [NIOSH 2011](#) for references.

Indoor vs. Outdoor Ranges

An estimated 9,000 non-military outdoor ranges exist in the United States, with millions of pounds of lead from bullets shot annually. Because outdoor ranges are typically built in an open area, lead and noise are more widely dispersed. Outdoor ranges need less cleaning and maintenance than indoor ranges. However, despite the natural ventilation of outdoor firing ranges, personal breathing zone lead levels can exceed the NIOSH recommended exposure limit (REL) and Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) [Mancuso et al. 2008]. Some outdoor ranges have ballistic baffles overhead and concrete walls and structures on the sides. The air in these spaces can become stagnant and lead to increased exposures.

Description of Exposure Affected Population

According to the Bureau of Justice Statistics, more than 1.2 million Federal, State, and local law enforcement officers work in the United States [DOJ 2012, 2011]. These officers are required to train regularly in the use of firearms and may be exposed to hazardous levels of lead and noise if they train at outdoor ranges. In addition to law enforcement, NIOSH estimates that shooting ranges employ 40,000–60,000 workers, and that about 15% of the U.S. population, or 34.4 million people, participate in target shooting [NIOSH 2010].



DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

TWA using a 5-dB exchange rate [29 CFR 1910.95]. The OSHA occupational noise standard states that exposures to impulsive noise should not exceed 140 dB peak sound pressure level (SPL).

The NIOSH REL for noise (8-hour TWA) is 85 dBA using a 3-dB exchange rate [NIOSH 1998]. NIOSH also recommends that peak SPL not exceed 140 dB.

NIOSH Investigations

NIOSH conducted Health Hazard Evaluations that involved exposure to lead and noise to law enforcement officers and employees at outdoor firing ranges (Figure 1).

Lead

At a firing range in California, 16 personal breathing zone (PBZ) air samples and six surface wipe samples were collected for lead (REL or PEL) for lead. The highest lead exposure (15 $\mu\text{g}/\text{m}^3$) was measured on an instructor at the range. Exposures can vary depending on weather conditions (particularly wind speed and direction) and the shooter's proximity to the gun smoke source. The highest levels of surface contamination were on the firearms. Lead was also found on outdoor picnic tables where employees ate. Colorimetric wipe tests identified lead on hands, but employees had good personal hygiene practices; no lead was found on hand wipes after hand washing [NIOSH 2011].

Noise

NIOSH evaluated the noise exposure of a SWAT team in Fort Collins, CO, during training exercises. Hearing was tested before and immediately after training sessions. Noise measurements were made of firearms and of the protection offered by customized hearing protectors. Most officers did not show any change in hearing after shooting, but the oldest group did show mild hearing loss at higher frequencies. Firearm noise was between 159 and 169 dB, which was greater than the 140 dB peak limit for impulsive noise. Peak noise reductions from the earplugs, ear muffs, and customized protectors were in the 30 dB range. Double hearing protection (plugs plus muffs) added 15–20 dB of additional protection [NIOSH 2003].



Figure 1. NIOSH exposure assessment of Federal law enforcement officers conducting a live-fire training exercise

Recommendations

Workers and shooters at outdoor firing ranges should take the following steps to protect themselves [NIOSH 2003, 2009, 2011]:

- Attend training, follow safe work practices, and participate in health monitoring programs.
- Report symptoms to your employer and get medical attention when needed:
 - Common health effects of lead poisoning in adults include reproductive effects, nausea, diarrhea, vomiting, poor appetite, weight loss, anemia, fatigue, hyperactivity, headaches, stomach pain, and kidney problems.
 - Exposure to high noise levels can cause hearing loss, tinnitus (ringing in the ear), stress, high blood pressure, fatigue, and gastro-intestinal problems.
 - If you suspect you have had high lead exposure, even if you show no symptoms, get your BLL tested.
- Practice good hygiene:
 - Wash hands and face with soap and water or clean them with lead decontamination wipes after shooting, handling spent cartridge cases, or cleaning weapons, especially before eating, drinking, or smoking. Wipes for cleaning skin without water are commercially available and should be used if access to soap and water is limited [NIOSH 2009].
 - Change clothes before leaving the range and wash clothes separately from other family clothing.
- Use personal protective equipment (PPE):
 - Wear double hearing protection (earplugs and ear-muffs) and eye protection when shooting.
 - Wear a brimmed cap and tight-fitting clothes for protection against hot shells and ejected casings if the ranges' shooting stations are in very close proximity.
 - Wear properly-fitted respirators and full protective outer clothing for maintenance activities that involve close contact with lead dust or spent bullets.
 - Wear gloves and eye protection when using chemicals to clean firearms.

Employers should take the following steps to protect workers and shooters at firing ranges:

- Consider providing non-lead bullets and non-lead primers (often referred to as "green" or non-toxic" ammunition) [NIOSH 2011].
- If state law permits, consider providing noise suppressors for gun barrels [NIOSH 2011].
- Establish effective engineering and administrative controls:
 - Apply appropriate noise control measures, such as sound transmission barriers (i.e., walls, earthen berms), and absorptive materials such as acoustical treatments

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and natural vegetative (i.e., plants, trees, grass) buffers to limit noise in nearby areas [MN DNR 2003].

- If possible, use non-porous materials, coatings, or plastic covers on all contact surfaces to make them easier to clean.

- Limit the length of time that workers and shooters use the firing range; rotate assignments and provide quiet, clean, break areas.
- If you operate a range with ballistic or overhead baffles and wall structures, consider using fans behind the shooters and pointed down-range in order to provide sufficient air movement away from the shooters.

- Routinely clean the range using proper techniques and disposal methods. Do not use dry sweeping, wiping, or dusting. Use wet cleaning and HEPA vacuums only [NIOSH2011].

- Consider installing wind speed and direction meters. Post range safety rules and provide authority to range masters to enforce them.

- Provide workers and shooters with training and information about hazards:

- Inform workers and shooters about the importance of hygiene in reducing potential lead exposures, post warning signs, and provide convenient washing facilities to encourage frequent hand washing.

- Prohibit eating, smoking, chewing gum, or tobacco use in areas potentially contaminated with lead.

- Inform pregnant workers and shooters about possible risks to the fetus.

- Ensure that workers are aware of symptoms that may indicate a health problem.

- Tell workers about participating in medical surveillance programs and getting their BLLs tested, even if they don't show symptoms.

- Review OSHA requirements for medical monitoring for lead (29 CFR 1910.1025(f)) and noise (29 CFR 1910.95(d)(e)(g)(h)).

- For best medical and lead management practices, consult the Association of Occupational and Environmental Clinics [Kosnett et al. 2007].

- To reduce lead contamination at your range, consult the EPA's Best Management Practices for Lead at Outdoor Shooting Ranges [EPA 2001].

- Establish a hearing conservation program [NIOSH 2011].

- Provide workers with protective equipment:
 - Provide and encourage the use of double hearing protection devices (earplugs and earmuffs) along with hygiene and cleaning kits.

- Provide skin protection, eye protection, and NIOSH-approved respirators for workers who clean lead-contaminated areas.
- Provide knee or full body pads to limit transfer of lead to clothing.

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Acknowledgments

This document was prepared by Chucri A. Kardous and Susan Afanah, National Institute for Occupational Safety and Health.

^aA written respiratory protection program should be developed and implemented that met the requirements of the OSHA respiratory protection standard [29 CFR 1910.134].

For more information

More information about firing ranges and NIOSH HHEs on firing ranges can be found on the NIOSH firing range topic page:

<http://www.cdc.gov/niosh/topics/lead/>

General information about noise and lead exposures can be found on these NIOSH topic pages:

<http://www.cdc.gov/niosh/topics/noise>
<http://www.cdc.gov/niosh/topics/lead/>

To obtain information about other occupational safety and health topics, contact NIOSH:

Telephone: 1-800-CDC-INFO (1-800-232-4636)
TTY: 1-888-232-6348 • E-mail: cdcinfo@cdc.gov

or visit the NIOSH Web site at www.cdc.gov/niosh

For a monthly update on news at NIOSH, subscribe to NIOSH eNews by visiting www.cdc.gov/niosh/eNews.

Reducing Exposure to Lead and Noise at Outdoor Firing Ranges

DHHS (NIOSH) Publication No. 2013-104

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PubMed

Format: Abstract

Appl. Occup. Environ. Hyg., 2003 Aug;18(8):629-36.

Noise exposure assessment and abatement strategies at an indoor firing range.

Kardous CA¹, Wilson RD, Hayden CS, Szilapa P, Murphy WJ, Reeves ER.

Author information

Abstract

Exposure to hazardous impulse noise is common during the firing of weapons at indoor firing ranges. The aims of this study were to characterize the impulse noise environment at a law enforcement firing range; document the insufficiencies found at the range from a health and safety standpoint; and provide noise abatement recommendations to reduce the overall health hazard to the auditory system. Ten shooters conducted a typical live-fire exercise using three different weapons—the Beretta.40 caliber pistol, the Remington.308 caliber shotgun, and the M4.223 caliber assault rifle. Measurements were obtained at 12 different positions throughout the firing range and adjacent areas using dosimeters and sound level meters. Personal and area measurements were recorded to a digital audio tape (DAT) recorder for further spectral analysis. Peak pressure levels inside the firing range reached 163 decibels (dB) in peak pressure. Equivalent sound levels (Leq) ranged from 78 decibels, A-weighted (dBA), in office area adjacent to the range to 122 dBA inside the range. Noise reductions from wall structures ranged from 29-44 dB. Noise abatement strategies ranged from simple noise control measures (such as sealing construction joints and leaks) to elaborate design modifications to eliminate structural-borne sounds using acoustical treatments. Further studies are needed to better characterize the effects of firing weapons in enclosed spaces on hearing and health in general.

PMID: 12851012 DOI: 10.1080/10473220301409

[Indexed for MEDLINE]



MeSH terms



LinkOut - more resources



June 14, 2019

Mr. Nolan Espinda, Director
State of Hawaii
Department of Public Safety
919 Ala Moana Boulevard
Honolulu, HI 96814

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

ATTN: Mr. Wayne Takara, Mr. Harold Alejandro
Dear Mr. Espinda,

Thank you for your review and letter dated December 24, 2018 regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

1. We acknowledge your comment regarding cultural resources. To address this comment, the Cultural Impact Assessment will be revised accordingly (refer to Appendix M). In the Final EIS Section 5.2 (Cultural Resources) the following text will be added to "Potential Impacts and Mitigation Measures" to address the Department of Public Safety (PSD)'s comment:

In response to PSD's and the State Office of Planning's comments, several revisions will be made to Sections 6.0 and 7.0 of the Cultural Impact Assessment (Appendix M) including the following language:

While the biological resources survey completed for the proposed project identified two indigenous native plants, 'uhaloa (*Waltheria indica*) and 'ilima, within the project footprint (Hobdy 2011:4), there were no on-going traditional and customary practices within the current project area that are reliant on gathering these plants from within the proposed project footprint. Additionally, while the central isthmus, including the section of Pulehunu Ahupua'a where the proposed project is located, was once known for trails between the mauka reaches and the shoreline, as well as, transit between Waikapu and upland Kula, contemporary pedestrian access across the central isthmus via foot trails were not mentioned by respondents to the DHHL beneficiary survey, participants in Cultural Impact Assessment studies completed for projects directly adjacent to the current project area, or during consultation with Kula Makai Moku representative Mr. Vernon Kalanikau. Given the above, there are no anticipated impacts or adverse effects to either specific traditional cultural resources that are related to on-going traditional and customary practices

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within the proposed footprint of the current project area, or the ability to carry-out traditional and customary practices via access through the current project area.

[...]

In response to the aforementioned CIA revisions, two cultural mitigations were added and are summarized below.

- Embrace the re-introduction and cultivation of suitable native plants, in support of ia au lapa au (traditional Hawaiian medicine) practices and traditional crafts.
- Consider traditional trail systems during lot design. The DHHL Project Areas have not been used for traditional trail access within the last century; this mitigation embraces a revival of trail system access to the shoreline, as well as between Waikapū and upland Kula.

2. We acknowledge your comment regarding utility gas and alternative renewable energy. To provide more information regarding gas utility availability, Section 5.8.6 (Electrical, Telephone and Cable Television) will be revised to state:

According to the Hawai'i Public Utilities Commission:

The Commission regulates the production, conveyance, transmission, and delivery of gas. When the gas pipelines deliver fuel directly to a property, this service is called "utility gas" and is regulated by the Commission. However, sales of gases in cylinders (for example, propane, medical, and industrial gases) are not regulated by the Commission.

Hawai'i's only utility gas provider, The Gas Company (dba Hawai'i Gas), serves customers in its six gas districts: Honolulu, Hawaii Island, Maui, Mokolai (sic), Lanai, and Kauai.

DHHL's engineering consultant notes that currently Maui does not have a municipal gas utility.

The following text will be added to "Potential Impacts and Mitigation Measures":

Energy saving strategies and use of alternative/renewable energy (such as solar and wind power) will be considered as plans for the DHHL Project Areas progress...Based on PSD's comments, PSD will likely coordinate with The Gas Company to bring utility gas to the proposed MRPSC, as well as consider alternative renewable energy sources such as solar and wind power in designing and constructing the MRPSC. Individual agencies may pursue gas utility options to supply their respective projects, if site conditions allow for the requisite infrastructure. Similarly, renewable energy sources such as solar and wind power would be considered on a site by site basis by the entity involved in developing its individual project. The Pūlehuui Regional Infrastructure Master Plan does not preclude

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individual agencies from selecting any given energy alternative(s) as they design and implement their respective independent projects.

3. We acknowledge your comment about potential noise impacts by Hawai'i Army National Guard activities at the Pu'unēnē Armory. To address this comment, the Final EIS Section 5.4 (Sound) will be revised as shown on the attachment labeled Sound.

Regarding proposed activities at the future Maui Regional Public Safety Complex, we note that the uses you describe in your letter do not impact regional infrastructure as described in the Draft EIS. The EIS incorporates by reference project information provided by DLNR and DAGS/PSD, for their respective proposed developments. As the Draft EIS notes, this includes the Maui Regional Public Safety Complex Environmental Impact Statement Preparation Notice. Due to concerns about noise and safety, DHHL would prefer that PSD construct an indoor firing range as opposed to an outdoor one; DHHL will participate in consultation as PSD proceeds with the planning process for the MRPSC.

4. We acknowledge your comment regarding permits and approvals needed for specific projects serviced by the Proposed Action regional infrastructure. A discussion of permitting and/or approvals associated with a specific project within the Infrastructure Regional Study Area should be included in environmental reporting documents specific to that project, in compliance with Chapter 343, HRS.

To directly address your comment, EIS Section 6.4 (Approvals and Permits) will be revised to state:

Since the Proposed Action does not include the planning, design, and construction of the MRPSC, a listing of anticipated permits and approvals for the MRPSC has not been added to Table 6-5. The Pūlehuui Regional Infrastructure Master Plan incorporates by reference other available project information, if provided by DLNR, and DAGS/PSD for their respective proposed developments in the region. See Section 3.3.2.


As noted in the Draft EIS, the primary purpose of the Proposed Action is to undertake regional infrastructure master planning on behalf of DHHL, Department of Land and Natural Resources (DLNR), and Department of Accounting and General Services on behalf of Department of Public Safety (DAGS/PSD), to facilitate the efficient development of certain lands managed by those agencies in Pūlehuui. Pursuant to DHHL's mission the secondary, supporting purpose of this action is to further define the programmatic land uses anticipated on DHHL's lands in Pūlehuui. Section 6.4 of the EIS includes a list of the permits and approvals anticipated for the Proposed Action.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

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If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands
at (808) 620-9500.

Sincerely,



Selena Pang
PBR HAWAII

Attachment: Sound

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850



In Reply Refer To:
01EPHF00-2019-SL-0079

November 26, 2018

PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

Subject: Species List for Pūlehuui Regional Infrastructure Master Plan, Wailuku District, Maui

Dear PBR Hawaii:

The U.S. Fish and Wildlife Service (Service) received your correspondence on November 2, 2018, regarding availability for review of a Draft Environmental Impact Statement (EIS) for the Pūlehuui Regional Infrastructure Master Plan. The Department of Hawaiian Homelands (DHHL) is undertaking a regional infrastructure master planning effort on behalf of four State agency stakeholders involving a coordinated regional infrastructure alternatives analysis for water, wastewater, drainage, and key roadways (the "Infrastructure Regional Study Area"). The regional analysis will evaluate alternatives for regional, sub-regional, and "independent" approaches to infrastructure development. In addition, the Proposed Action involves DHHL Project Areas ("Pūlehuui North" and "Pūlehuui South"). The land use programs on the DHHL Project Areas are anticipated to involve commercial, light industrial, diversified agricultural, and subsistence agricultural use including agricultural homesteads for DHHL beneficiaries. A portion of Pūlehuui South may accommodate supporting regional infrastructure, pending consultation and appropriate technical studies. Regional Infrastructure Master Plan is located in Wailuku District, Maui, near Kihei, on approximately 1,500 acres (lat. 20.8103, long. -156.4638).

Based on information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Project, there are five listed species in the vicinity of the project area: the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian petrel (*Pterodroma sandwicensis*), band-rumped storm-petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus newelli*), and endangered Blackburn's sphinx moth (*Manduca blackburni*). There is no proposed or final critical habitat within the vicinity of the project area. Kealia Pond National Wildlife Refuge is located less than ¼ mile from Pūlehuui South, proposed project area. We offer the following recommendations to avoid and minimize project impacts to listed species pursuant to the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

Hawaiian hoary bat:

The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet (ft) or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Additionally, Hawaiian hoary bats forage for insects from as low as 3 ft to higher than 500 ft above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project description:

- Do not disturb, remove, or trim woody plants greater than 15 ft tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

Seabirds:

Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following applicable measures into your project description:

- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

Blackburn's sphinx moth

The Blackburn's sphinx moth may be in the vicinity of the proposed project area. Adult moths feed on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), lily (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichtiana*); larvae feed upon non-native tree tobacco (*Nicotiana glauca*) and native aiea (*Nothocestrum* sp.). To pupate, the larvae burrow into the soil and can remain in a state of torpor for up to a year (or more) before emerging from the soil. Soil disturbance can result in death of the pupae.

We offer the following survey recommendations to assess whether the Blackburn's sphinx moth is within the project area:

- A biologist familiar with the species should survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.
 - Surveys should be conducted during the wettest portion of the year (usually November-April or several weeks after a significant rain) and within 4-6 weeks prior to construction.

- o Surveys should include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
- o If moths or the native aiea or tree tobacco over 3 ft tall are found during the survey, please contact the Service for additional guidance to avoid take.

If no Blackburn's sphinx moth, aiea, or tree tobacco are found during surveys, it is imperative that measures be taken to avoid attraction of Blackburn's sphinx moth to the project location and prohibit tree tobacco from entering the site. Tree tobacco can grow greater than 3 ft tall in approximately 6 weeks. If it grows over 3 ft, the plants may become a host plant for Blackburn's sphinx moth. We therefore recommend that you:

- Remove any tree tobacco less than 3 ft tall.
- Monitor the site every 4-6 weeks for new tree tobacco growth before, during and after the proposed ground-disturbing activity.
- o Monitoring for tree tobacco can be completed by any staff, such as groundskeeper or regular maintenance crew, provided with picture placards of tree tobacco at different life stages.

Thank you for your efforts to conserve listed species and native habitats. Please contact Fish and Wildlife Biologist Jay Nelson (808-792-9441, email: jay_nelson@fws.gov) if you have any questions or for further guidance.

Sincerely,

Acting for Michelle Bogardus
Island Team Leader
Maui Nui and Hawaii Island



June 14, 2019

Ms. Robyn Thorson, Regional Director
U.S. Fish and Wildlife Service, Pacific Division
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

ATTN: Ms. Jodi Charrier

Dear Ms. Thorson,

Thank you for your review and letter dated November 26, 2018 (your reference code 01EPIF00-2019-SL-0079) regarding the Draft Environmental Impact Statement (EIS) for the Proposed Action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge your letter and offer the following responses on behalf of the Proposing Agency DHHL and regional State agency stakeholders.

We acknowledge your comment that there is no proposed or final critical habitat within the vicinity of the Infrastructure Regional Study Area.

We acknowledge your comments regarding listed species. To address these comments and those received from other agencies on a similar topic, the Final EIS Section 4.7 (Fauna Resources) will be revised as shown on the attachment labeled Fauna Resources.

We appreciate your participation in the environmental review process. Your comments will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena T. Pang
Selena Pang
PBR HAWAII

Attachment: Fauna Resources

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

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November 19, 2018

Ms. Selena Pang, Planner
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

Mr. Kaleo Manuel, Acting Planning Program Manager
State of Hawaii
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Ms. Pang and Mr. Manuel:

Subject: Draft Environmental Impact Statement (EIS) for the Pulehunu Regional Infrastructure Master Plan, Pulehunu, Wailuku, Maui, Tax Map Keys (TMK): (2) 3-8-008-008; (2) 3-8-008-034; (2) 3-8-008-036; (2) 3-8-008-001 (por.); (2) 3-8-008-038; (2) 3-8-008-001 (por.); (2) 3-8-008-020; (2) 3-8-008-037 (por.); (2) 3-8-008-001 (por.)

Thank you for your letter regarding the subject EIS for review and comment by the staff of the U.S. Geological Survey Pacific Islands Water Science Center. We regret however, that due to prior commitments and lack of available staff, we are unable to review this document.

We appreciate the opportunity to participate in the review process.

Sincerely,

SSA
Stephen S. Anthony
Center Director



PBR HAWAII
& ASSOCIATES, INC.

June 14, 2019

Mr. Stephen S. Anthony, Center Director
U.S. Geological Survey
Pacific Islands Water Science Center
1845 Wasp Boulevard, Building 176
Honolulu, HI 96818

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PULEHUNUI INFRASTRUCTURE REGIONAL MASTER PLAN,
ISLAND OF MAUI**

Dear Mr. Anthony,

Thank you for your review and letter dated November 19, 2018 regarding the Draft Environmental Impact Statement (EIS) for the proposed action. As the planning consultant for the Department of Hawaiian Home Lands (DHHL), we acknowledge you have no comments to offer at this time.

We appreciate your participation in the environmental review process. Your letter will be reproduced in the forthcoming Final EIS.

If you have any questions, please contact Julie Ann Cachola of the Department of Hawaiian Home Lands at (808) 620-9500.

Sincerely,

Selena T. Pang

Selena Pang
PBR HAWAII

cc: Department of Accounting and General Services
Department of Land and Natural Resources
Department of Public Safety

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ATTACHMENTS

ATTACHMENT

4.7 FAUNA

4.7 FAUNA RESOURCES

During the Draft EIS public review period, the U.S. Fish and Wildlife Service (USFWS) wrote: Based on information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Project, there are five listed species in the vicinity of the project area: the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian petrel (*Pterodroma sandwichensis*), band-rumped storm-petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus newelli*), and endangered Blackburn's sphinx moth (*Manduca blackburni*). There is no proposed or final critical habitat within the vicinity of the project area. Keālia Pond National Wildlife Refuge is located less than ¼ mile from Pūlehunui South, proposed project area. We offer the following recommendations to avoid and minimize project impacts to listed species pursuant to the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq).

[...]

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

Walk-through fauna surveys were conducted by Robert Hobby in conjunction with the biological surveys conducted in 2011 (Pūlehunui North) and 2017 (Pūlehunui South). All parts of each property were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and location as well as observations of trails, tracks, scat and signs of feeding. In addition, evening visits were made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

U.S. Fish and Wildlife Service Critical Habitat

There are no U.S. Fish and Wildlife Service Critical Habitat areas in the DHHL Project Areas (see Figure 4-6).

Pūlehunui North Mammals

Three species of non-native mammals or their signs were observed during two site visits. Taxonomy and nomenclature follow Tomich (1986). These include signs of domestic dog (*Canis familiaris*), feral cat (*Felis catus*) and rat (*Rattus* sp.)

Other non-native mammals one would expect to see in this habitat include mice (*Mus domesticus*) and mongoose (*Herpestes auropunctatus*). These rodents feed on seeds, fruits, insects, eggs and herbaceous vegetation and are prey for the cats and mongoose.



Figure 4-6:
USFWS Critical Habitat and Kealia Pond
PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
 DATE: 9/15/2018

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey at two sites in Pūlehuui North. When present in an area these bats can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the glow of twilight. No evidence of such activity was observed though visibility was excellent and plenty of flying insects were seen. In addition, a bat-detecting device (Batbox IID) was employed after dusk, set to the frequency of 27,000 Hertz which these bats are known to use for echolocation. No bats were detected at either site using this device.

Pūlehuui South Mammals

Tracks of four mammal species were seen during three site visits in the Pūlehuui South. Recent rains left much muddy ground that facilitated track identification. Most common were feral pigs (*Sus scrofa*) whose tracks were everywhere, and some were seen. Axis deer (*Axis axis*) tracks were also widespread and one small herd was seen after dark. Also common were mongoose (*Herpestes auripunctatus*) tracks and scat. Tracks of one domestic dog (*Canis familiaris*) were seen.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey of the Pūlehuui South at four locations. A bat detecting device (Batbox IID) was employed that steps-down the ultra-sonic echo-location call they emit from 27,000 hertz into the audible range of humans. A single bat was detected at close range at one location in the northwest corner of the Pūlehuui South adjacent to Kōialoa Stream channel just above Maui Veterans Highway.

A few other non-native mammal species that could be expected to occur in the Pūlehuui South include mice (*Mus domesticus*), rats (*Rattus spp.*) and feral cats (*Felis catus*).

Pūlehuui North Birds

There were moderate levels of both bird species and total numbers observed across Pūlehuui North during two site visits. When sugar cane was in cultivation, temporary puddles from agricultural drip irrigation drew in a number of these species to the area. Fourteen bird species were recorded, including 12 non-native species, 1 migratory species, the Pacific golden plover or kōlea (*Pluvialis fulva*), and 1 indigenous waterbird, the black-crowned night-heron or 'auku'u (*Nycticorax hoactli*). Taxonomy and nomenclature follow American Ornithologists' Union (2011).

Two bird species were common around the sugar cane fields: zebra dove (*Geopelia striata*) and spotted dove (*Streptopelia chinensis*). Less common were the rock dove (*Columba livia*) and the migratory kōlea. One 'auku'u was seen at dusk flying over the area towards a plantation reservoir where it would roost for the night. A few other non-native bird species such as the northern cardinal (*Cardinalis cardinalis*), house finch (*Carpodacus mexicanus*) and the nutmeg mannikin (*Lonchura punctulata*) might also be expected to occur here, but the habitat is not suitable for Hawai'i's native forest birds that are presently restricted to higher elevations beyond the range of mosquitoes and the deadly avian diseases they transmit. None of the Endangered nēnē goose (*Branta sandvicensis*) were seen in the habitat.

Hawaiian Biodiversity and Mapping records indicated that several of the Endangered Hawaiian stilt (*Himantopus mexicanus knudseni*) and Hawaiian coot (*Fulica alai*) have been seen at Kealia National Wildlife Refuge a mile to the south and at small plantation reservoirs over a mile to the north of the

area. These water birds are attracted to such aquatic features. No such aquatic features occur in the area and these birds are not likely to utilize this dry habitat.

Pūlehuui South Birds

Birdlife was fairly diverse with 14 species being recorded during three site visits to the Pūlehuui South. Taxonomy and nomenclature follow American Ornithologists' Union (2017). Three species were common throughout the Pūlehuui South, including the zebra dove (*Geopelia striata*), the spotted dove (*Streptopelia chinensis*) and the gray francolin (*Francolinus pondicerianus*). Uncommon were the black francolin (*Francolinus francolinus*), mourning dove (*Zenaidura macroura*), house finch (*Carpodacus mexicanus*), African silverbill (*Lonchura cantans*) and the 'akekeke or ruddy turnstone (*Arenaria interpres*). An additional six species were of rare occurrence.

Two species were indigenous, migratory birds that breed and raise their young in the arctic during the summer but spend their winter months in Hawai'i: the 'akekeke and the kōlea or Pacific golden-plover (*Plover fulva*).

A few other non-native birds might occasionally be seen here, but the habitat is not suitable for Hawai'i's native forest birds and seabirds that nest high in the mountains beyond the range of mosquitoes and the avian diseases they carry and transmit.

Pūlehuui North Insects

There were moderate numbers of insect species encountered in this area. A total of 10 non-native species were identified within 6 insect Orders (See Fauna Inventory). Taxonomy and nomenclature follow Nishida et al (1992). No native species were seen. Two species were of common occurrence in the area: the common honey bee (*Apis mellifera*) and the long-tailed blue butterfly (*Lamipides boeticus*).

A special effort was made to look for the Endangered Blackburn's sphinx moth (*Manduca blackburni*) (USFWS 2008) by carefully examining the approximately 30 specimens of its non-native alternate host plant, the tree tobacco (*Nicotiana glauca*), that were found in the area. No adult moths, their larvae or their eggs were found on these plants. These moths are closely linked to certain plants in the nightshade family, which have toxins to which the moths and larvae have adapted that provide protection from potential predators. (Adult moths can also feed on nectar from native plants including beach morning glory (*Pomoea pes-caprae*), 'ilie'e (*Plumbago zeylanica*), and malapilo (*Caparis sandwichiara*).) The native species of 'aiea (*Nothocestrum* spp.) used to provide these protections, but has now become rare, and the Blackburn's sphinx moth subsequently became rare as well. Fortunately for the moth, the non-native tree tobacco shrub provides a source of similar toxins, and moth numbers are starting to rebound. Tree tobacco thrives in hot, dry climates and had invaded sugar cane fields where it enjoyed irrigation and fertilizer. Historically, tree tobacco populations were held in check during the harvesting process when the fields were burned. However, now that sugarcane agriculture has ceased and these fields are fallow, tree tobacco plants are becoming more abundant.

Also looked for were small native bees of the genus Hylaeus, some of which are Endangered. These bees frequent the flowers of the native shrub 'ilima (*Sida fallax*) a few of which were scattered

around the north end of the area. Though some of the 'ilima were in flower careful observation did not turn up any of these native bees.

Pūlehuui South Insects

Insects were rather modest in species diversity and in total numbers in this normally dry habitat. A total of 11 species, representing six insect Orders, were found in the Pūlehuui South during three site visits. Taxonomy and nomenclature follow Nishida et al (1992). Just one species was of common occurrence, the graybird grasshopper (*Schistocera nitens*). Seven species were uncommon and three species were rare (see the Animal Species List on page 10 of Appendix E-2). Just one native dragonfly, the indigenous globe skimmer (*Pantala flavescens*) was recorded in moderate numbers.

No Endangered Blackburn's sphinx moth (*Manduca blackburni*) adults, larvae or eggs were observed at Pūlehuui South during the biological survey. As noted above, the non-native weedy shrub known as tree tobacco (*Nicotiana glauca*) provides a source of similar toxins, and moth numbers are starting to rebound. Tree tobacco thrives in hot, dry climates and had invaded sugar cane fields where it enjoyed irrigation and fertilizer. Historically, tree tobacco populations were held in check during the harvesting process when the fields were burned. However, now that sugarcane agriculture has ceased and these fields are fallow, tree tobacco plants are becoming abundant. At Pūlehuui South, this is especially true in the lower half of the property.

Potential Impacts and Mitigation Measures

Pūlehuui South Fauna

The wildlife within the Pūlehuui South are composed mostly of non-native species that are of no special conservation concern. Just one mammal, two birds and one insect were found in this Pūlehuui South that are species native to Hawai'i. These species are addressed here along with other species that are either associated with native species or which could possibly utilize this habitat although not found during the survey.

USFWS wrote:

Hawaiian Hoary Bat:

The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet (ft) or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Additionally, Hawaiian hoary bats forage for insects from as low as 3 ft to higher than 500 ft above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the Endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project description:

- Do not disturb, remove, or trim woody plants greater than 15 ft tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

The DLNR Division of Forestry and Wildlife (DOFAW) wrote:

The State and Federal listed Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in trees. To avoid the potential for impacts to this tree-roosting species, site clearing should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be avoided woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW. Barbed wire should be avoided for any construction because bat mortalities have been documented as a result of becoming ensnared by barbed wire during flight.

Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

'Ōpe'ape'a or Hawaiian bat—One of these Endangered bats was positively detected in the northwest corner of the Pūlehuunui South. Their Endangered status provides special protections and some habitat considerations that ensure that they are not harmed or killed. The U.S. Fish and Wildlife Services (USFWS) has jurisdiction over Endangered species under the authority of the Endangered Species Act (1973). These bats are wide ranging and may temporarily use this habitat in response to spikes in populations of nocturnal flying insects which they prey upon. These bats breed and raise their young between April and September. They place their immature young in trees during the night when the adults are out feeding on insects, and tend to them during the day. The USFWS recommends not removing trees during the breeding season. In this Pūlehuunui South the vast majority of the land is recently harvested sugar cane fields that have no trees on them. Large kiawe and other trees are presently restricted to intermittent stream channels that pass through the area and along some of the boundaries.

'Ōpe'ape'a or Hawaiian bat. One bat was positively detected in the northwest corner of the Pūlehuunui South. Their Endangered status provides special protections and some habitat considerations that ensure that they are not harmed or killed. The U.S. Fish and Wildlife Services (USFWS) has jurisdiction over Endangered species under the authority of the Endangered Species Act (1973). These bats are wide ranging and may temporarily use this habitat in response to spikes in populations of nocturnal flying insects which they prey upon. These bats breed and raise their young between June 1 and September 15. Adults place their immature young in woody vegetation during the night when they forage, and tend to them during the day. To mitigate potential impacts to the 'ōpe'ape'a, contractors at the DHHL Project Areas will be instructed to avoid site clearing activities between June 1 through September 15. If site clearing must occur during this time, the DLNR Division of Forestry and Wildlife will be consulted before disturbance, removal or trimming of woody vegetation taller than 15 feet. Furthermore, the bats forage for insects as low as three feet to higher than 500 feet above the ground, and therefore barbed wire will not be used for fencing to mitigate harm to the bats caused by entanglement.

'Akekele and Kōlea. Both of these migratory bird species are common winter visitors in Hawai'i. They also occur in many other parts of the world as winter migrants. They are widespread and common and neither has any heightened conservation status. No recommendations are offered with regard to either of these bird species.

Globe skimmer dragonfly. This indigenous dragonfly is one of the most widespread insect species in Hawai'i, and as its name implies, it is found in many other places around the globe. It is a species of least conservation concern and no recommendations are made.

USFWS wrote:

Blackburn's sphinx moth

The Blackburn's sphinx moth may be in the vicinity of the proposed project area. Adult moths feed on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), iliee (*Plumbago zeylanica*), and malapilo (*Capparis sandwichiana*). Larvae feed upon non-native tree tobacco (*Nicotiana glauca*) and native aiea (*Nothocestrum* sp.). To pupate, the larvae burrow into the soil and can remain in a state of torpor for up to a year (or more) before emerging from the soil. Soil disturbance can result in death of the pupae. We offer the following survey recommendations to assess whether the Blackburn's sphinx moth is within the project area:

- A biologist familiar with the species should survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.

o Surveys should be conducted during the wettest portion of the year (usually November-April or several weeks after a significant rain) and within 4-6 weeks prior to construction.

Surveys should include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage). o If moths or the native aiea or tree tobacco over 3 ft tall are found during the survey, please contact the Service for additional guidance to avoid take.

If no Blackburn's sphinx moth, aiea, or tree tobacco are found during surveys, it is imperative that measures be taken to avoid attraction of Blackburn's sphinx moth to the project location and prohibit tree tobacco from entering the site. Tree tobacco can grow greater than 3 ft tall in approximately 6 weeks. If it grows over 3 ft, the plants may become a host plant for Blackburn's sphinx moth. We therefore recommend that you:

- Remove any tree tobacco less than 3 ft tall.
- Monitor the site every 4-6 weeks for new tree tobacco growth before, during and after the proposed ground-disturbing activity.
- o Monitoring for tree tobacco can be completed by any staff, such as groundskeeper or regular maintenance crew, provided with picture placards of tree tobacco at different life stages.

The County of Maui Planning Department wrote:

11. In the Biological Resources Survey, it said that Blackburn sphinx moths eggs or larvae were found in the area and that the tobacco plants should be examined during the wet season to determine their presence or absence. We encourage you to have the area re-examined during the rainy season. Also, the study noted that native seabird may fly over the area. Because the birds are attracted to bright lights and become disoriented by them, we encourage the shielding of outdoor lighting throughout the project area.

DOFAW wrote:

The State and Federal listed Blackburn's Sphinx Moth (BSM; Manduca blackburni) has a historic range that encompasses the project area. Larvae of BSM feed on many normative hostplants that include tree tobacco (Nicotiana glauca) which grows in disturbed soil. We recommend contacting our Maui DOFAW office at (808) 984-8100 for further information about where BSM may be present and whether a vegetation survey should be conducted to determine the presence of plants preferred by BSM.

Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

Blackburn's sphinx moth—No Endangered Blackburn's sphinx moth (Manduca blackburni) adults, larvae or eggs were seen in Pūlehuui South during the survey. This may have been due to the fact that the survey was conducted at the time of year when all three of the above life stages are in a dormant state. These moths are closely linked to certain plants in the nightshade family which have toxins to which the moths and larvae have adapted that provide protection from potential predators. The native species of aia (Nectocestrum spp.) used to provide these protections, but have now become rare, and the Blackburn's sphinx moth has subsequently become rare as well. Fortunately for this moth it has found a source of similar toxins in a related non-native weedy shrub known as tree tobacco (Nectipora glauca) and its numbers are starting to rebound. Tree tobacco thrives in hot dry climates and had invaded sugar cane fields where it enjoyed irrigation and fertilizer—it was held in check, however, during the harvesting process when the fields were burned. However, now that sugarcane agriculture has ceased and these fields have become fallow, tree tobacco plants are becoming abundant, especially in the lower half of Pūlehuui South, which have been shown to support recent population growth of these moths.

Blackburn's sphinx moth. No Endangered Blackburn's sphinx moth (Manduca blackburni) adults, larvae or eggs were observed at Pūlehuui South during the biological survey. This may have been because the survey was conducted at the time of year when all three of the above life stages are in a dormant state. Now that sugarcane agriculture has ceased and former sugar fields are fallow, tree tobacco plants are becoming abundant. At Pūlehuui South, this is especially true in the lower half of the property.

While tree tobacco plants are considered to be weeds in Hawai'i, they have been given federal protections when they are in association with the Endangered Blackburn's sphinx moth eggs and larvae. It is possible that the moths are present but dormant in chrysalis form in the soil beneath the potential tree tobacco host plants. These plants should be examined again during between November and April (the latter part of the wet season) to get a more definitive reading of their presence or absence. Consultation USEFWS guidance will be followed and, if necessary, consultation with the USFWS will be sought prior to site clearing to address an appropriate plan for removal of existing tobacco plants on the Pūlehuui South property. (The USEFWS will be contacted for additional guidance, should moths or host plants over three feet in height be identified. DHHL notes that should no moths or host plants be identified, USEFWS has indicated that measures should be taken to avoid attracting moths and prohibit tree tobacco from entering the property.)
Nēnē. The nēnē goose is listed as an Endangered species and is endemic to the Hawaiian Islands. Nēnē feed on succulent young grasses and herbaceous vegetation and are often found near water

features on golf courses and parks. No nēnē were seen during the survey but they could be attracted to the rain puddles. Their use of the Pūlehuui South will be greatly lessened by the cessation of field irrigation. If nēnē show up they should not be bothered or harassed and should be allowed to leave at their own convenience.

USEFWS wrote:

Seabirds:

Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators.

Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following applicable measures into your project description:

- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

DOFAW wrote:

We note that artificial lighting can adversely impact seabirds that may pass through the area at night causing disorientation that could result in collision with manmade artifacts or grounding of birds. For nighttime lighting that might be required at the facility, DOFAW recommends that any lights be fully shielded to minimize impacts. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15. This is the period when young seabirds take their maiden voyage to the open sea.

Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

Seabirds While no seabirds were found in the Pūlehuui South, two federally protected species, the Endangered Laysan Albatross (Phoebastria immutabilis) and the Threatened Laysan Duck (Anas wyvilliana) are known to fly from the ocean at dusk to their nesting burrows high in the mountains and return to the ocean at dawn during the breeding season between March and November. They fly over the lowlands during these flights. These birds are known to be disoriented by bright lights and strike tall structures and be injured and grounded where they become vulnerable to vehicle strikes and predators. During October and November fledging young birds are particularly vulnerable to these threats. To mitigate these impacts,

Pūlehuunui South will utilize appropriate exterior lighting such as hooded lights and avoidance of excessive lighting.

General Impacts to Seabirds. No seabirds were identified at Pūlehuunui South. However, seabirds that in the general vicinity may traverse the DHHL Project Areas at night during the breeding, nesting and fledging seasons (March 1 to December 15). Species of such seabirds may include the Hawaiian petrel (*Pterodroma sandwichensis*), band-rumped storm-petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus newelli*). These birds are known to be disoriented by bright lights and strike tail structures and be injured and grounded where they become vulnerable to vehicle strikes and predators. Between September 15 and December 15, fledging young birds are particularly vulnerable to these threats. To mitigate impacts to seabirds, Pūlehuunui South will utilize appropriate exterior lighting such as hooded lights and avoidance of excessive lighting. Where feasible, outdoor lights at Pūlehuunui South will be fully shielded so the bulb can only be seen from below bulb height, and only used when necessary. Nighttime construction will not occur between September 15 and December 15.

DOFAW wrote:

Finally, DOFAW is concerned about attracting vulnerable birds to areas that may host non-native predators such as cats, rodents, and mongoose. We recommend taking action to minimize predator presence; remove cats, place bait stations for rodents and mongoose, and provide covered trash receptacles.

We appreciate your efforts to work with our office for the conservation of our native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible.

The State of Hawai'i Department of Transportation Airports Division (DOT-AIR) wrote:

Section 5.8.4 of the DEIS, pages 131-136, discusses new retention basins for mitigation to retain storm water at both sites (Pūlehuunui North and Pūlehuunui South), independent of outside flows from other properties. Standing water creates a potential wildlife attractant and therefore creates a bird-strike risk to aircrafts flying over the property.

DOT-AIR requests that design and landscaping for the Pūlehuunui project do not create conditions to attract wildlife. If wildlife is attracted to the project site and poses a potential hazard to aircrafts, the DHHL is requested to take appropriate measures to ensure the proper mitigation of the potential wildlife hazard. FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

Attraction of birds and other wildlife. DHHL acknowledges that standing water may create a potential wildlife attractant thereby presenting a bird-strike risk to aircraft flying in the region, as well as potentially attracting vulnerable birds to areas inhabited by non-native predators. As noted

in Section 4.1, a high proportion of the rainfall that Maui receives each year falls on the northeast facing shores, leaving the central isthmus and southern coastal areas relatively dry. The annual average rainfall in the vicinity of the Infrastructure Regional Study Area (based on readings taken at Kahului Airport) amounts to approximately 11 to 13 inches. Therefore, the occasions that detention basins will contain standing water for long periods of time are anticipated to be minimal. At the request of DOT-AIR, DHHL will specify to prospective developers and other site users that design and landscaping at the DHHL Project Areas should not attract wildlife. Should wildlife be determined to present a potential hazard to aircraft, DHHL will take appropriate measures to ensure the proper mitigation of the potential wildlife hazard. DHHL notes FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

Proper eradication will occur in compliance with HAR Chapter 11-26 prior to site clearing at the DHHL Project Areas.

Pūlehuunui North Fauna

The fauna in this area is strongly dominated by non-native species. Of 3 mammals, 14 birds, and 10 insects observed, only one common indigenous bird, the 'auku'u, was seen flying across the area at dusk toward an off-site destination. None of these species are of any special protected status or heightened conservation concern.

During the Draft EIS public review period, comments regarding the Hawaiian hoary bat were received from USFWS and DOFAW. These comments are noted above under **Pūlehuunui South Fauna**. Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

'Ōpe'ape'a or Hawaiian hoary bat. No Endangered Hawaiian hoary bats were detected during the survey of Pūlehuunui North, and the nearly complete lack of trees or large shrubs in Pūlehuunui North makes this area unlikely habitat for them. Nevertheless, to mitigate potential impacts to the 'Ōpe'ape'a, contractors at the DHHL Project Areas will be instructed to avoid site clearing activities between June 1 through September 15. If site clearing must occur during this time, the DLNR Division of Forestry and Wildlife will be consulted before disturbance, removal or trimming of woody vegetation taller than 15 feet. Furthermore, the bats forage for insects as low as three feet to higher than 500 feet above the ground, and therefore barbed wire will not be used for fencing to mitigate harm to the bats caused by entanglement.

During the EISPN public review period, the DOH EPO wrote:

The property may harbor vectors which may disperse to the surrounding areas when the site is cleared. In accordance with Title 11, HAR, Chapter 11-26, "Vector Control", the applicant shall ascertain the presence or absence of rodents on the property. Should the presence of vectors be determined, the applicant shall eradicate the vectors prior to clearing the site.

Since the biological survey found signs indicating the presence of rodents on the property, proper eradication will occur in compliance with HAR Chapter 11-26 prior to site clearing.

~~The habitat in this area is not suitable for any of Hawaii's native forest birds, water birds or seabirds. Nonetheless, there are native seabirds, the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the Threatened Newell's shearwater (*Puffinus newelli*) that fly over these lowlands on the way to their burrows high in the mountains. These seabirds, and especially the fledglings, are attracted to bright lights in the evenings and early dawn hours and can become disoriented and crash. They are then vulnerable to injury, vehicle strikes and predators. To mitigate these impacts, prospective developer(s) at Pūlehunui North will be encouraged to utilize appropriate exterior lighting such as hooded lights and avoidance of excessive lighting.~~

During the Draft EIS public review period, comments regarding the Blackburn's sphinx moth were received from USFWS, the County of Maui Planning Department, and DOFAW. These comments are noted above under **Pūlehunui South Fauna**. Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

Blackburn's sphinx moth. While no Blackburn's sphinx moths, their eggs or larvae were found in Pūlehunui North, they are known from similar habitat about two miles northwest of this site. It is possible that they are present but dormant in chrysalis form in the soil beneath the potential tree tobacco host plants. These plants should be examined again ~~during~~ between November and April (the latter part of the wet season) to get a more definitive reading of their presence or absence. USFWS guidance will be followed and, if necessary, consultation with the USFWS will be sought prior to site clearing to address an appropriate plan for removal of existing tobacco plants. (The USFWS will be contacted for additional guidance, should moths or host plants over three feet in height be identified. DHHL notes that should no moths or host plants be identified, USFWS has indicated that measures should be taken to avoid attracting moths and prohibit tree tobacco from entering the property.)

During the Draft EIS public review period, comments regarding seabirds were received from USFWS and DOFAW. These comments are noted above under **Pūlehunui South Fauna**. Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

General Impacts to Seabirds. The biological survey noted that the habitat in this area is not suitable for any of Hawaii's native forest birds, water birds or seabirds. No seabirds were identified at Pūlehunui South. However, seabirds that in the general vicinity may traverse the DHHL Project Areas at night during the breeding, nesting and fledging seasons (March 1 to December 15). Species of such seabirds may include the Hawaiian petrel (*Pterodroma sandwichensis*), band-rumped storm-petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus newelli*). These birds are known to be disoriented by bright lights and strike tall structures and be injured and grounded where they become vulnerable to vehicle strikes and predators. Between September 15 and December 15, fledging young birds are particularly vulnerable to these threats. To mitigate impacts to seabirds, prospective developer(s) at Pūlehunui North will be encouraged to utilize appropriate exterior lighting such as hooded lights and avoidance of excessive lighting. DHHL will encourage prospective developer(s) to use outdoor lights that are fully shielded so the bulb can only be seen from below bulb height, and only used when necessary. DHHL will advise against nighttime construction between September 15 and December 15.

During the Draft EIS public review period, comments regarding wildlife attraction were received from DOFAW and DOT-AIR. These comments are noted above under Pūlehunui South Fauna. Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

Attraction of birds and other wildlife. DHHL acknowledges that standing water may create a potential wildlife attractant thereby presenting a bird-strike risk to aircraft flying in the region, as well as potentially attracting vulnerable birds to areas inhabited by non-native predators. As noted in Section 4.1, a high proportion of the rainfall that Maui receives each year falls on the northeast facing shores, leaving the central isthmus and southern coastal areas relatively dry. The annual average rainfall in the vicinity of the Infrastructure Regional Study Area (based on readings taken at Kahului Airport) amounts to approximately 11 to 13 inches, and as noted in Section 4.3.1.1 soils in the region are generally well-drained. Therefore, it is highly unlikely that detention basins will contain standing water in the event of a storm, and any standing water are anticipated to be minimal. At the request of DOT-AIR, DHHL will specify to prospective developers and other site users that design and landscaping at the DHHL Project Areas should not attract wildlife. Should wildlife be determined to present a potential hazard to aircraft, DHHL will take appropriate measures to ensure the proper mitigation of the potential wildlife hazard. DHHL notes FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

As a result of these findings, and with consideration for the above guidance and recommendations, the Proposed Action is not expected to have a significant negative impact on the wildlife resources in this part of Maui.

ATTACHMENT

5.3 ROADWAYS AND TRAFFIC

5.3 ROADWAYS AND TRAFFIC

Austin, Tsutsumi & Associates, Inc. (ATA) prepared a Traffic Impact Analysis Report (TIAR) to evaluate the potential traffic impacts resulting from key regional developments at Pūlehuui. The TIAR includes an analysis of existing regional traffic conditions and projected future conditions both without and with the development of the DHHL Project Areas. Key conclusions of the TIAR are summarized below. Appendix H contains the complete TIAR.

Existing Conditions –

The following are brief descriptions of the existing roadways studied within the vicinity of the DHHL Project Areas (see also Figure 5-2):

Maui Veterans Highway (formerly Mokulele Highway) is a regional, four-lane, two-way divided State highway facility that runs in the north-south direction. This roadway begins to the north transitioning from Pu'unene Avenue into Maui Veterans Highway at its intersection with Ho'okele Street and terminates to the south at its intersection with North Kihel Road, where it continues further south as Pi'ilani Highway. The posted speed limit in the vicinity of the DHHL Project Areas is 45 miles per hour (mph).

Nāki'i Road is a two-lane, two-way roadway that provides access to the Central Maui Baseyard from Maui Veterans Highway. The posted speed limit along this roadway is 15 mph.

Kama'āina Road is a roadway that runs in the east-west direction. Kama'āina Road begins to the west at its intersection with Maui Veterans Highway and terminates to the east at an intersection with South Firebreak Road. Kama'āina Road primarily services traffic generated by the Hawaiian Cement Baseyard located further south of the roadway. Kama'āina Road is currently unstriped but was observed to provide enough width to service two-way traffic.

Mehameha Loop is a two-lane, two-way private roadway that generally runs parallel and to the west of Maui Veterans Highway. This roadway intersects with Maui Veterans Highway across from Kama'āina Road, forming the west leg of the signalized intersection (Mehameha Loop North) at the northern end. This roadway traverses south, providing access to the Maui Humane Society and is gated further south for private use. Mehameha Loop ultimately terminates across from the Pūlehuui Motorsports Park Access Road forming the west leg of the unsignalized intersection (Mehameha Loop South) at the southern end. The roadway is gated just west of the unsignalized intersection across Mehameha Loop South. The posted speed limit along this roadway is 15 mph.

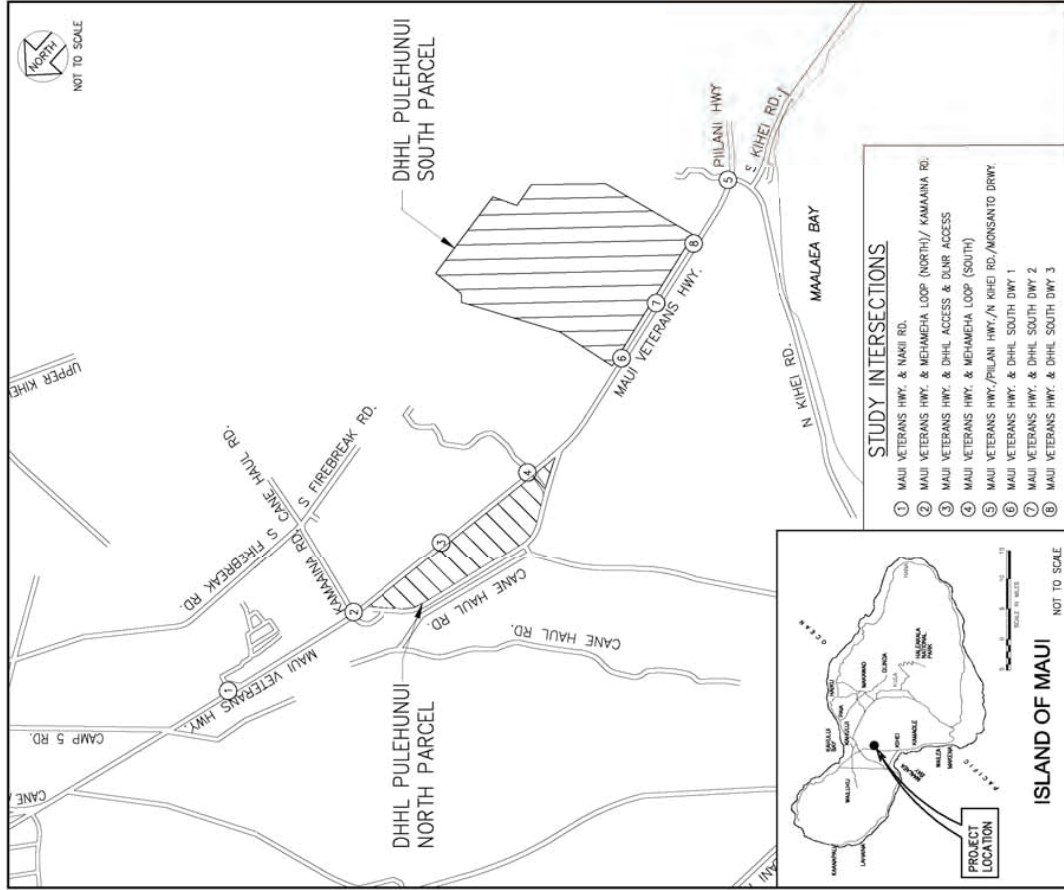


Figure 5-2:
Regional Roadways
**PŪLEHUUNUI REGIONAL
INFRASTRUCTURE MASTER PLAN**
Department of Hawaiian Homelands
Island of Maui



Source: Austin, Tsutsumi & Associates, Inc. 2018
 Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

Pi'ilani Highway is generally a four-lane, two-way State highway facility that runs in the north-south direction. This roadway begins to the north transitioning from Maui Veterans Highway at its intersection with North Kīhei Road and terminates to the south in Wailea, where it transitions into Wailea Ike Drive. The posted speed limit along this roadway is 45 mph.

North Kīhei Road is a two-lane, two-way State roadway that connects Honoapi'iani Highway in Mā'alaea to Maui Veterans Highway/Pi'ilani Highway in Kīhei. The posted speed limit along this roadway is 30 mph.

South Firebreak Road is a local road that facilitates transport for Hawaiian Cement trucks in the north-south direction. South Firebreak Road begins to the south near the Hawaiian Cement Baseyard and travels north to Pūlehu Road where it transitions into North Firebreak Road before it terminates about 1.25 miles north of Haleakalā Highway. Various intersection approaches along South Firebreak Road are gated and previously provided access to HC&S sugar cane fields. In the vicinity of the DHHL Project Areas, the roadway is currently unstriped but was observed to provide enough width to service two-way traffic.

Pūlehuunui Motorsports Park Access Road is an unstriped roadway that provides access to the Pūlehuunui Motorsports Park and Army National Guard Armory. The roadway begins to the west at its connection with Mehamaha Loop (South) near the Maui Veterans Highway/Mehamaha Loop (South) intersection and terminates as a dead end at the Pūlehuunui Motorsports Park. There is no posted speed limit along this roadway.

Table 5-1: LOS Summary of Existing Intersection Conditions

| Intersection | Existing Overall LOS ¹ Conditions | | | |
|---|--|--------------------------|------------------------|---|
| | Morning Peak Hour (AM) | Afternoon Peak Hour (PM) | Weekend Peak Hour (WE) | |
| Maui Veterans Hwy & Nāiki Rd | A | A | A | A |
| Maui Veterans Hwy & Mehamaha Lp North/ Kama'āina Rd | A | A | A | A |
| Maui Veterans Hwy & Mehamaha Lp South? | - | - | - | - |
| Pi'ilani Hwy/Maui Veterans Hwy & N Kīhei Rd/Monsanto Drwy | C | C | C | B |

Source: Austin, Tsutsumi & Associates, Inc. *Revised Traffic Impact Analysis Report DHHL North and South Parcels, August-2018 March 2019.*

The weekday hourly traffic volume data utilized in the TIAR were collected on Thursday, September 10 and Tuesday, September 15, 2015 as well as Thursday, January 19, 2017. The

¹ Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), 6th Edition, methods for calculating volume to capacity ratios, delays and corresponding levels of service were utilized in this study.
² Access to the intersection of Maui Veterans Highway and Mehamaha Loop is restricted by A&B and, therefore, experiences little to no traffic under existing conditions

weekend hourly traffic volume data was collected on Saturday, August 12, 2017. Weekday PM traffic volumes taken in 2015 were adjusted to generally meet 2017 conditions.

Based on the traffic count data, the AM, PM and WE peak hours of traffic were determined to occur between 7:15 AM to 8:15 AM, 3:30 PM to 4:30 PM and 12:00 PM to 1:00 PM, respectively.

No significant delays or queuing were observed at the study intersections. All intersection movements generally operated adequately at Level of Service (LOS) D or better. However, various left-turn and minor street movements operated at LOS E/F during the peak hours of traffic due to low movement volumes of 10 or fewer vehicles per peak hour.

Potential Impacts and Mitigation Measures

During the Draft EIS public review period, the County of Maui Department of Public Works wrote: "We reviewed the subject application and have no comments at this time."

The County of Maui Department of Transportation wrote: "Thank you for the opportunity to comment on this project. We have no comments to make regarding this project at this time."

The County of Maui Planning Department wrote:

8. We note there was a 'no comment' letter from the Maui Department of Transportation. Please continue to coordinate with them on the possible creation of a bus stop(s) near the project site to serve area employees, as well as potential lessees, their customers and homesteaders.

9. We note that ATA is also the traffic engineer for the DLNR project. This project's Traffic Impact Assessment Report includes discussion of two (2) new traffic signals to be located at: 1) Maui Veteran's Highway/DHHL access/DLNR area, 2) Maui Veteran's Highway/Mehameha Loop and 3) Maui Veteran's Highway/Mehameha Loop/Maui Raceway Park. This would make for many stops within this area, along a State Highway. Has this been discussed with the State Department of Transportation? We highly encourage the traffic engineer and the Applicant to consider other options, perhaps with less stop-and-go. We note that on page 46, it says that roundabouts and two-way stops were not considered because it would create lengthy delays and capacity issues; however, we believe that it should be studied and considered as an alternative to new traffic signals.

10. We did not see that the Maui Metropolitan Planning Organization (MPO) was consulted with regarding the long-term transportation plan for the region and we highly encourage that you consult with them prior to publication of the Final EIS.

Refer to Appendix B-2 for a copy of these comments and DHHL's response.

Refer to Appendix H for the TIAR which has been revised to address traffic-related comments, including two new appendices (TIAR Appendices G and H). TIAR Appendix H includes a LOS and capacity analysis for double-lane roundabouts under the Base Year 2038 scenario.

The State of Hawai'i Department of Transportation Highways Division wrote:

The Transportation Impact Analysis Report (TIAR) dated October 24, 2018 is not acceptable for the following reasons:

1. A preliminary meeting on October 18, 2018 was coordinated between the DHHL, Austin, Tsutsumi & Associates, Inc. and the DOT staff. It was explained to the DHHL that the DOT's Federal Aid Highways 2035 Transportation Plan for the District of Maui dated July 2014 (hereinafter referred to as "HDOT 2035 Transportation Plan") to widen Maui Veterans Highway from a 4-lane into a 6-lane configuration as mentioned in the TIAR, is not programmed nor funded to date; therefore, the TIAR should be revised to delete this assumption. Additionally:

i. The Figure 5.3 and 5.5 in the TIAR should be revised to depict future configuration to remain as four-lanes; Without Background Mitigation and to include as a four-lane configuration; With Project/With Mitigation.

ii. "Without" Background Mitigation Conditions and Future Year 2038 Conditions to be consistent with the change.

iii. Should the HDOT 2035 Transportation Plan on Maui Veterans Highway as mentioned in the DEIS and the TIAR be deferred or not implemented, all necessary mitigations may be the responsibility of the Master Plan project.

iv. The revised TIAR should consider pro-rata shares identified for each of the four agencies and its proposed land uses.

2. We note that an earlier pre-consultation joint meeting with emphasis on the DLNR Business Park was also held on June 5, 2017 with DHHL and the three agencies. Three proposed access points on Maui Veterans Highway were presented and agreed upon for the DLNR Business Park and DHHL Pulehunui North, which was consistent with the DLNR's DEIS and its TIAR dated March 2018 (reference attached letter STP 8.2468).

3. Petitioner shall fund and implement transportation improvements, mitigation measures, and pro-rata contributions that will alleviate the impacts generated by the project as recommended by the revised TIAR and by any required updates; and as accepted by the DOT.

Refer to Appendix B-2 for a copy of these comments and DHHL's responses.

Discussion regarding the HDOT 2035 Transportation Plan is has been revised to clarify that the TIAR does not assume its implementation by 2038. Refer to Appendix H for the TIAR which has been revised to address traffic-related comments, including two new appendices (TIAR Appendices G and H). TIAR Appendix G analyzes a Base Year 2038 Without Widening scenario as requested by DOT. As noted below, DHHL will coordinate with HDOT on its fair share of improvements.

Pūlehuunui North is approximately 184.4 acres of vacant land. For the purposes of the traffic analysis, the property was assumed to include:

- 80 acres of industrial space
- 16 acres of commercial space
- 5 acres for a possible hotel
- 40 acres for a cultural center/visitor attraction space
- 43.4 acres for roads, easements and open space.

There are two existing accesses to Pūlehuunui North via Mehamaha Loop (North)/ Kama'āina Road and Mehamaha Loop (South)/Pūlehuunui Motorsports Park Access. A new third access is proposed along Maui Veterans Highway, via a new signalized 4-legged intersection between Mehamaha Loop (North)/ Kama'āina Road and Mehamaha Loop (South)/Pūlehuunui Motorsports Park Access. This new third access will provide direct access to both Pūlehuunui North and the future DLNR Industrial and Business Park development across Maui Veterans Highway.

Pūlehuunui South is approximately 646 acres of vacant land. For the purposes of the traffic analysis, uses at Pūlehuunui South were assumed to include the following:

- 173 acres maintained for agricultural use
- 238 acres for Agricultural homesteads, with an estimated 110 homesteads for DHHL beneficiaries
- 33 acres for an education facility
- 18 acres for a cultural and arts center
- 105 acres for industrial/agriculture processing space
- 79 acres for roads, easements and open space

Access to this development would occur via three existing accesses from Maui Veterans Highway fronting the DHHL South Parcel site. Buildout of the DHHL Project Areas is anticipated to occur by Year 2035, but for purposes of the traffic analysis, a forecast Year 2038 was used to analyze the full impacts of Pūlehuunui Regional Subdivision, which includes the DHHL Project Areas, DLNR Industrial and Business Park, Maui Regional Public Safety Complex (MRPSC) and Pū'ūnēnē Heavy Industrial Subdivision.

Base Year 2038

Projections for Base Year 2038 traffic included increases generated by a 2.1 percent annual growth rate along Maui Veterans Highway and numerous developments forecast to be completed within the vicinity of the DHHL Project Areas. These nearby developments include the DLNR Industrial and Business Park, Pū'ūnēnē Heavy Industrial Subdivision, Maui Regional Public Safety Complex (MRPSC), Central Maui Baseyard Expansion, Pīlani Promenade, Maui Bay Villas (formerly Maui Lū), Kīhei High School, Maui Business Park Phase II, Kīhei Residential, Kaiwahine Village, Kenolio Apartments, Maui Research & Technology Park, Krausz DOWntown Kīhei, Līloa Village, South Maui Community Park, Alahele Subdivision.

Various widening improvements are proposed at the Maui Veterans Highway/Meahameha Loop (North)/ Kama'āina Road intersection as part of the development of the Pū'ūnēnē Heavy Industrial Subdivision. The State of Hawai'i Department of Transportation's (HDOT DOT) Federal Aid Highways 2035 Transportation Plan for the District of Maui (Plan) dated July 2014 (hereinafter referred to as "HDOT DOT 2035 Transportation Plan") estimated that by the year 2035, traffic volumes on Maui Veterans Highway will increase by over 80 percent due to nearby population and land development growth in the area. To increase highway capacity and accommodate this traffic growth, the HDOT DOT 2035 Transportation Plan conceptually identified the widening of Maui Veterans Highway to construct two additional travel lanes on Maui Veterans Highway from Kūihelani Highway in Kahului to Pīlani Highway in Kīhei as a potential need by Year 2035. It should be noted that this Maui Veterans Highway Widening improvement is currently not a DOT-funded or approved project, programmed project, and is only an identified roadway capacity solution for long-range planning purposes. Because it is currently not a funded improvement and is not programmed in the latest Statewide Transportation Improvement Program (STIP), this widening improvement was not included in the TIAR; the TIAR does not assume its implementation by 2038.

~~The traffic analysis does not assume the Maui Veterans Highway Widening improvement project will be implemented by Year 2038.~~ For purposes of the traffic analysis, widening improvements along Maui Veterans Highway were recommended at each study intersection based on LOS analysis for both Base Year and Future Year scenarios.

By Base Year 2038 without the DHHL Project Areas, traffic in the study area is expected to increase due to trips generated by nearby developments and growth along Maui Veterans Highway. As a result of the increase in traffic volumes, several roadway improvements are recommended to be completed by Base Year 2038.

The signalization of the new Maui Veterans Highway/DLNR Access intersection and Maui Veterans Highway/Meahameha Loop South intersection is recommended as the most feasible alternative at these intersections. Based on the mainline through volume along Maui Veterans Highway and turning movement traffic accessing the side streets, a signal would be warranted at each of these intersections. Traffic control that includes roundabouts, ~~and~~ full movement two-

way stop control, and right-in, right-out access was not considered feasible at these intersections since it would create lengthy delays and capacity issues. Refer to Appendix H for the revised TIAR.

The coordination of traffic signals at Maui Veterans Highway/Mehameha Loop (North)/Kama'āina Road and Maui Veterans Highway/DHHL North Access/DLNR Access intersections should be considered if feasible, and the signal timing plans should be optimized to improve throughput progression along Maui Veterans Highway.

Table 5-2: LOS Summary of Existing Conditions and Base Year 2038 with Mitigation Conditions

| Intersection | Existing Overall LOS Conditions | | | | Base Year 2038 with Mitigation Conditions (without DHHL Parcels) | | | |
|--|---------------------------------|----|----|----|--|----|----|----|
| | AM | PM | WE | WE | AM | PM | PM | WE |
| Maui Veterans Hwy & Nāki'i Rd | A | A | A | A | B | B | B | A |
| Maui Veterans Hwy & Mehameha Lp North/Kama'āina Rd | A | A | A | A | B | C | C | C |
| Maui Veterans Hwy & DLNR Access | - | - | - | - | B | C | C | D |
| Maui Veterans Hwy & Mehameha Lp South | - | - | - | - | A | C | C | B |
| Pi'ilani Hwy/Maui Veterans Hwy & N Kihē Rd/Monsanto Drwy | C | C | B | B | C | D | D | C |

Source: Austin, Tsutsumi & Associates, Inc. Revised Traffic Impact Analysis Report DHHL North and South Parcels. August 2018 March 2019.

With the recommended improvements at the study intersections, all intersections are forecast to operate at overall LOS D or better. All movements will also operate under capacity, with vehicle to capacity (V/C) ratios below 1.0. Additionally, all mainline through movements along the highway are expected to operate at LOS D or better during all peak hours. The majority of left-turn and minor street movements are expected to operate at LOS E/F due to the long cycle lengths favoring the through movements along Maui Veterans Highway.

Future Year 2038

Pūlehuunui North is anticipated to contain a mix of industrial space, commercial space, a possible hotel and a cultural center/visitor attraction on approximately 184.4 acres of vacant land. Pūlehuunui South is anticipated to contain a mix of agricultural use, agricultural homesteads, educational facilities, recreational community facility and industrial/agricultural processing space on approximately 646 acres of currently-vacant land. Buildout of both DHHL Project Areas is anticipated to occur by Year 2035, but for purposes of this TIAR, a forecast Year 2038 was used to analyze the full impacts of the Pūlehuunui Regional Subdivision, which includes the DHHL

Project Areas, DLNR Industrial and Business Park, Maui Regional Public Safety Complex (MRPSC) and Pu'unēnē Heavy Industrial Subdivision.

Upon completion of the DHHL Project Areas, traffic in the study area is expected to increase over Base Year 2038 conditions. The DHHL Project Areas are anticipated to generate approximately 1,623(1,733)[1,969] trips during the AM(PM)[WE] peak hours of traffic, respectively. As discussed previously, for purposes of the traffic analysis, widening improvements along Maui Veterans Highway were recommended at each study intersection based on LOS analysis for Future Year 2038. As a result of the increase in traffic volumes, several roadway improvements are recommended with the DHHL Project Areas and described in greater detail in Section 7 and Appendix D of the TIAR (see Appendix H of this ~~DEIS~~ FEIS). Left-turn storage lane lengths for the Pūlehuunui North and South accesses are also shown in Tables 5.3 to 5.6 of the TIAR.

The signal timing plans at Maui Veterans Highway/Mehameha Loop (North)/ Kama'āina Road, Maui Veterans Highway/DHHL North Access/DLNR Access and Maui Veterans Highway/Mehameha Loop (South)/Pūlehuunui Motorsports Park Access Road intersections should be optimized to provide favorable throughput progression along Maui Veterans Highway.

Based on national guidance, the vehicular capacity for a single-lane roundabout is generally up to 25,000 vehicles per day. The vehicular capacity for a double-lane roundabout is generally up to 45,000 vehicles per day. Forecasted traffic for Year 2038 predicts between 60,000-75,000 vehicles per day on Maui Veterans Highway in the area, therefore double-lane roundabouts would likely provide insufficient capacity. Furthermore there are currently no double-lane roundabouts operational in Hawai'i, resulting in a potentially steep learning curve for drivers in a relatively high-volume area upon implementation. There are few triple-lane roundabouts operational throughout the United States due to notable challenges documented by the FHWA including an increased risk of sideswipe crashes due to drivers crossing lanes within the roundabout, and driver confusion in interpreting signage and lane arrows. In addition to these safety concerns, as noted above double-lane roundabouts are already likely to have a steep learning curve for Hawai'i drivers. Triple-lane roundabouts are therefore are not recommended.

~~Full buildout of the entire Pūlehuunui Regional Subdivision is anticipated to occur after the 2035 estimated need for HDOT's Maui Veterans Highway widening improvement. HDOT's Maui Veterans Highway widening improvement is currently not a funded improvement and is not identified on the latest Statewide Transportation Improvement Program (STIP). Due to the uncertainty of HDOT's DOT's Maui Veterans Highway widening improvement, DHHL will coordinate with HDOT on its fair share of improvements. Based on a comparison of DHHL Project Area traffic increase to total Future Year 2038 forecast traffic, the DHHL Project Areas will constitute approximately 14 percent of all traffic, based on its composite average increase for the AM, PM and Saturday-MD all peak hours of traffic.~~

Traffic generated by the DHHL Project Areas will not contribute significantly to regional traffic nor cause unacceptable delay time at the studied intersections by the completion of the

Proposed Action (Future Year 2038). While vehicle delays at the studied intersections are expected to increase as a result of the Proposed Action, the anticipated vehicle wait time does not vary significantly from future year conditions without the Proposed Action (Base Year 2038) and the study intersections will continue to operate within reasonable wait times (LOS D or better).

In addition to the improvements described above the County of Maui's *Maui Island Plan* conceptually identifies two future regional roadways that may further alleviate traffic conditions in the region: the Upcountry-Kihei Corridor and the Kihei Mauka Bypass Collector Road. While these two roadways have not yet been funded or designed and therefore are excluded from the TIAR analysis, they are considered qualitatively as a regional roadway solution. The Upcountry-Kihei Corridor is a new future bypass road that will provide a more direct connection between Kihei and the upcountry areas of Haleakala. This bypass could substantially reduce north-south traffic along Maui Veterans Highway. The Kihei Mauka Bypass Collector Road roadway alignment and termination points are not defined, however the anticipated land uses at Pūlehuunui South do not preclude accommodation of the Kihei Mauka Bypass Collector Road through roadway easements and/or right-of-way acquisition. DHHL is open to coordination with other agencies to further explore accommodating the Kihei Mauka Bypass Collector Road. Refer to Appendix H.

Table 5-3: LOS Summary of Base Year 2038 and Future Year 2038 with Mitigation

| Intersection | Base Year 2038 with Mitigation Conditions (without DHHL Parcels) | | | | Future Year 2038 with Mitigation Conditions (including DHHL Parcels) | | | |
|---|--|----|----|----|--|----|----|----|
| | AM | PM | WE | WE | AM | PM | WE | WE |
| Maui Veterans Hwy & Nāki'i Rd | B | B | A | A | B | B | B | A |
| Maui Veterans Hwy & Melemehe Lp North/Kama'āina Rd | B | C | C | C | B | C | C | C |
| Maui Veterans Hwy & DLNR Access | B | C | D | D | B | C | C | D |
| Maui Veterans Hwy & Melemehe Lp South | A | C | B | B | B | C | C | C |
| Pi'ilani Hwy/Maui Veterans Hwy & N Kihei Rd/Monsanto Drwy | C | D | C | C | C | D | D | C |
| Maui Veterans Hwy & DLNR Drwy 2 | - | - | - | - | C | C | C | C |

Source: Austin, Tsutsumi & Associates, Inc. *Revised Traffic Impact Analysis Report DHHL North and South Parcels*. August-2018 March 2019.

ATTACHMENT

5.4 SOUND

5.4 SOUND

Existing background noise in the vicinity of the DHHL Project Areas is principally attributed to vehicular traffic on Maui Veterans Highway. The noise from flight paths of arriving and departing aircraft at Kahului Airport, located to the north of the DHHL Project Areas, represents another occasional source of noise (see Figure 5-3) although the DHHL Project Areas are beyond the bounds of its noise exposure map.

With the cessation of HC&S operations at the end of 2016, intermittent noise from sugar cane agricultural activity no longer exists. Depending on the type of diversified agriculture on Pulehunu South and adjacent agricultural lands, intermittent noise from agricultural activities may continue.

An Acoustic Study for the DHHL Project Areas was prepared by Y. Ebusu and Associates. See Appendix F. The existing background ambient noise levels within the DHHL Project Areas are moderate and less than 55 A-weighted decibels (dBA), except during passbys of heavy motor vehicles on the cane field service roads or during flybys of aircraft operating at Kahului Airport. A-weighted decibels are an expression of loudness of sound in air as perceived by the human ear.

Traffic along Maui Veterans Highway controls the background noise levels within the DHHL Project Areas. The loudest noise sources at the DHHL Project Areas are probably heavy trucks traveling along the roadways closest to each site boundaries. During Saturdays, and occasionally on Fridays, Sundays, and holidays, noise from activities at the Pulehunu Motorsports Park are probably the loudest noise sources at the northern end of Pulehunu South.

Traffic noise was measured in July 2018 at four locations. Refer to Appendix F. The results of the traffic and background ambient noise measurements and predicted traffic noise levels are summarized in Table 3 of Appendix F.

The existing traffic noise levels in the vicinity along Maui Veterans Highway rights-of-way are slightly less than 65 Day Night Average Sound Level (DNL) on the east side and 65 to 66 DNL on the west side. Existing noise levels at the Maui Humane Society building closest to Maui Veterans Highway (64 to 65 DNL) and at the HIARNG Pu'unene Armory (59 to 60 DNL) are considered to be acceptable for office buildings. Existing traffic noise levels at Central Maui Baseyard were less than 65 DNL, which is considered to be acceptable for industrial land uses. Exterior noise level as high as 75 DNL are generally considered acceptable for commercial, industrial, and other non-noise sensitive land uses.

Sound level measurements of noise during drag racing time trials at Pulehunu Motorsports Park (PMP) were obtained at one location (shown in Figure 1 of the Appendix H) to determine if potential noise impacts may possibly affect future uses at the DHHL Project Areas during similar drag racing events. The noise events are recurring of short duration, 90 to 117 dBA bursts of noise. Location F (see Figure 1 of the Acoustic Study) was assumed to also be representative of noise levels occurring at the south end of the dual drag strips during drag racing events, and data

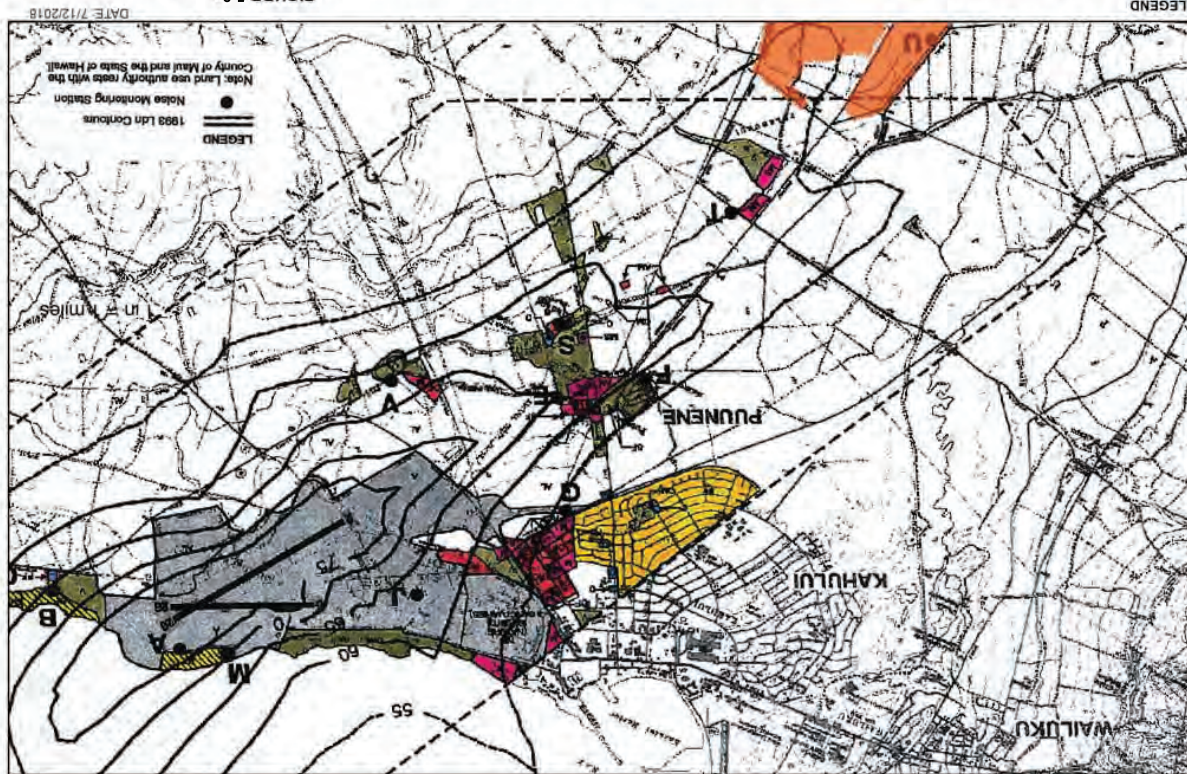


FIGURE 5-3:
 Kahului Airport Noise Exposure Map

DATE: 7/12/2018

LEGEND
 1000 Ldn Contours
 Noise Monitoring Station
 Note: Land use authority rests with the County of Maui and the State of Hawaii.

1 in = 1 mile

WAILUKU
 KAHULUI
 PUNENE

LEGEND
 Infrastructure Regional Study Area

Source: Base DOT Assets Division, 1995
 Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary determinations or other spatial analysis.

from Location F was used to predict the sound levels during drag racing events at other locations in the DHHL Project Areas. Refer to Appendix F.

During the Draft EIS public review period, PSD wrote: "No discussion on impact of background noise from the adjacent Active National Guard Armory."

Refer to Appendix B-2 for a copy of these comments and DHHL's responses. It is acknowledged that aircraft landing at the Pu'unēhē Armory could create temporary noise. In 2002 the Department of Defense published its Final Environmental Assessment for Construction of the Hawai'i Army National Guard's Maui Consolidated Readiness Center (the Pu'unēhē Armory). Per the Final EA:

Helipad use (for HIARNG training exercises) is expected to average two (2) takeoffs and two (2) landings over one weekend period per month. During annual training exercises, which are held over a two-week period at Schofield Barracks on Oahu or the Pohakuloa Training Area on the Big Island, helipad use is expected to involve three (3) to five (5) takeoffs and three (3) landings during the beginning and end of this period, respectively. (Hawai'i Army National Guard, 2002).

The Final EA further notes, "No night flights would be involved."

Potential Impacts and Mitigation Measures

During the Draft EIS public review period, PSD wrote: "Additionally, it should be noted in the Draft EIS that the PSD is proposing at the DAGS/PSD MRPSC Site plans to construct an either an Indoor or Outdoor Firing Range for Weapons Qualification Purposes. Anticipated noise levels for Fire Ranges range from 78 decibels which can reach to 122 decibels but according to NIOSH 1998 cannot exceed 140 decibels. Please provide discussion if warrant an impact to the surrounding development.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

The details of non-DHHL State projects are outside the purview of DHHL and are not part of the Proposed Action under this EIS. This EIS incorporates by reference project information provided by DLNR and DAGS/PSD, for their respective proposed developments. Due to concerns about noise and safety, DHHL would prefer that PSD construct an indoor firing range as opposed to an outdoor one; DHHL will participate in consultation as PSD proceeds with the planning process for the MRPSC.

Construction-Related Noise

During the EISPN public review period, the DOH EPO wrote: "if noise created during the construction phase of the project may exceed the maximum allowable levels (HAR, Chapter 11-46, "Community Noise Control") then a noise permit may be required and needs to be obtained before the commencement of work." The Proposed Action will comply with all applicable rules and provisions including those of Chapter 11-46, HAR. If noise created during the construction phase of the proposed action is expected to exceed the maximum allowable levels, then a noise permit will be obtained before the commencement of work.

With respect to construction, audible construction noise will probably be unavoidable during the entire project construction period. The use of properly muffled construction equipment should be required on all job sites. The incorporation of DOH construction noise limits and curfew times, which are applicable throughout the State of Hawai'i is another noise mitigation measure. Noisy construction activities are not allowed on Sundays and holidays, during the early morning, and during the late evening and nighttime periods under the DOH permit procedures.

The closest existing residences to the DHHL Project Areas are well beyond the 1,000 foot separation distance, therefore, risks of adverse noise impacts at existing residences during construction activity are expected to be very low. Construction noise impacts are possible at the Maui Humane Society due to the relatively small (350 ft) buffer distance to Pūlehuui North. Special coordination procedures between the construction contractor and the animal caretakers may be required during close-in site preparation activities. The use of temporary sound barriers (wooden walls, bumper-to-bumper buses with closure panels, etc.) or even portable air conditioning equipment could provide additional sound attenuation during site preparation activities.

Operational Related Noise

By existing DOH regulations, fixed noise machinery on commercial and industrial buildings within DHHL Project Areas may emit sound levels continuously during the day and night, as long as their sound levels do not exceed 70 dBA at or beyond the lots' property boundaries. Risks of adverse noise impacts from onsite noise sources are considered to be minimal. The study recommended that noise mitigation measures which limit the noise from fixed mechanical equipment to those allowed by the DOH should be required of all tenants within the DHHL industrial and commercial areas.

Vehicular Noise

Existing traffic noise levels along Maui Veterans Highway are relatively high and are expected to remain so through 2038. Risks of future traffic noise impacts along the highway should continue to be low due to the absence of noise sensitive receptors (i.e., residences) along the highway in the DHHL Project Areas.

The Acoustic Study predicted future traffic noise levels for 2038. The future projections of the Infrastructure Regional Study Area and DHHL Project Area traffic noise levels on the roadways

which would service the DHHL Project Areas are shown in Table 4 of the Acoustic Study (see Appendix F).

Projected traffic associated with the DHHL Project Areas and anticipated roadway improvements are expected to create small to moderate changes in traffic noise levels along Maui Veterans Highway in the vicinity of the DHHL Project Areas by 2038. With the exception of the proposed DHHL access at Maui Veterans Highway and Pūlehuui Motorsports Park Access Road at Maui Veterans Highway, the predicted increases of 0.4 to 0.8 DNL in DHHL Project Area-related traffic noise are small compared to the 2.9 to 3.6 DNL predicted for the Infrastructure Regional Study Area traffic and anticipated roadway improvements. At the new DHHL Access at Maui Veterans Highway, a large increase in traffic noise is expected solely as a result of predicted project traffic from Pūlehuui North. Similarly, there is an expected large increase in traffic noise level at the DLNR Access at Maui Veterans Highway as a result of the proposed DLNR Industrial and Business Park.

The increase in traffic noise levels due to the Infrastructure Regional Study Area and DHHL Project Area traffic at Kama'āina Road at Maui Veterans Highway and Maui Raceway Access Road at Maui Veterans Highway are relatively high due to the very low or nonexistent traffic on these two roads during 2017. However, the dominant traffic noise in the DHHL Project Areas will continue to be traffic along Maui Veterans Highway, with the increases in future traffic noise levels from the Pūlehuui North and South project-generated traffic being relatively small along this roadway, and primarily associated with non-project traffic.

Within Pūlehuui South, a planned 1,900 foot buffer distance to the highway's centerline will mitigate future traffic noise levels at the planned agricultural homesteads, which is predicted to not exceed 55 DNL by 2038 and will be controlled by traffic moving within Pūlehuui South and on perimeter roadways. The area designated for Education within Pūlehuui South is planned to be located with minimum 750 foot buffer distance from the centerline of Maui Veterans Highway. The lots adjacent to the highway right-of-way designated for Culture and Arts within Pūlehuui South are expected to be exposed to incompatible traffic noise levels from Maui Veterans Highway, which exceed 65 DNL. The lots adjacent to the highway right-of-way and designated for commercial uses within Pūlehuui South are predicted to be exposed to traffic noise levels between 65 and 70 DNL, which is considered to be "Marginally Compatible" but not "Incompatible" (see Figure 2 of Appendix F). Traffic noise levels at the interior lots of the Culture and Arts and Commercial portions of Pūlehuui South will probably become "Compatible" for their planned uses as man-made structures provide noise shielding effects from the highway noise. The use of sound attenuating walls and/or berms may also be used as a traffic noise mitigation measure for both indoor and outdoor spaces, and DHHL will consider re-locating sensitive uses within the property as needed. Traffic noise levels at the planned industrial lots within Pūlehuui South should be "Compatible" due to their larger setbacks from the highway. Risks of adverse noise impacts from future traffic noise are considered to be low for all uses within Pūlehuui South, except at the Culture and Arts frontal lots.

Pūlehuui North includes a possible hotel (at the discretion of a future developer) in addition to commercial/light industrial uses. The hotel should be "Compatible" with 2038 highway noise levels as long as a minimum 215 feet setback is maintained from the centerline of the highway, so as to not exceed 65 DNL. If a Hotel is developed, it will likely include air conditioning, which means that windows will be closed and serve to attenuate noise from traffic along Maui Veterans Highway and stationary noise from other uses at Pūlehuui North. Commercial/Light Industrial uses on Pūlehuui North should not be exposed to "Incompatible" highway noise levels of 75 DNL because of their minimum setback distance of 110 feet from the highway centerline. Risks of adverse noise impacts from future traffic noise at Pūlehuui North are considered to be very low. In addition, the use of sound attenuating walls and/or berms may also be used as a traffic noise mitigation measure for both indoor and outdoor spaces.

PMP Noise

Noise from Pūlehuui Motorsports Park (PMP) are predicted to be audible at noise sensitive receptors within the DHHL Project Areas. While lands designated for agricultural or industrial uses can technically be compatible with outdoor noise exposure levels as high as 76 DNL, residences or other noise sensitive receptors located on these lands could react unfavorably when exposed to such high intermittent noise levels, as were measured at PMP. Because noise during drag racing events at PMP will probably be audible at noise sensitive locations at Pūlehuui South, and because future residences are potential receptors at these locations, there is a risk that noise complaints may occur regarding these noise producing activities at PMP. As the use of closure and air conditioning is anticipated at the hotel, risks of adverse noise impacts from PMP are considered to be low at the hotel. A HUD compliant noise study will be conducted to determine whether the FHA/HUD noise standard of 65 DNL will be exceeded at noise sensitive uses at Pūlehuui South.

To mitigate potential impacts of PMP activities on potential residences and other sensitive noise receptors that may be associated with the proposed land uses, a noise study that meets the requirements of 24 CFR Part 51, Subpart B will be conducted prior to construction of buildings that will house any such uses. The study will address noise standards and any appropriate mitigation required under 24 CFR Part 51, Subpart B. Following the recommendation of the Acoustic Study, disclosure about the audibility of the PMP's activities will be provided to future users at the DHHL Project Areas.

Pū'unēnē Armory Noise

Pū'unēnē Armory activities are not anticipated to impact or be impacted by the DHHL Project Areas as the DHHL Project Areas are located a minimum of 200 feet from the armory (and farther from the armory's landing pad) and will include visual and noise buffers as discussed above and in Section 5.7. Based on the information provided in the Final EA for the armory, the helipad would accommodate two takeoffs and two landings per month (total 24 events per year). Annual exercises would involve three to five takeoffs and three landings (maximum 8 events over a two-week period). Therefore the maximum number of takeoff or landing events would be 32 per year. Per the EA, these events would not occur at night, thereby further reducing acoustical impacts.

Based on this information, noise levels under the landing track are not anticipated to exceed 55 DNL.

With the recommended mitigation measures, the proposed development of the DHHL Project Areas is not anticipated to have an adverse impact on noise in the vicinity of the Infrastructure Regional Study Area. Refer to Appendix F.

ATTACHMENT

5.10.2 KIHEI-MAKENA COMMUNITY PLAN

5.10.2 Kihei-Mākena Community Plan Area

As noted in the Draft County Forecast, the Kihei-Mākena Community Plan (CP) area, in which the property is located, is Maui County's second most populous CP area (after the Wailuku-Kahului CP area). In 2015 it was estimated to account for about 19 percent of Maui Island's population, and 21 percent of its households. However, the area accounted for some 23 percent of the Island's wage and salary jobs in 2015.

While the Infrastructure Regional Study Area is within the Kihei-Mākena CP Area, the adjacent Wailuku-Kahului CP area is also addressed due to its proximity to the Proposed Action. Wailuku-Kahului is expected to remain the economic and population center of the island and County (accounting for about 38 percent of Maui's population, 34 percent of its households, and 46 percent of wage and salary jobs in 2015). However, the Kihei-Mākena CP area is expected to gain share; according to the Draft County Forecast, the Kihei-Mākena CP area "has combined a growing visitor economy, new jobs associated with both visitors and the tech sector, and expanding residential areas. It has had the smallest average household size. The forecast extends all these trends. Based in part on recent development proposals, the forecast shows stronger growth in residential units than in visitor units." (County of Maui, Planning Department, 2006)

Potential Impacts and Mitigation Measures

As noted in the Draft County Forecast, residential growth in the Kihei-Mākena region has been consistent, remaining home to almost a quarter of Maui's households. (Wailuku-Kahului remains the economic and population center of the island, as home to over a third of Maui's households.) By providing a regional infrastructure master plan, the Proposed Action facilitates the creation of facilities and jobs to sustain this growth, thus supporting projected long-term patterns of settlement and growth on Maui. Additionally, as observed in the DLNR Industrial and Business Park ~~DEIS~~ FIS, much of the existing inventories of industrial lands in the region currently bear prices that encourage commercial and/or quasi-retail uses, which are allowed by their "stacked" zoning designations. ~~On the other hand, conventional light industrial subdivisions are still observed in Central Maui but were noted to have diminishing developable inventory.~~

During the Draft EIS public review period, the County of Maui Planning Department wrote:

4. For the Final EIS, please include a statement that it is anticipated that the Maui County Code (MCC), Title 19 will likely undergo revision in the next few years. The Department does not favor stacking uses and M-1 Light Industrial zoning consists of many different types of uses. When Title 19 is revised, the permitted uses within the M-1 Light Industrial zoning may also be amended so that it is just light industrial.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

DHHL observes that such a revision may impact lands in the Infrastructure Regional Study Area subject to County land use controls and, indirectly, the regional market for light industrial lands. Conventional light industrial subdivisions in Central Maui are noted to have diminishing

developable inventory which may offset some of those impacts. (The Hawaiian Homes Commission Act (§§204 and 206), which has been incorporated into Article XII of the Hawai'i State Constitution, vests DHHL with exclusive authority to control its lands, and as noted DHHL anticipates a diverse range of uses at the DHHL Project Areas.)

During the EISPN Public Review period, the Maui County Department of Housing and Human Concerns – Housing Division wrote: “The Department has reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the above subject project. Based on our review, we have determined that the subject project is not subject to Chapter 2.96, Maui County Code. The Department has no additional comments to offer.”

ATTACHMENT

5.11.1 SCHOOLS

5.11.1 Schools

The State Department of Education (DOE) operates several schools in the Kahului and Kihei regions, as shown in the following Table 5-9.

During the Draft EIS public review period, DOE wrote:

The HDOE schools currently servicing the proposed DHHL Project are Kihei Elementary, Lokelani Intermediate, and Maui High. Kihei Elementary and Lokelani Intermediate schools have capacity for roughly 200 and 125 students, respectively. This excess capacity is expected to remain the same over the next five years. Maui High School is over capacity by approximately 400 students. This over capacity is expected to remain the same over the next five years. Though Kihei High School is anticipated to open during this time period, no immediate decrease in student population at Maui High School is anticipated.

Ground breaking occurred earlier this year for the initial phase of the new Kihei High School. This first phase will provide classroom capacity for approximately 800 students; with a maximum design capacity for approximately 1,600 students. The HDOE anticipates opening this first phase for the 2021 /2022 school year. Once opened, it is anticipated that the high school will gradually reduce the number of students attending Maui High School.

Table 5-9: Educational Facilities

| Elementary Schools (Grades K through 5) | |
|---|----------|
| School | Location |
| Kahului | Kahului |
| Kamali'i | Kihei |
| Kihei | Kihei |
| Lihikai | Kahului |
| Pōmaika'i | Kahului |
| Intermediate Schools (Grades 6 through 8) | |
| Lokelani | Kihei |
| Maui Waena | Kahului |
| High School (Grades 9 through 12) | |
| Maui High | Kahului |
| Charter Schools (Grades K through 12) | |
| Kihei PC High School | Kihei |

Source: State of Hawaii, Department of Education

In January 2016, the DOE conducted groundbreaking ceremonies for the new Kihei High School (KHS) which will be situated in North Kihei, mauka of Pi'ilani Highway. Ground work for new wells

and an access road was completed in 2016. The next phase of site construction is anticipated to begin by the end of 2017 or early 2018 (Friends of Kīhei High School, 2017).

University of Hawai'i - Maui College, located in Kahului, is the primary higher education institution serving the island of Maui.

Potential Impacts and Mitigation Measures

During the EISPN Public Review period, the Department of Education wrote:

The Project is located within the Central Maui School Impact Fee District, Wailuku Cost Area. In 2007, the Hawaii State Legislature enacted the school impact fee program allowing for the collection of impact fees from residential projects within School Impact Fee Districts designated by the Board of Education (BOE). The Central Maui School Impact Fee District and impact fee amount was established by the BOE in 2009. A single family unit is assessed a fee of \$5,373 and a multi-family unit is assessed a fee of \$2,371.

During the Draft EIS public review period, DOE wrote:

The DEIS incorporates HIDEOE previous comments on the Environmental Impact Statement Preparation Notice (EISPN), by memorandum dated January 22, 2018, regarding the Projects location within the Central Maui School Impact Fee District. Since the EISPN, the DHHL Project has been refined to include the development of approximately 80 to 100 agricultural homestead lots at Pulehunui South. When the DHHL Project is mature and unit turn over stabilized, we would expect approximately 49 HIDEOE students will reside there.

[...]

Chapter 302A-1606, Hawaii Revised Statutes requires the developer of new residential development with 50 or more units, to execute an agreement with the HIDEOE. The DHHL is encouraged to meet with the HIDEOE as early as possible to execute an Educational Contribution Agreement.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

DHHL will continue to consult with the appropriate Federal, State, and County agencies to determine potential impacts and coordinate mitigation approaches. DHHL recognizes that if residences are constructed at Pulehunui South, school-aged children from those households will place additional demand for public and private educational facilities. To mitigate potential impacts, as plans for the DHHL Project Areas progress, DHHL will consult the DOE regarding school impact fees and other potential impacts to educational resources. DHHL Project Areas will comply with any applicable impact fee requirements (including an Educational Contribution

Agreement, as applicable). The realization of Pulehunui South may even make a positive impact on educational opportunities. Based on the demand for community uses including cultural education, 33 acres of land have been set aside for educational uses at this property.

Pulehunui North is not expected to be a direct population generator. As such, it is not anticipated to place additional demand upon educational facilities in the Kahului and Kīhei regions.

ATTACHMENT

5.11.7 AIRPORTS AND AIRFIELDS

5.11.7 Airports and Airfields

The nearest airfield to the DHHL Project Areas is the approximately 30-acre Pu'unenē Army serves the Hawai'i Army National Guard (HARNG) as a recruiting and training area, as well as a staging area for emergency response and related training. Flight paths into and out of the Armory (located across Maui Veterans Highway) may pass over the south portion of Pūlehunui North. Incoming aircraft consist primarily of Chinook and Black Hawk helicopters which typically approach the landing pad from the south.

Potential Impacts and Mitigation Measures

During the Draft EIS public review period, the State of Hawai'i Department of Transportation Airports Division (DOT-AIR) wrote:

The proposed Pulehunui development is approximately four miles from the end of Runway 2 at Kahului Airport (OGG). Pulehunui North also lies below the imaginary transitional airspace surface for OGG. Safety concerns for aircraft operations mandates the DOT-AIR to review all proposed development projects within five miles from airports, as prescribed in the Technical Assistance Memorandum of 2016, created for DOT-AIR with assistance by the Federal Aviation Administration (FAA), Honolulu Airports District Office and the Hawaii State Office of Planning.

Section 5.8.4 of the DEIS, pages 131-136, discusses new retention basins for mitigation to retain storm water at both sites (Pulehunui North and Pulehunui South). Independent of outside flows from other properties. Standing water creates a potential wildlife attractant and therefore creates a bird-strike risk to aircrafts flying over the property.

DOT-AIR requests that design and landscaping for the Pulehunui project do not create conditions to attract wildlife. If wildlife is attracted to the project site and poses a potential hazard to aircrafts, the DHHL is requested to take appropriate measures to ensure the proper mitigation of the potential wildlife hazard. FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

DHHL acknowledges that standing water may create a potential wildlife attractant thereby presenting a bird-strike risk to aircraft flying in the region, as well as potentially attracting vulnerable birds to areas inhabited by non-native predators. As noted in Section 4.1, a high proportion of the rainfall that Maui receives each year falls on the northeast facing shores, leaving the central isthmus and southern coastal areas relatively dry. The annual average rainfall in the vicinity of the Infrastructure Regional Study Area (based on readings taken at Kahului Airport) amounts to approximately 11 to 13 inches, and as noted in Section 4.3.1 soils in the region are generally well-drained. Therefore, it is highly unlikely that detention basins will contain standing water in the event of a storm, and any standing water are anticipated to be minimal. At

the request of DOT-AIR, DHHL will specify to prospective developers and other site users that design and landscaping at the DHHL Project Areas should not attract wildlife. Should wildlife be determined to present a potential hazard to aircraft, DHHL will take appropriate measures to ensure the proper mitigation of the potential wildlife hazard. DHHL notes FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

During the Draft EIS public review period, DOT-AIR also wrote:

The proposed development may be exposed to fumes, smoke, noise, vibrations, odors, etc., resulting from aircraft flight operations. The DEIS report adequately addressed noise mitigation and disclosure issues, pending actual implementation.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

As noted in Section 5.5, air quality on Maui, and throughout the State of Hawai'i, is considered to be good due to the presence of northeasterly trade winds that tend to disperse pollutants seaward. Regarding regional emissions, the DHHL Project Areas are located in an Attainment/Unclassified area for all National Ambient Air Quality Service (NAAQS) and regional air quality is good. Should DHHL suspect that fumes, smoke, noise, vibrations, odors, and other airport-related exposures may impact the anticipated uses of its lands, more protective mitigation strategies will be considered at such time, depending on the nature of the concern. Should other unforeseen impacts arise from aircraft activities which are not mitigated by the strategies described in this EIS, DHHL will consider additional measures.

Pu'unēnē Armory activities are not anticipated to impact or be impacted by the DHHL Project Areas as the DHHL Project Areas are located a minimum of 200 feet from the armory (and farther from the armory's landing pad) and will include visual and noise buffers as discussed in Sections 5.4 and 5.7.

During the Draft EIS public review period, DOT-AIR also wrote:

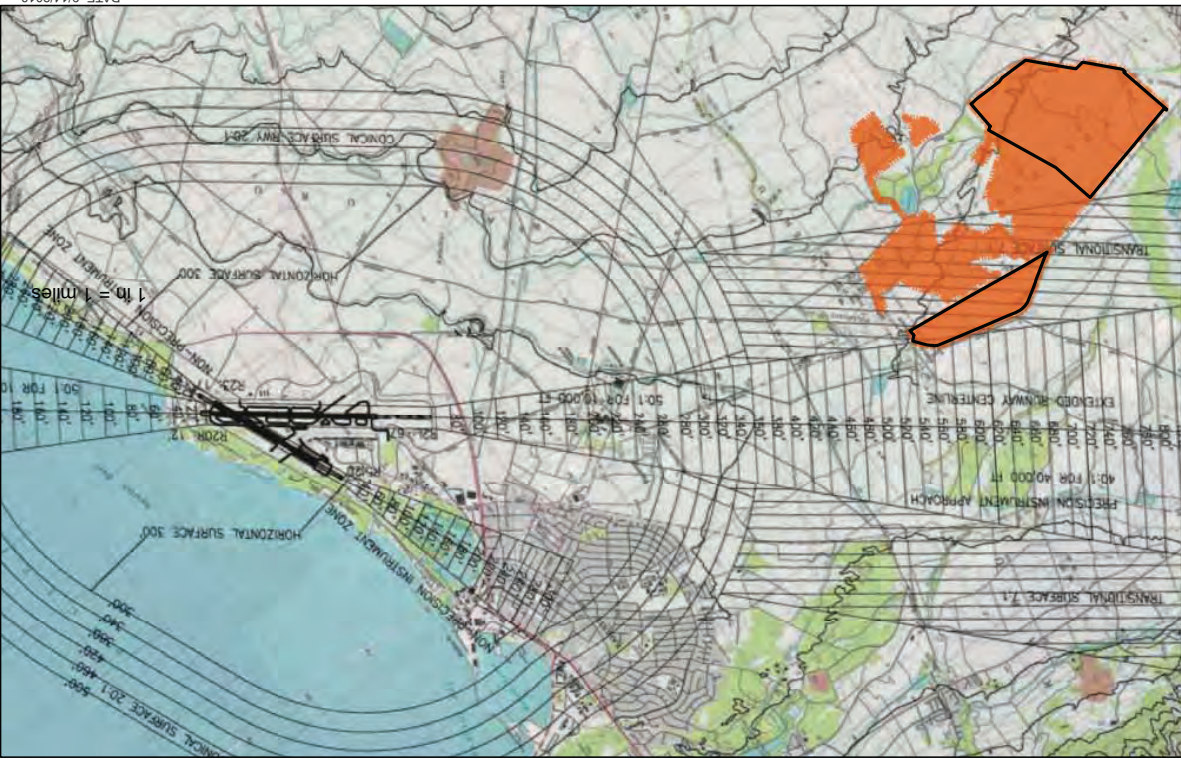
FAA regulation requires the submittal of FAA Form 7460-1, Notice of Proposed Construction or alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet.

Large-scale photovoltaic (PV) panel installations have the potential to create glint and glare hazard conditions for aircraft pilots. If the proposed project includes PV installation, it is recommended that the project proponent conduct a glint and glare analysis to ensure that the solar energy installation will not create hazardous conditions to OGG flight operations.

Please see the following website for more information: www.sandia.gov/glare. Large-scale solar energy installations also have the potential to emit radio frequency interference (RFI). Glint, glare, RFI, PY panels and tall equipment such as cranes that may be used during construction can create hazardous conditions to pilots. Any such PY system, construction equipment, and/or other structure that creates a hazardous condition for pilots, must be immediately mitigated by the owner upon notification by the DOT-AIR and/or by FAA.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

Figure 5-3 shows a noise exposure map for the Kahului Airport, located a minimum of four miles north of the DHHL Project Areas. Figure 5-24 shows the airport airspace plan in reference to the Infrastructure Regional Study Area, which demonstrates that aircraft may transit over Pulehunu North but are not anticipated to restrict the anticipated land uses. To prevent potential impacts to airport activities from wildlife, glint/glare hazards, obstructions and other issues, the Federal Aviation Administration (FAA) is being consulted to ensure compliance with any applicable rules and laws including those outlined in the State Office of Planning's technical assistance memorandum regarding airports in the state (State Office of Planning, 2016).



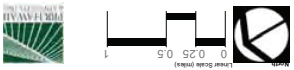
DATE: 9/14/2018

FIGURE 5-24:

Airport Airspace Plan

PŪLEHNUUI REGIONAL

INFRASTRUCTURE MASTER PLAN



- LEGEND**
- DHH Project Areas
 - Infrastructure Regional Study Area

Source: Kahului Airport Master Plan Update, 2016.
 Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

ATTACHMENT

6.3.2 COUNTY'S MAUI ISLAND PLAN

6.3.2 County's Maui Island Plan

The Maui Island Plan derives its framework from Maui County's Countywide Policy Plan adopted in 2010. The Maui Island Plan establishes urban and rural growth areas in order to promote future growth while preserving natural resources and character. There are three Growth Boundary types: Urban, Small Town, and Rural.

During the Draft EIS public review period, the County of Maui Planning Department wrote:

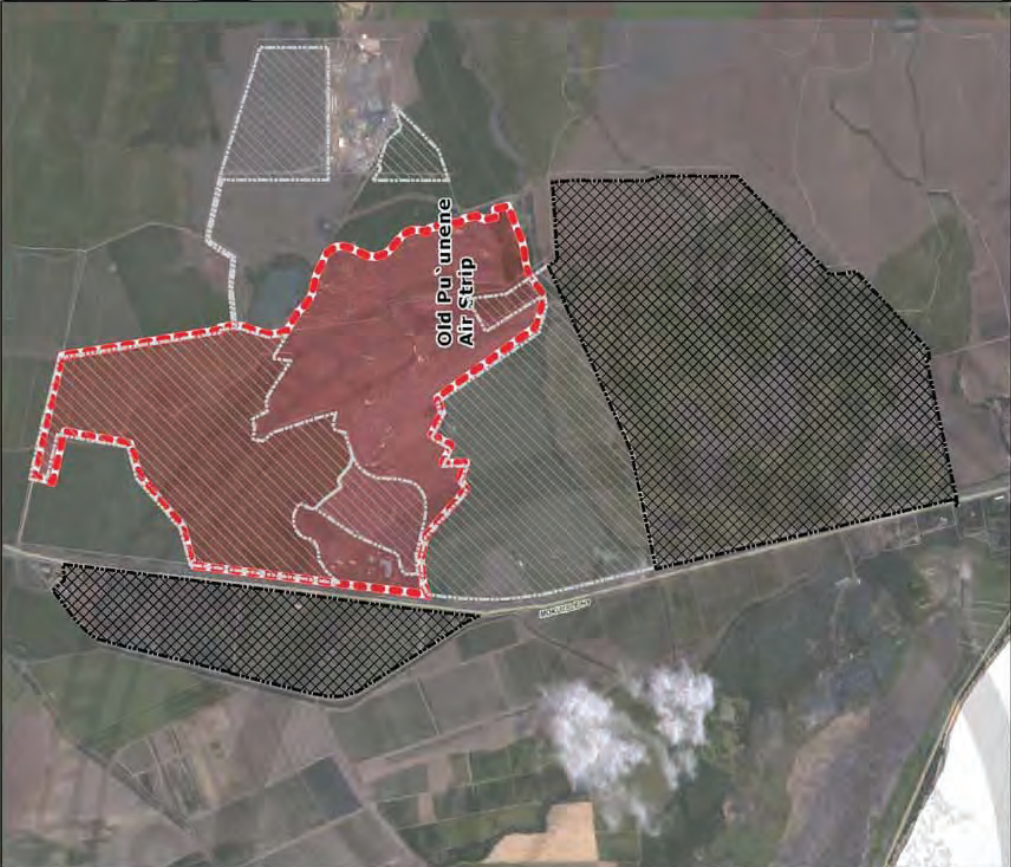
3. The Maui Island Plan discusses "Smart Growth" principles, locating jobs near population centers and existing infrastructure. The proposed commercial and industrial uses are in conflict with "Smart Growth" principles.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

The Hawaiian Homes Commission Act (§§204 and 206), which has been incorporated into Article XII of the Hawai'i State Constitution, vests DHHL with exclusive authority to control its lands, and the anticipated land uses are generally consistent with the Department's existing Maui Island Plan. The anticipated amendment to the Department's Maui Island Plan is being sought to refine the plan for agriculture and supporting uses at Pūlehuui South, based on outreach to DHHL beneficiaries which is detailed in Section 9.2.

It should be noted that much of the Infrastructure Regional Study Area is in an area identified for Urban Growth in the County's Maui Island Plan. The DHHL Project Areas lie outside of any current growth boundary. Pūlehuui North was within the Urban Growth Boundary (UGB) for many years, until 2012, when a vote was taken to expand the UGB surrounding Pūlehuui Motorsports Park to include the future DLNR Pūlehuui Industrial Park/Maui Regional Public Safety Complex (described in Section 3.3.2). In the same motion, Pūlehuui North was removed from the UGB despite designation by DHHL for industrial use, compatible surrounding land uses, and its inclusion in Project District 10 which provided for urban land uses (see Figure 6-1).

Therefore, in the context of the County's Maui Island Plan, DHHL believes the Department's anticipated land uses are prudent given future commercial/industrial uses in Pūlehuui (including State projects anticipated within the Infrastructure Regional Study Area, that are outside the purview of DHHL).



DATE: 9/14/2018

Figure 6-1:
Maui Island Plan
PŪLEHUNUI REGIONAL
INFRASTRUCTURE MASTER PLAN

LEGEND

- DHHH Project Areas
- Infrastructure Regional Study Area
- Urban Growth Boundary (Maui Island Plan)



Source: Urban Growth Boundary, Maui Island Plan, 2012.
 Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

ATTACHMENT

6.4 APPROVALS AND PERMITS

6.4 APPROVALS AND PERMITS

A listing of anticipated permits and approvals required for ~~the~~ the Proposed Action is presented below.

Table 6-5. Anticipated Permits and Approvals

| RESPONSIBLE AGENCY | PERMIT/APPROVAL |
|--|---|
| Governor, State of Hawai'i DHHL | Chapter 343, HRS Compliance |
| State Department of Health – Clean Water Branch | National Pollutant Discharge Elimination System (NPDES) Permit Review |
| State Department of Health – Disability and Communication Access Board | Community Noise Permit (if applicable) |
| State Department of Health – Indoor and Radiological Health Branch | New Raw Water Source Capacity review |
| State Department of Health – Safe Drinking Water Branch | Review |
| State Department of Health – Wastewater Branch | Chapter 6E, HRS Compliance |
| State Department of Land and Natural Resources – State Historic Preservation Division | Surface Water Use Permit |
| State Department of Land and Natural Resources – Commission on Water Resource Management | Permit to Perform Work within a State Right- of-Way (ROW) Use and Occupancy Agreement Permitted Access |
| State Department of Transportation | Grading/Subdivision/Building/Electrical Permits, plan review Review |
| County of Maui Department of Public Works | Special Flood-Hazard Flood Development Permit (if applicable) |
| County of Maui Department of Water Supply Planning Commission | Review |
| County of Maui Wastewater Reclamation Division | Review |

During the Draft EIS public review period, The County of Maui Planning Department wrote:

12. We note that on page 219, it says that Special Flood Hazard Development Permits may be required, if applicable. We would like to inform you that you will be required to apply for a Flood Development Permit for any parcel that is not located within Flood Zone X or XS.

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

Depending on the selected infrastructure alternatives, additional permits and approvals may be needed. As noted by the County of Maui Planning Department, a Flood Development Permit will be applied for any parcel that is not located within Flood Zone X or XS.

During the Draft EIS public review period, PSD wrote:

Missing discussion for Future Jails and/or Correctional Facilities if a County Special Use Permit (CUP) needs to be filed with the Maui County, Dept. of Planning. Please also discuss possible additional permits associated with the Land Use Commission with the State of Hawaii need to also be filed? Ref: Chapter 19.510.010 MCCC Application and Procedures, Chapter 19.510.020 MCCC, Application for Public Hearing, Chapter 19.501.070 Special Use Permit

Refer to Appendix B-2 for a copy of the comment and DHHL's response.

Since the Proposed Action does not include the planning, design and construction of the MRPSC, a listing of anticipated permits and approvals for the MRPSC has not been added to Table 6-5. The Pūlehuui Regional Infrastructure Master Plan incorporates by reference other available project information, if provided by DLNR, and DAGS/PSD for their respective proposed developments in the region. See Section 3.3.2.

The State Office of Planning wrote:

I. The regional infrastructure study area is entirely within the State Agricultural District. At some point in the future, the study area will require a State Land Use District Boundary Amendment. OP represents the State as a mandatory party in proceedings before the Land Use Commission (LUC). In developing its position, OP evaluates whether the project meets the LUC decision-making criteria in HRS § 205-17, as well as its conformance with Coastal Zone Management (CZM) objectives and policies in HRS § 205-A-2.

Refer to Appendix B-2 for a copy of the comments and DHHL's response. The Hawaiian Homes Commission Act (§§204 and 206), which has been incorporated into Article XII of the Hawai'i State Constitution, vests DHHL with exclusive authority to control its lands. Non-DHHL projects within the Infrastructure Regional Study Area are pursuing the necessary permits and entitlements (including State Land Use District Boundary Amendment) independently for their respective proposed uses. A discussion of permitting and/or approvals associated with a specific project within the Infrastructure Regional Study Area should be included in environmental reporting documents specific to that project, in compliance with Chapter 343, HRS. A list of permits and approvals anticipated to be needed for the Proposed Action under this EIS is included in Table 6-5. Section 6.3.2 addresses conformance with the CZM Act, HRS Chapter 205A.

APPENDIX C

**PRELIMINARY ENGINEERING ~~AND~~
~~DRAINAGE~~ REPORT**

Errata
to
Austin Tsutsumi & Associates
October 2018
Preliminary Engineering Report
Pūlehunui Regional Infrastructure Master Plan

The errata corrections listed below apply to the Preliminary Engineering Report.

| Page | Location | Change |
|------|---------------------------|---|
| 2-7 | 3 rd paragraph | A 2018 TNWRE memorandum was inadvertently referenced but not included. The reference has been changed from Appendix A to Appendix C and the memorandum has been included. |
| | Appendix C | The 2018 TNWRE memorandum "Possible Drinking Water-Well Sites on TMK 3-14-01-001 in the Waihee Aquifer" has been included as Appendix C. |

April 2019

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DEPARTMENT OF HAWAIIAN HOME LANDS
DEPARTMENT OF LAND AND NATURAL RESOURCES
 Pūlehunui Ahupua‘a, Kula Moku, Maui

Prepared for:



Proposing Agency:
 Department of Hawaiian Home Lands



Prepared by:



Austin, Tsutsumi and Associates
 1871 Wili Pa Loop, Suite A
 Wailuku, Hawai'i 96793

OCTOBER 2018

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CHAPTER 1

INTRODUCTION

CHAPTER 1 – INTRODUCTION

1.1 INTRODUCTION

The Department of Hawaiian Home Lands (DHHL) is preparing a regional infrastructure master plan to serve certain State-owned lands located in Pūlehuui, Maui, Hawaii. The purpose of this report is to identify and analyze the existing drainage, water and wastewater infrastructure, for the Pūlehuui Regional Project, and to evaluate alternatives as a regional approach to include infrastructure developments by Department of Land and Natural Resources (DLNR) and the Department of Accounting and General Services/Department of Public Safety (DAGS/PSD).

1.2 LOCATION

The Pūlehuui Regional Project is located in Pūlehuui, Maui, Hawaii, mauka and makai and along the Maui Veterans Highway (fka Mokuule Highway). The land owners involved with the Pūlehuui Regional Project consist of five parcels that are identified by their Owner, Tax Map Key and acreage on the following Table 1-1.

Table 1-1: Pūlehuui Regional Project Parcels.

| Managing Agency | T.M.K. | Acres |
|---|--------------------------------------|---------------------|
| Department of Hawaiian Home Lands (Pūlehuui North) | (2) 3-8-008: 008, 035 & 036 | 184 |
| Department of Hawaiian Home Lands (Pūlehuui South) | (2) 3-8-008: 034 | 646 |
| Department of Land and Natural Resources (DLNR Industrial Business Park) | (2) 3-8-008: 001 | 280.4 |
| Department of Accounting and General Services/Department of Public Safety(DAGS/PSD) | (2) 3-8-008: 037 (2) 3-8-008: 001 | 40-45 |
| Department of Parks and Recreation (DPR), Pūlehuui Motorsports Park (PMP) | (2) 3-8-008: 037 | 222.6 |
| | | Total approx. 1,378 |

The above uses include all anticipated developments in the Infrastructure Regional Study Area defined in the Environmental Impact Statement for the Pūlehuui Regional Infrastructure Master Plan, plus the Maui Raceway Park which is anticipated to connect to the regional infrastructure system. The Maui Raceway Park is not within the Infrastructure Regional Study Area, but this analysis accounts for its needs because it is anticipated that the PMP will utilize the regional infrastructure.

Some of the land owners surrounding the Pūlehuui Regional Project are the State of Hawaii, Alexander & Baldwin Properties, Inc., and Monsanto Company. The project area stakeholders involved are displayed in Exhibit 1-1.

1.3 PROJECT DESCRIPTION

DHHL is undertaking a regional infrastructure master planning effort on behalf of four State Agency stakeholders. DHHL anticipates that regional infrastructure improvements may be beneficial to serve regional or State-owned lands to be managed by DHHL, DLNR or DAGS/PSD and those agencies' respective proposed

developments. The stakeholders involved in the Pūlehuunui Regional Project and a brief description of their project follows.

1.3.1 Department of Hawaiian Home Lands, Pūlehuunui North

The DHHL Pūlehuunui North project is a master planned development with commercial, light industrial, public/ quasi-public, hotel, and open space uses. During the master plan phase, the lots will be pad graded and utility stub-outs will be installed. The main access to the project will be from a proposed intersection off of Maui Veterans Highway. During the subdivision process, it may be required that Mehamaha Loop be improved to County Standards as part of this project. (See Exhibit 1-3 - DHHL Pūlehuunui North)

1.3.2 Department of Hawaiian Home Lands, Pūlehuunui South

The DHHL Pūlehuunui South development is an area primarily for agricultural farm and agricultural homestead use by DHHL Beneficiaries, with zones also reserved for agriculture-supportive, industrial, and community uses.

The agricultural homestead area, located on the mauka portion of the site, will feature approximately 80-110 homestead lots for DHHL Beneficiaries with the intent of agricultural use. These agricultural units will typically have an area of up to two acres with an overall area totaling 238 acres. (See Exhibit 1-4 – DHHL Pūlehuunui South.)

The agricultural farm lots will be reserved for general commercial agricultural use through intensive or extensive farming and ranching. These lots have a total area of 146 acres and will also act as a buffer between the Maui Raceway Park and the ag homestead area.

The remaining land area abuts Maui Veterans Highway and consists of the following potential uses/example uses:

- o Education (33 acres) – Hawaiian Culture Immersion Schools, language programs, agricultural/mālama āina education, business & job training, and daycare.
- o Farmers Market (11 acres) – Marketing of agricultural goods produced across the island.
- o Culture & Arts (18 acres) – Luau grounds, cultural venue events, meeting space, gathering areas, pavilion, and community center. Area may also support Beneficiary-led agritourism, ecotourism, cultural tourism, and other outreach activities.
- o Ag Support (24 acres) – Agricultural community resource, packing, cooling, industrial processing of agricultural products, and storage/warehousing.
- o Beneficiary Gardens (27 acres) – Large scale community garden opportunities for Beneficiaries across the island (operated by community).
- o Commercial Enterprises (70 acres) – Light industrial lands to Hawaiian businesses, Base yards, non ag-related uses.

1.3.3 Department of Land and Natural Resources, DLNR Industrial and Business Park

The proposed DLNR Industrial and Business Park will include small, medium and large lots envisioned to be utilized for light industrial use. Necessary infrastructure such as roadway, water, sewer, and drainage systems will be developed to support those planned uses. The entire DLNR Industrial and Business Park, including the Division of Forestry and Wildlife's (DOFAW) portion of the development (a baseyard) will be developed as M-1 Light Industrial uses. (See Exhibit 1-2 –DLNR Site Plan.)

1.3.4 Department of Accounting and General Services/Department of Public Safety (DAGS/PSD)

The State of Hawaii Department of Accounting and General Services, on behalf of the Department of Public Safety is proposing to develop the Maui Regional Public Safety Complex (MRPSC) on approximately 40.3 acres of land in the Pūlehuunui Regional Project study area. The proposed project consists of the construction of a new MRPSC facility that will include adult male and female detention housing and support facilities, minimum

security male and female housing and support facilities, and administration offices. The proposed MRPSC will initially include 608 bed spaces, and will provide space for future expansion to house up to 843 bed spaces.

1.3.5 Department of Parks and Recreation (DPR), Pūlehuunui Motorsports Park (PMP)

The Department of Parks and Recreation is finalizing a master plan for the Pūlehuunui Motorsports Park which is located in the middle of the Pūlehuunui Regional Project study area. Although the Motorsports Park accommodates a variety of organizations and events throughout the year, it lacks adequate infrastructure such as potable water, wastewater, electricity and drainage. Because of the location of the PMP, it will be included in this infrastructure study.

1.4 REPORT LAYOUT

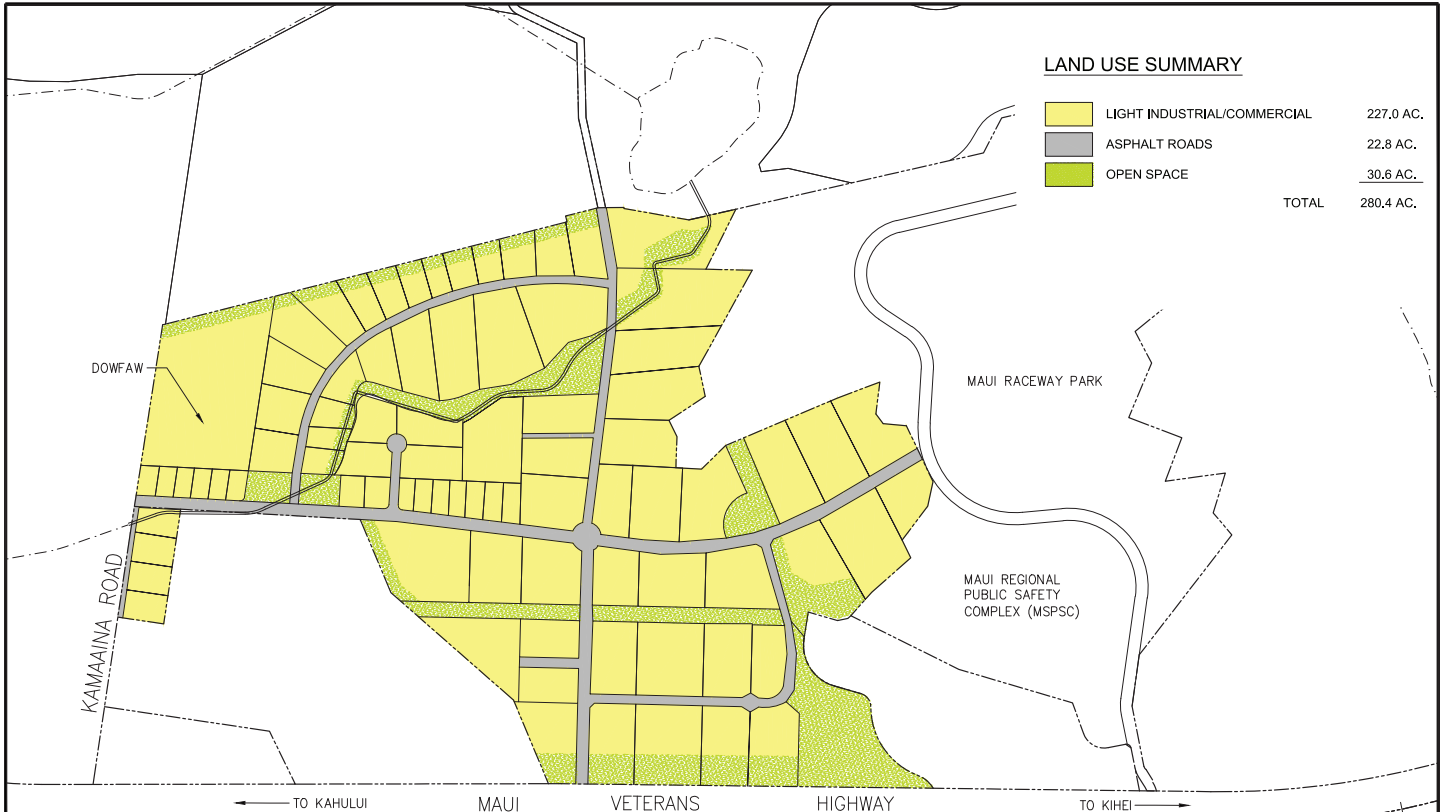
Each subsequent chapter in this report will entail existing conditions, proposed alternatives and a recommended conclusion for water, wastewater, and drainage.

CHAPTER 1

EXHIBITS

LAND USE SUMMARY

| | | |
|---|-----------------------------|------------------|
|  | LIGHT INDUSTRIAL/COMMERCIAL | 227.0 AC. |
|  | ASPHALT ROADS | 22.8 AC. |
|  | OPEN SPACE | 30.6 AC. |
| TOTAL | | 280.4 AC. |



DLNR INDUSTRIAL & BUSINESS PARK SITE PLAN

SCALE: 1" = 600'

0
LINE IS 1 INCH AT FULL SIZE
(P. 1001 - 10-10-11 Scale Approved)

PRELIMINARY ENGINEERING REPORT
REGIONAL MASTER PLAN
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DLNR BUSINESS PARK

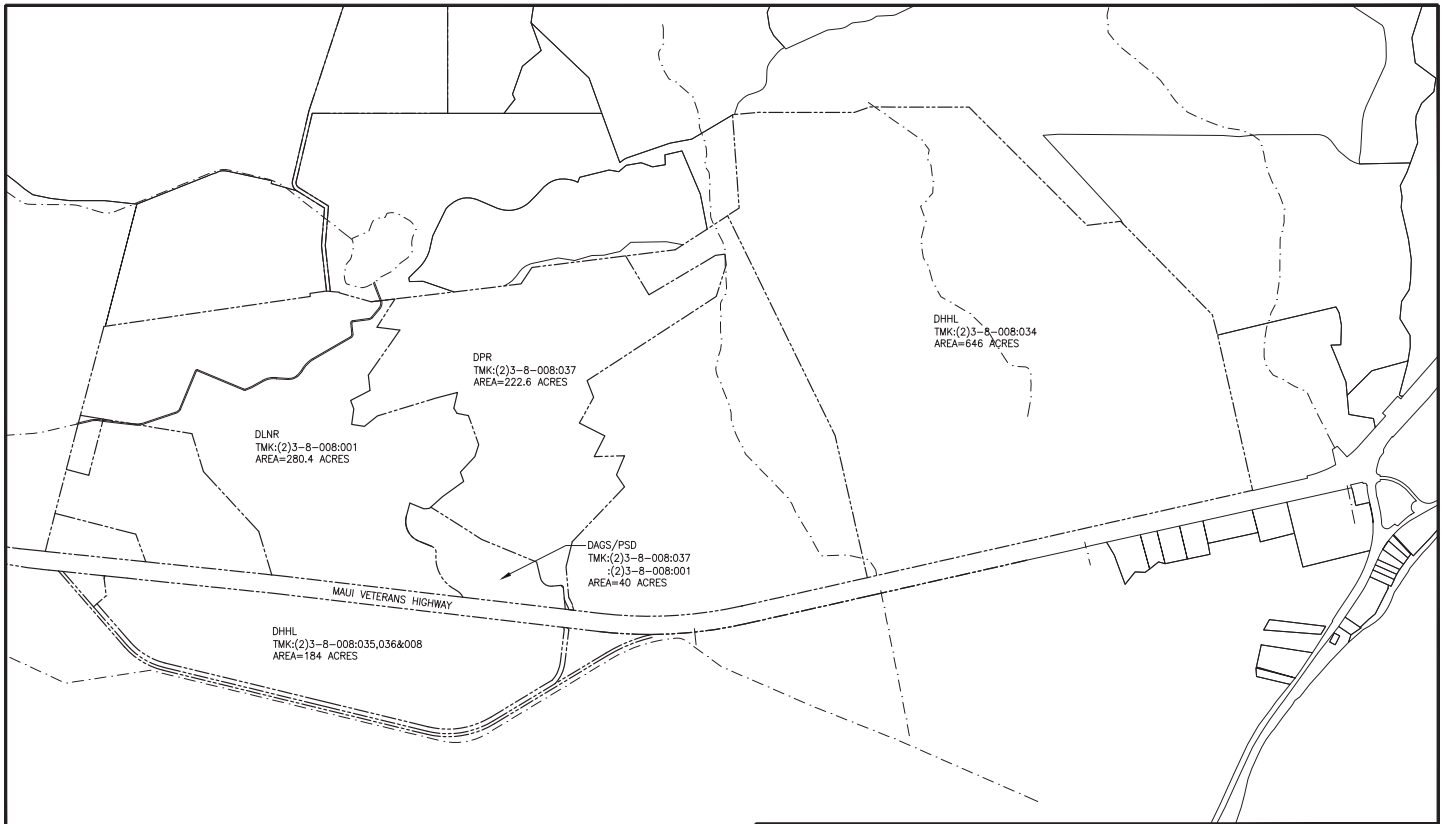
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AUGUST 2018

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TAX MAP

SCALE: 1" = 1200'

0
LINE IS 1 INCH AT FULL SIZE
(P. 1001 - 10-10-11 Scale Approved)

PRELIMINARY ENGINEERING REPORT
REGIONAL MASTER PLAN
PULEHUNUI, MAUI, HAWAII

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TAX MAP

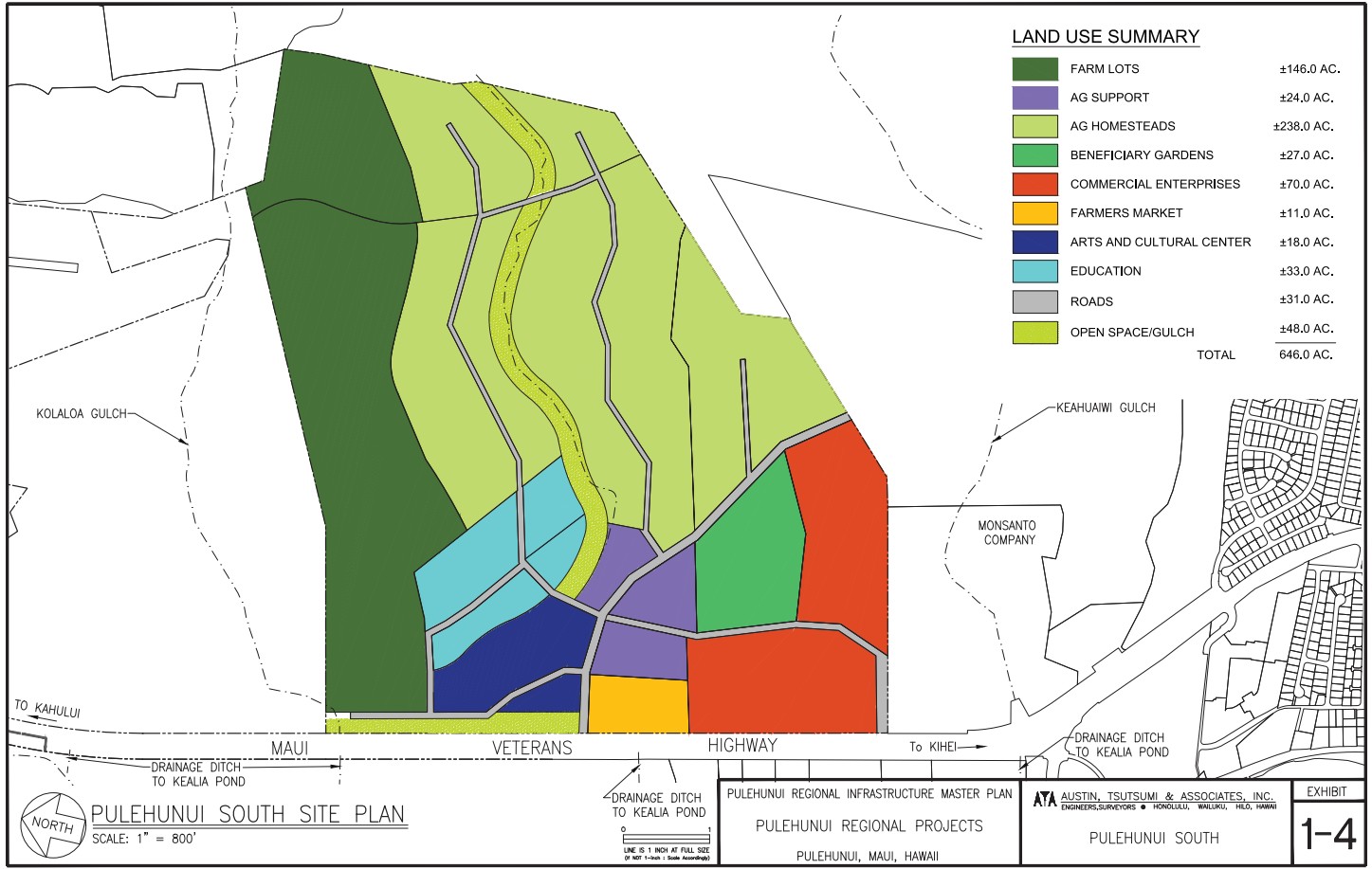
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AUGUST 2018

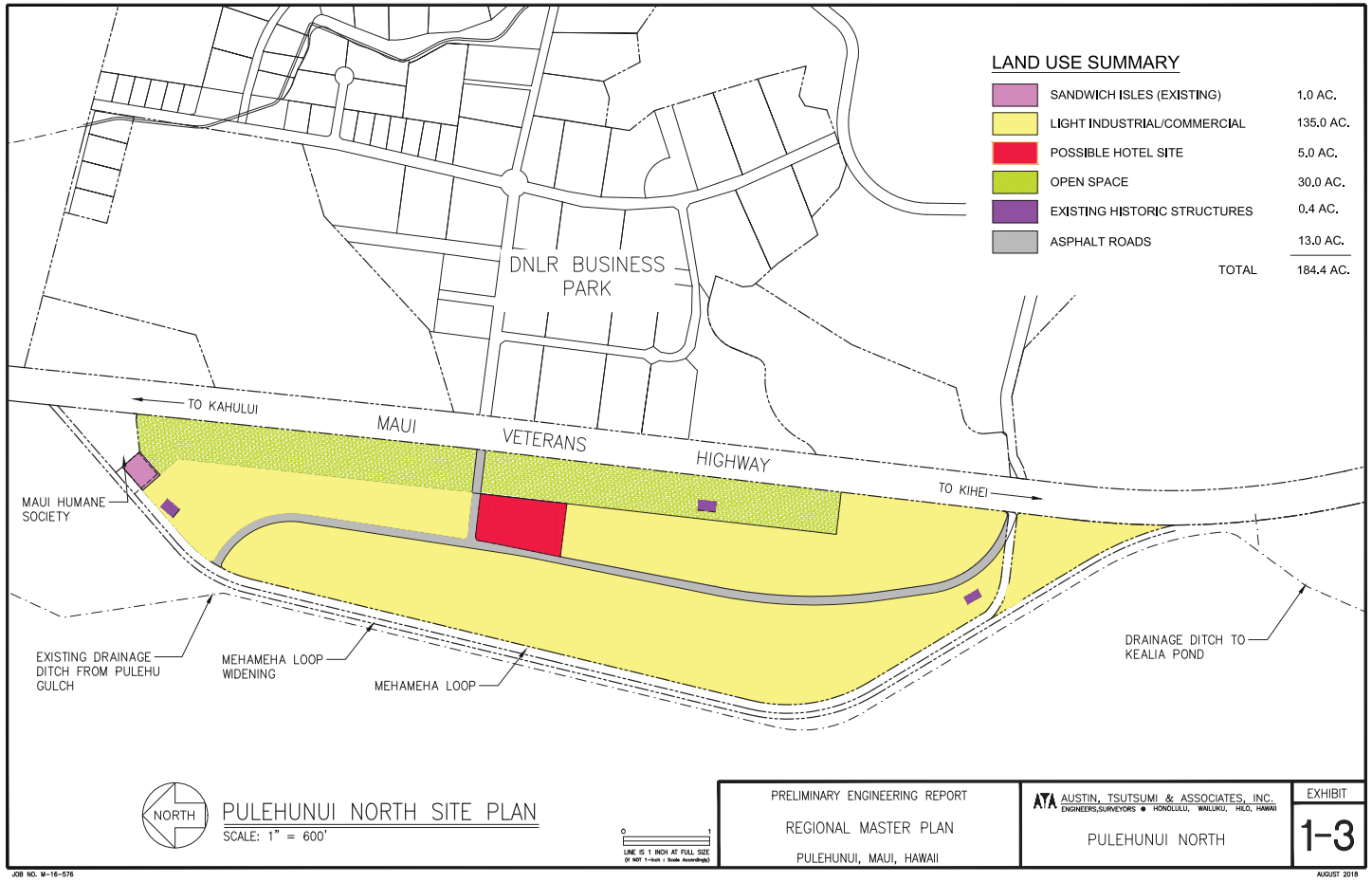
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JOB NO. M-16-576

AUGUST 2016

CHAPTER 2 - WATER SYSTEM

2.1 EXISTING WATER SYSTEM

The County of Maui, Department of Water Supply (DWS) provides water service to some users in the Pūnene-Pūlehuui area, including the National Guard Armory and the Humane Society. (See Exhibit 2-1 - Existing Water System.) DWS also provides water to users in Kihei, with the northern most users along North Kihei Road.

DWS has two transmission waterlines in the vicinity of the Pūlehuui Regional Project. These are the 18-inch Kihei Water Development Project (KWDP) waterline and the 36-inch Central Maui Water Transmission System (C.M.W.T.S.) waterline. The National Guard Armory is serviced from a 12-inch waterline connected to the 36-inch C.M.W.T.S. waterline at the southern intersection of Maui Veterans Highway and Mehamaha Loop, with a pressure reducing valve (PRV) at this connection. There is also a 6-inch waterline connected to the 18-inch KWDP waterline just south of southern intersection of Maui Veterans Highway and Mehamaha Loop that runs north along Maui Veterans Highway.

Properties along North and South Kihei road are serviced by a 12-inch waterline that connects to the 18-inch KWDP waterline near the intersection of Piliani Highway, Maui Veterans Highway and North Kihei Road.

The source water for the C.M.W.T.S. is groundwater wells in the Waiehu area, which draw water from the Iao Aquifer. Water is stored in the 1.0 million gallon (MG) Waihe'e Tank (also referred to as the C.M.W.T.S. Tank) in Waiehu. The Waihe'e Tank has a top elevation of 511 feet mean sea level (msl) and a bottom elevation of 490.75 feet msl. Water from this tank flows by gravity to Kihei via the C.M.W.T.S. waterline. The C.M.W.T.S. waterline is 42 inches from the Waihe'e Tank to Kahekii Highway, and is 36 inches the rest of the way to Kihei. The Waihe'e Tank services portions of Waihe'e, Maalaea, Pūlehuui and South Maui.

The source water for the 18-inch KWDP is primarily the Mokuahu Wells, which also draw water from the Iao Aquifer. The wells are located at the end of Mokuahu Road, just north of Iao Stream.

CHAPTER 2 WATER SYSTEM

The lao Aquifer is designated as a groundwater management area under the State of Hawaii Commission on Water Resource Management (CWRM), which means that the current withdrawal from the aquifer is approximately (or has reached) 90% of the sustainable yield of the aquifer. The sustainable yield of the aquifer is designated to be 20 million gallons per day (mgd). The CWRM regulates well pumpage in the aquifer using the 12-month moving average statistic. In 2003, the 12-month moving average of water withdrawals exceeded 18 mgd, or 90% of the sustainable yield, thus triggering the designation as a groundwater management area.

The lao Aquifer lies on the flank of the West Maui Mountains and encompasses about 25 square miles. The lao Aquifer is located between the ridge south of Waiehe River and the ridge north of Waikapu Stream, and between the coast, the summit of the West Maui Mountain and the crest of the isthmus.

One of the largest systems drawing water from the lao Aquifer was Shaft 33, which consistently supplied five mgd to DWS's system. To better distribute the draft from this portion of the aquifer, DWS has developed new wells to replace its use of Shaft 33. The wells are the lao Well, Waikapu Well, and the recently completed Wailuku Well No. 1 and Wailuku Well No. 2. Shaft 33 is now shut down and is in the process of being closed and sealed.

In addition to these groundwater wells, DWS is currently constructing the new lao Water Treatment Plant (WTP), which will replace the existing lao WTP. The average day production rate of the new lao WTP will be 3.2 mgd. The new lao WTP will treat surface water from the lao-Waikapu Ditch, which is the current water source for the existing lao WTP. The treated water from the WTP will be conveyed to DWS's existing 3.0 MG lao Reservoir, which also receives water from the lao Well and the two Wailuku Wells. This reservoir supplies water to DWS's central Maui water system.

2.2 PROPOSED WATER SYSTEM ALTERNATIVES

2.2.1 General

The proposed water system would service the following areas (hereafter referred to as the Pūlehuui Regional Project):

- o DHHL Pūlehuui North – 184 acres
- o DHHL Pūlehuui South – 646 acres
- o DLNR Industrial and Business Park – 280.4 acres
- o Maui Regional Public Safety Complex (MRPSC) – 40 – 45 acres
- o Pūlehuui Motorsports Park (PMP) – 222.6 acres

The above uses include all anticipated developments in the Infrastructure Regional Study Area defined in the Environmental Impact Statement for the Pūlehuui Regional Infrastructure Master Plan, plus the PMP which is anticipated to connect to the regional infrastructure system. The PMP is not within the Infrastructure Regional Study Area, but this analysis accounts for its needs because it is anticipated that the PMP will utilize the regional infrastructure. The expectation is that the majority of the above uses will be serviced by a potable water system that would provide water for all uses, including potable, non-potable (irrigation) and fire protection purposes.

In addition to the potable water uses described above, a strictly non-potable system will be used to supply irrigation water to 146 acres of the DHHL Pūlehuui South project, which will be developed as an agricultural area. Non-potable water will also be used for irrigation in other areas of the south project, such as the Beneficiary Gardens. Further discussion on the non-potable system is included in Section 2.5.

This study is based on three alternatives for potable water supply. Water Alternative 1 is based the County of Maui, DWS providing water for the Pūlehuui Regional Project. The Pūlehuui Regional Project's water system would connect to DWS's existing water system in the vicinity of the project area, which would supply water for potable, non-potable and fire protection purposes.

Water Alternative 2 is based on development of a water treatment plant (WTP) that would treat surface water from East Maui Irrigation's (EMI's) ditch system. Water

Alternative 3 is based on development of a Reverse Osmosis (RO) WTP that would treat brackish water. Both Alternatives 2 and 3 would be privately owned and operated system (as opposed to owned and operated by DWS) and would involve construction of new waterlines and a water storage tank to service the Pūlehuunui Regional Project.

2.2.2 Alternative 1 - Proposed DWS Water System

2.2.2.1 Water Demand

The estimated potable water demand was calculated using criteria from the DWS's Water System Standards (WSS), dated 2002, as follows:

- o Light Industrial/Commercial/Ag. Support/Farmers Market/Arts & Cultural Users: The demand was calculated based on the WSS average day demand for "Commercial/Industrial Mix", which is 140 gallons per day (gpd) per 1,000 square feet (sf). This includes a minimal amount of irrigation use for each lot. For the purposes of this study, assumptions were made for the Floor Area Ratio (FAR) for the various land uses. The FAR varies from a minimum of 0.01 for the Farmers Market, which is equivalent to a building area of 440 square feet per acre, to a maximum of 0.48 for the DLNR Industrial and Business Park, which is equivalent to a building area of 21,000 square feet per acre.

- o Ag Homestead: The demand was calculated based on the WSS average day demand for "Single Family Residential", which is 600 gallons per unit. It was assumed that there will be 90 two acre lots with a 10,000 sf home site on each lot. The remaining lot area would be irrigated using non-potable water.

- o Education: The demand was calculated based on the WSS average day demand for "Schools", which is 60 gallons per student. It was assumed that there will be 400 students. This was a conservative estimate based on informal discussions with administrators for Punana Leo Preschool and Ke Kula o Nawahiokalaniopu'u K-12 School.

- o Open Spaces/ Buffers/ Green Areas/ Roadways (where applicable): The demand was calculated based on the WSS average day demand for "Schools, Parks", which is 1,700 gpd per acre.

- o Hotel: The demand was calculated based on WSS average day demand for "Resort", which is 17,000 gal/acre.

- o Wastewater Treatment Plant (WWTP): The demand was based on providing potable water for restrooms, a laboratory and a kitchen/break room, which is anticipated to be approximately 1,000 gpd. All process and irrigation water is expected to be supplied by the WWTP effluent.

There is not expected to be any potable water demand associated with the Agriculture-farm lot uses or the Beneficiary Gardens. There is also not expected to be any potable water demand associated with any landscaping for roads or buffer areas within DHHL Pūlehuunui South. The average day demand is estimated to be 1,360,000 gpd. Table 2-1 shows the projected water demands.

In accordance with the WSS, the maximum daily water demand is calculated as being 1.5 times the average daily demand, which would be approximately 2,037,000 gpd.

Table2-1: Projected Water Demands per DWS's System Standards

| Land Use Description | Area (acres) | Floor Area Ratio (FAR) | Building Area (sf/acre) | Building Area (sf) | Average Day Demand | | Maximum Daily Demand (gpd) |
|--|--------------|------------------------|-------------------------|--------------------|--------------------|--------------|----------------------------|
| | | | | | Demand (gpd) | Unit | |
| PŪLEHUJUI NORTH | | | | | | | |
| Sandwich Isles (existing) ¹ | 1 | - | - | 1,830 | 140 | gpd/1,000 sf | 300 |
| Commercial/LL Industrial | 135 | 0.38 | 16,500 | 2,227,500 | 140 | gpd/1,000 sf | 312,000 |
| Hotel | 5 | - | - | - | 17,000 | gpd/acre | 85,000 |
| Roadways ² | 13 | - | - | - | - | - | - |
| Open Space/Ag Buffer | 30 | - | - | - | - | - | - |
| Sub-Total (rounded) | 184 | | | | 1,700 | gpd/acre | 449,000 |
| PŪLEHUJUI SOUTH | | | | | | | 673,000 |
| Beneficiary Farmer's Cooperative | | | | | | | |
| Farm Lots ³ | 146 | - | - | - | - | - | - |
| Ag. Support | 24 | 0.10 | 4,400 | 105,600 | 140 | gpd/1,000 sf | 14,800 |
| Ag. Homestead ⁴ | 238 | - | - | - | 600 | gpd/lot | 54,000 |
| Beneficiary Gardens ⁵ | 27 | - | - | - | - | - | - |
| Commercial Enterprises | 70 | 0.10 | 4,400 | 308,000 | 140 | gpd/1,000 sf | 43,200 |
| Farmers Market | 11 | 0.01 | 440 | 4,840 | 140 | gpd/1,000 sf | 700 |
| Arts & Cultural Center | 18 | 0.05 | 2,200 | 39,600 | 140 | gpd/1,000 sf | 5,600 |
| Education ⁶ | 33 | - | - | - | 60 | gpd/student | 24,000 |
| Wastewater Treatment Plant | - | - | - | - | - | - | 1,000 |
| Roadways & Exist. Gulch Areas ⁷ | 79 | - | - | - | - | - | - |
| Sub-Total (rounded) | 646 | | | | | | 144,000 |
| DUNN INDUSTRIAL AND BUSINESS PARK | | | | | | | 215,000 |
| Commercial/Light Industrial ⁸ | 227.0 | 0.40 | 17,424 | 3,659,040 | 140 | gpd/1,000 sf | 540,000 |
| Road Area ⁹ | 22.8 | - | - | - | 1,700 | gpd/acre | 15,500 |
| Green Area ⁹ | 30.6 | - | - | - | 1,700 | gpd/acre | 41,600 |
| Sub-Total (rounded) | 280.4 | | | | | | 597,000 |
| MRPSC ⁹ | | | | | | | 895,000 |
| Light Industrial ¹⁰ | 40-45 | | | | | | 152,000 |
| MAUI RACEWAY PARK | | | | | | | 227,000 |
| Commercial/Light Industrial ¹¹ | 222.6 | | | | | | 18,000 |
| TOTAL - All Developments (Rounded) | | | | | | | 1,380,000 |
| | | | | | | | 2,037,000 |

¹ Approximate building area was calculated from aerial map.

² Water demand for roadway and existing gulch areas are 0.

³ Assumed that Farm Lots will use non-potable water and will have no potable water demand.

⁴ Assumed SF Demand of 600 gpd for 90 lots. Assumed each 2 acre lot will have a 10,000 sf home site. Remaining

property will be irrigated with non-potable water.

⁵ Assumed that Beneficiary Gardens will use non-potable water and will have no potable water demand.

⁶ Assumed that Beneficiary Gardens will use non-potable water and will have no potable water demand.

⁷ Average Day Demand is based on 400 students.

⁸ Average Day Demand includes demand for 20-acre DOFAW site.

⁹ Average Day Demand is based on an irrigated area of 24.4 acres.

¹⁰ MRPSC stands for Maui Regional Public Safety Complex.

¹¹ Average Day Demand based on consultation memo from PSD.

¹² Demand based on 900 visitors using 20 gpd. However, this would only occur 13 times per year, so the demand of 18,000 is conservative.

2.2.2.2 Water Source

It is anticipated that this Pūlehujuui Regional Project will be granted approval by DWS to connect to the nearby DWS water system to supply water to the site. DRHL will need to coordinate further with DWS regarding if a water source will be required for this project.

If a new water source is required, the recommendation would be to drill new wells in the Waihe'e Aquifer since current groundwater withdrawal from the lao Aquifer is close to the sustainable yield. DWS has five wells that currently pump from the Waihe'e Aquifer, which are the Kupaa Well, Kanoa Well Nos. 1 and 2 and the North Waihe'e Well Nos. 1 and 2. (See Exhibit 2-2, Existing Wells and Tanks in the Waihe'e Aquifer.)

Tom Nance Water Resource Engineering (TNWRE) recommends drilling up to three new wells in the Waihe'e Aquifer. (See Appendix A C TNWRE Memorandum.) Use of the new wells could bring the total draft from the Waihe'e Aquifer close to the sustainable yield of the Waihe'e Aquifer, which is 8 mgd.

The wells could be drilled on State-owned land designated as TMK: 2-3-1-001:001. (See Exhibit 2-3, Existing and Potential Wells and Tanks in the Waihe'e Aquifer.) The wells would be located at an approximate elevation of 760 mean sea level (msl), which is about 120 feet higher than the Kupaa Well and 0.5 MG Tank.

Two options for locating a new storage tank to provide storage of the well water are being considered. Option 1 would be to construct a new tank near the new wells in State-owned land at the same elevation of the Kupaa Tank, which is at elevation 640 feet msl, so that the tanks would "float" with each other. Option 2 would be to construct a new tank next to the Kupaa Tank, but this option would require acquiring land from the existing property owner.

2.2.2.3 Water Conservation

DWS has initiated a conservation program to decrease the amount of water used by existing users. Conservation measures include prioritizing replacement of old and leak-prone mains, providing water-efficient fixture to consumers, distributing leak detection tablets, and increasing water reuse.

According to a DWS presentation in August 2016, the water savings by implementing conservation measures is expected to be approximately 700,000 gpd by 2019,

increasing to over 1,100,000 gpd by 2021. Although this conservation program is expected to increase the amount of available water, how DWS will choose to allocate this water is unknown. Therefore, development of a new water source may still be required.

2.2.2.3 Water Storage Tank Size

DWS has noted in the past that the 1.0 MG Waihe'e Tank is unable to support new projects. Therefore, one or more new storage tanks would be required to service the Pūlehuunui Regional Project. The storage volume would be sized to meet the requirements of the WSS, which are as follows:

- o Meet maximum day consumption. Reservoir full at the beginning of the 24-hour period with no source input to the reservoir.
- o Meet maximum day rate plus fire flow for duration of fire. Reservoir 3/4 full at start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.
- o Minimum size reservoir shall be 0.1 MG. Reservoir size shall be one of the following standard tank sizes: 0.10 MG, 0.20 MG, 0.25 MG, 0.30 MG, 0.50 MG and 1.0 MG, thereafter, sizes should be multiples of 0.5 MG (to a maximum of 3.0 MG).

To meet Criterion 1, the minimum volume would need to be at least 2,037,000 gallons.

Criterion 2 is based on incoming flow to the tank. Since the location of the tank is unknown at this time, the wells/pumps that would be feeding the tank are not known. A conservative approach would be to assume that there is no flow entering the tank, in which case the minimum required volume would be approximately 600,000 gallons. However, the next largest standard tank size would be 1,000,000 gallons.

Since the required capacity for Criterion 1 is larger than Criterion 2, Criterion 1 is the determining criteria, and the storage volume would need to be at least 2,037,000 gallons. Options for storage could be a single, 2.5 MG tank, or two tanks of lesser volume. The tank material would be concrete, with the method of construction either being cast-in-place, or utilizing a prestressed method. Tanks that are 0.5 MG and smaller could also be constructed of bolted stainless steel panels.

2.2.2.4 Water Storage Tank Location

The location of the tank(s) is still under consideration; however, the tank(s) should be located to provide the best opportunity for integrating the tank(s) into DWS's existing water system. Some of the criteria for locating the tank(s) are as follows:

Land ownership: Preferably, the tank(s) would be located on land owned by the State or the County of Maui. Otherwise, land would need to be purchased or leased. A maximum area of about five to six acres (400 feet x 600 feet) would be required to accommodate a 2.5 MG tank site, including grading. The area could be significantly reduced if retaining walls are constructed along the site boundary to minimize grading. However, the cost of such retaining walls would likely be significant.

Elevation: The tank(s) should be located at a minimum elevation of about 260 feet, to fit into DWS's existing water system, and to be able to service a reasonable number of users. The optimum location would be at an elevation above 480 feet, such that the tank(s) could supply water to the existing 36-inch C.M.W.T.S. waterline.

Location: The tank(s) should be located to minimize the amount of new transmission waterline required to connect the new tank(s) to DWS's distribution system or to the 36-inch C.M.W.T.S. waterline.

A meeting was held with DWS on December 20, 2017 to discuss possible tank(s) site locations to provide additional storage of water. (See Exhibit 2-4 – Off-Site Water Tank Options.) At that time, three options were considered to be viable.

Option 1: 1.0 MG Waihe'e Tank Site

DWS's preferred location is adjacent to the existing 1.0 MG Waihe'e Tank, which is at an approximate elevation of 485 feet. Unfortunately, there is not enough room on the existing parcel owned by DWS to construct a new tank(s). Therefore, land acquisition for a tank(s) site nearby would be required.

There are two land owners that surround the Waihe'e Tank site. The lot to the east of the Waihe'e Tank slopes downwards. The majority of the lot is too low to allow the existing and the new tank(s) to be at the same elevation, allowing them to hydraulically "float" with each other. However, there is a small area near the

existing Waihe'e Tank that may be able to accommodate a tank(s), perhaps with the use of retaining walls, or a smaller, say 2.0 MG, tank.

The lot to the east of the Waihe'e Tank site has a variable topography, with several possible options for a tank(s) that could be located around an elevation of 485 feet. There are several structures and developed areas within this lot that would need to be taken into consideration when locating the tank(s).

The advantage of this alternative is that the new tank(s) would be located near the C.M.W.T.S. waterline, and no additional transmission main would be required to connect to the 36" waterline. However, there would need to be a new inter-connecting waterline between the existing tank and the new tank(s).

Option 2: Adjacent to the existing 3.0 MG Iao Tank

The second option would be to construct the tank(s) on the property adjacent to the existing Iao Tank, which was recently purchased by DWS. However, DWS already has an agreement for constructing a 2.0 MG tank on this lot which would be used to service planned developments in the vicinity of the Iao Tank. Therefore, this option is considered to be less viable than Option 1 - although there may be an opportunity to negotiate with the developers of the 2.0 MG tank to increase the capacity of the tank so as to accommodate a portion of the needs of the Pūlehuui Regional Project. This option would need to be in tandem with another option, since it is anticipated that the site would not be able to accommodate a tank any larger than 3.0 MG. Also, DWS has indicated that a 3.0 MG tank may be the largest acceptable tank size.

Option 3: At the existing Iao Water Treatment Plant

The existing Iao Water Treatment Plant (WTP) is currently located at the 3.0 MG Iao Tank Site. However, a new Iao WTP is currently under construction, and upon startup, the existing WTP will be removed. Therefore, Option 3 would be to construct a new tank(s) adjacent to the existing 3.0 MG Tank in the space made available by demolition of the existing WTP. As with Option 2, this option would need to be in tandem with another option, since it is anticipated that the site would not be able to accommodate a tank(s) any larger than 1.0 MG.

Several other locations, including locating a new tank(s) near the existing 300,000-gallon Waikapu Tank on Waiko Road, or near the existing mid-level Kehalani Mauka Tank, were discussed, but were not deemed to be viable at this time.

As discussed previously, if new wells are to be drilled in the Waihe'e Aquifer, two options for locating the storage tanks near the wells could be pursued. One or two tanks could be constructed near the new wells to provide the required 2.5 MG of storage. Consideration could also be given to constructing new storage tanks in two locations, e.g., one tank at the Waihe'e Tank site and one near where any new wells are drilled.

2.2.2.5 Transmission and Distribution System

The exact location of the new tank(s) is not known at this time, but there may be the need for a new transmission line to convey the water from the new tank(s) to a connection point with the existing 36-inch C.M.W.T.S. waterline, or with DWS's distribution system.

Each project will require distribution waterlines to convey water to the lots within the project areas. On-site distribution waterlines would be of ductile iron pipe, and would be located within the Pūlehuui Regional Project roadways. (See Exhibit 2-5 – Proposed Water System, Alternative 1 – DWS System.) The waterlines would be sized to provide water for potable, irrigation and fire suppression purposes. The waterlines would also be sized to meet the pressure and velocity requirements of the WSS. Fire hydrants would be installed at a maximum of 250 foot intervals within the site, per the WSS. The maximum fire demand would be 2,000 gallons per minute (gpm), which is applicable for light industrial.

Further analysis of the water transmission and distribution system will be undertaken as part of the detailed engineering design process for this Pūlehuui Regional Project.

2.2.3 Alternative 2 - Proposed Surface Water System

For Water Alternative 2, a new private system would supply water to the Pūlehuui Regional Project. The water system would involve treating surface water from East Maui Irrigation Company, Ltd.'s (EM) ditch system at a new surface water treatment plant (S-WTP) to produce potable water.

2.2.3.1 Water Demand

Since this would be a private system, the water demand does not need to be calculated based on the WSS. The average daily demand for the commercial and light industrial land uses within Pūlehuui North and DLNR Industrial and Business Park was based on water use at an existing similar commercial/light industrial development in the Waiko area, called Consolidated Baseyard. The average per acre demand for this development in 2016 was approximately 1,850 gpd/acre. Therefore, an average day demand of 2,000 gpd/acre is considered to be reasonable for the light industrial and commercial uses in the Pūlehuui Regional Project. Water demands for Pūlehuui South, and for land uses other than light industrial and commercial within the other project areas, were calculated based on the same criteria as for the DWS water system. The projected maximum day water demand for Alternative 2 is 1,841,000 gpd. Table 2-2 shows the projected water demands for the private system.

2.2.3.2 Water Source

With the cessation of sugar cane cultivation on Maui, the assumption is that water previously used for irrigation may be available for other uses, such as drinking water. Alternative 2 would involve treating the surface water from EMI's existing agricultural irrigation system.

The existing irrigation system is sourced from the diversions by EMI and originates from streams in East Maui. Pursuant to an agreement executed March 18, 1938, EMI, in consideration for the right to convey and divert water for their uses, granted to the Territory of Hawaii a perpetual right and easement to jointly convey and divert water for the Territory's use. Successor to the agreement is the State of Hawaii.

The closest EMI ditch to the Pūlehuui Regional Project is the Haiku Ditch, which runs along the lower slopes of Haleakala at an approximate elevation of 140 feet mean sea level (msl). The Haiku Ditch discharges into HC&S Reservoir 90, to the north of DLNR's proposed Industrial and Business Park site. Water from HC&S Reservoir 90 was used previously on the Pūlehuui Regional Project when it was being used for irrigation of sugar cane fields by HC&S.

EMI has three other ditches that increase in elevation up the slopes of Haleakala. The next higher ditch is the Lowrie Ditch, at an approximate elevation of 340 feet. The next

higher ditch is the Kauhikoa Ditch, at an approximate elevation of 770 feet msl, and the highest ditch is the Hamakua Ditch at an approximate elevation of 1060 feet msl.

The recommendation at this time is to take water from the Haiku Ditch, due to its proximity to the Pūlehuui Regional Project. However, further investigation may determine that obtaining water from one of the higher ditches may be more desirable. For example, the raw water in another ditch may prove to be of better quality than in the Haiku Ditch, or of a more consistent quantity. At this point, the quality and quantity of the water in the Haiku Ditch is unknown. However, the indication from recent discussions with HC&S is that the flows in the Haiku Ditch will probably not be at a consistent or high enough flow to sustain a reliable S-WTP. Further analysis of the existing Haiku Ditch, Reservoir 90 and the other components of EMI's irrigation system will be required to determine the most suitable water source for the S-WTP.

Table 2-2: Projected Water Demands based on a Private Water System

| Land Use Description | Area (acres) | Floor Area Ratio (FAR) | Building Area (sf) | Building Area Per Acre (sf/acre) | Average Day Demand | Maximum Daily Demand |
|--|--------------|------------------------|--------------------|----------------------------------|--------------------|----------------------|
| | | | | | Unit | (gpd) |
| PULEHUNUI NORTH | | | | | | |
| Sandwich Isles (existing) ¹ | 4 | - | - | - | 2,000 gpd/acre | 3,000 |
| Commercial/Industrial | 135 | - | - | - | 2,000 gpd/acre | 270,000 |
| Hotel | 5 | - | - | - | 17,000 gal/acre | 127,500 |
| Roadways ² | 13 | - | - | - | - | - |
| Open Space/Ag Buffer | 30 | - | - | - | 1,700 gpd/acre | 51,000 |
| Sub-T Total (rounded) | 184 | | | | | 408,000 |
| PULEHUNUI SOUTH | | | | | | |
| Beneficiary Farmer's Cooperative | | | | | | |
| Farm Lots ³ | 146 | - | - | - | - | - |
| Ag. Support | 24 | 0.10 | 4,400 | 105,600 | 140 gpd/1,000 sf | 22,200 |
| Ag. Homestead ⁴ | 236 | - | - | - | 600 gpd/lot | 54,000 |
| Beneficiary Gardens ⁵ | 27 | - | - | - | - | - |
| Commercial Enterprises | 70 | 0.10 | 4,400 | 308,000 | 140 gpd/1,000 sf | 43,200 |
| Farmers Market | 11 | 0.01 | 440 | 4,840 | 140 gpd/1,000 sf | 700 |
| Arts & Cultural Center | 18 | 0.05 | 2,200 | 39,600 | 140 gpd/1,000 sf | 5,600 |
| Education ⁶ | 33 | - | - | - | 80 gpd/student | 24,000 |
| Wastewater Treatment Plant | - | - | - | - | - | 1,000 |
| Roadways & Exist. Gulch Areas ² | 79 | - | - | - | - | - |
| Sub-T Total (rounded) | 646 | | | | | 144,000 |
| DLNR INDUSTRIAL AND BUSINESS PARK | | | | | | |
| Commercial/Light Industrial ⁷ | 227.0 | - | - | - | 2,000 gpd/acre | 447,000 |
| Road Area ⁸ | 22.8 | - | - | - | 1,700 gpd/acre | 15,500 |
| Green Area ⁹ | 30.6 | - | - | - | 1,700 gpd/acre | 41,600 |
| Sub-T Total (rounded) | 280.4 | | | | | 504,100 |
| MRPSC | | | | | | |
| Light Industrial ¹⁰ | 40-45 | - | - | - | - | 152,000 |
| MAUI RACEWAY PARK | | | | | | |
| Commercial/Light Industrial ¹¹ | 22.6 | - | - | - | - | 18,000 |
| TOTAL - All Developments (Rounded) | | | | | | 1,226,000 |

¹ Approximate building area was calculated from aerial map.
² Water demand for roadway and existing gulch areas are 0.
³ Assumed that Farm Lots will use non-potable water and will have no potable water demand.
⁴ Assumed SF Demand of 600 gpd for 90 lots. Assumed each 2 acre lot will have a 10,000 sf home site. Remaining property will be irrigated with non-potable water.
⁵ Assumed that Beneficiary Gardens will use non-potable water and will have no potable water demand.
⁶ Average Day Demand is based on 400 students.
⁷ Average Day Demand includes demand for 20-acre DOFAW site.
⁸ Average Day Demand is based on an irrigated area of 24.4 acres.
⁹ MRPSC stands for Maui Regional Public Safety Complex.
¹⁰ Average Day Demand based on consultation memo from PSD.
¹¹ Demand based on 900 visitors using 20 gpd. However, this would only occur 13 times per year, so the demand of 18,000 is conservative.

2.2.3.3 Surface Water Treatment Plant Process

The recommendation is to construct a S-WTP that utilizes membrane filtration for treatment of the raw water. There are two general types of membrane systems – pressure systems and submerged systems. Pressure systems typically require a feed pressure of 30 to 35 pounds per square inch (psi). Submerged systems do not require a feed pressure, since the raw water enters tanks open to atmosphere. With a submerged system, permeate pumps are used to “draw” the water through the membrane unit. Consideration should be given to both types of membrane systems.

The membrane system would be located within a new building, which would house the membrane filters and other ancillary equipment, such as raw water strainers, pumps, air blowers/compressors, chemical cleaning and disinfection systems, electrical and control panels, etc. The raw water should be screened prior to entering the treatment building to remove large debris, such as leaves and twigs, from the raw water. The S-WTP Building would also house the potable water pumps for pumping the treated water into the transmission/distribution system, and a fire pump for the fire protection system. (See Exhibit 2-6 – Surface WTP Process Schematic, Alternative 2A.) Approximately two to three acres of land is expected to be required for the S-WTP.

2.2.3.4 Surface Water Treatment Plant Location

Two alternatives are being considered for locating the S-WTP. The first alternative (Alternative 2A) would be to locate the S-WTP within the DLNR Industrial and Business Park site at an approximate elevation of 94 feet msl. The second alternative (Alternative 2B) would be to locate the S-WTP within the DHHL Pulehunui South project site at an approximate elevation of 116 feet msl.

Alternative 2A: Locate S-WTP within DLNR Industrial and Business Park Site

The recommendation is to construct a new ditch intake that would divert water from the Haiku Ditch before the ditch discharges into HC&S Reservoir 90. (See Exhibit 2-7 – Proposed Water System, Alternative 2A – Surface Water System (DLNR)). Screening at the ditch intake would remove large debris, such as leaves and twigs, from the raw water. A new raw water storage reservoir, which would be used just for the S-WTP, would be located below HC&S Reservoir 90, at the top of the DLNR Industrial and Business Park area. The reservoir would

act as a sedimentation reservoir for settlement of solids prior to the water being treated at the S-WTP. The reservoir would also act as an equalization reservoir to help reduce the effects of low flows in the Haiku Ditch. The recommendation is to install a floating cover on the reservoir to eliminate evaporation from the reservoir and prevent algal blooms.

The water would flow by gravity from the Haiku Ditch through the new ditch intake to the new raw water reservoir, and then by gravity to the S-WTP. The reservoir would be at an approximate ground elevation of 126 feet msl.

Alternative 2B: Locate S-WTP within DHHL Pūlehuunui South Site

The recommendation is to locate the S-WTP in the DHHL Pūlehuunui South project area, within the Agricultural Area. (See Exhibit 2-8 – Proposed Water System, Alternative 2B – Surface Water System (DHHL)). There is an existing irrigation system that delivers water from the HC&S Reservoir 90 to the DHHL Pūlehuunui South project area, which was previously utilized for sugar cane irrigation. The recommendation is to utilize, to the extent possible, the major components of the existing system to convey the ditch water to the S-WTP site. If the existing system cannot be utilized, either due to the condition of the components, or issues regarding ownership, then a new transmission system would be required.

The raw water should be screened to remove large debris and a new raw water storage reservoir with floating cover should be constructed.

2.2.3.5 Water Storage Tank

A tank would be required for storage of the potable water prior to the water entering the distribution system. Although Alternative 2 is a private system, the recommendation is to size the storage tank according to the WSS Standards. Criterion 1 for reservoir sizing would be the determining criteria, and the required volume would be 1.84 MG. However, since it would be a private system, the tank would not need to be a standard DWS size. The recommendation would be to construct a 1.9 MG concrete tank.

The storage tank would store the finished water prior to the water entering the distribution system, and would most likely also be used as a chlorine contact tank for disinfection.

2.2.3.6 Detention Basins

Detention basins would be used for gravity solids-liquid separation of backwash water from the membrane units. Drain water from raw water strainers and neutralized chemicals used for cleaning the membranes would also be conveyed to the detention basins. The recommendation would be to have at least two basins, such that one basin could be shut-down at a time to allow for gravity settlement of the sludge. After settlement, the liquid would be decanted, and the sludge would then be allowed to dry via evaporation. The dried sludge would then be removed from the compartment for disposal, and the decanted liquid could be used for irrigation on green areas or agricultural lots.

2.2.3.7 Transmission System

All new transmission waterlines would be required. A new raw water transmission line would be needed to convey the raw water to the raw water reservoir and from the raw water reservoir to the S-WTP. The raw waterline material would be of polyvinyl chloride (PVC), high density polyethylene (HDPE) or ductile iron (D.I.).

New potable and fire transmission waterlines from the S-WTP to the DHHL Pūlehuunui North project site would need to be installed under Maui Veterans Highway at the southern intersection of the highway and Mehamaha Loop.

Other potable and fire transmission waterlines would convey water between the DLNR Industrial and Business Park site and the DHHL Pūlehuunui South project. Two options are currently under consideration. The "Lower Route" would be along Maui Veterans Highway. The "Upper Route" would be at a higher elevation, through Maui Raceway Park and DLNR State-owned land (TMK: 3-8-08:38.)

The potable and fire transmission system waterlines would conform to the requirements of DWS's WSS, and be of D.I. pipe.

2.2.3.8 Distribution System

Each project will require distribution waterlines to convey potable water to the lots within the project areas. There would be separate waterlines for the potable water system and fire system. All the distribution waterlines would be located within the project roadways. The potable and fire waterlines would conform to the requirements of DWS's WSS, and be of D.I. pipe. Fire hydrants would be installed off the fire waterlines at a maximum of 250-foot intervals within the site.

Further analysis of the water transmission and distribution system will be undertaken as part of the engineering design process for this project.

2.2.4 Alternative 3 - Proposed Brackish Water System

As with Water Alternative 2, Water Alternative 3 would be a new private system that would supply water to the Pūlehuui Regional Project. The water system would involve treating brackish water at a new reverse osmosis brackish water treatment plant (RO-WTP), which would produce potable water.

2.2.4.1 Water Source

Since the groundwater underlying the Pūlehuui Regional Project is not of potable water quality, brackish water would be treated to decrease the chloride concentration to acceptable drinking water levels. The most practical approach to developing a brackish water source would be to construct a skimming well similar to existing A&B irrigation wells previously used for sugar cane irrigation in the area. Further analysis of the most feasible location of the brackish water source will be determined as part of the engineering design process for this project.

2.2.4.2 Reverse Osmosis Water Treatment Plant Process

The brackish water would pass through Reverse Osmosis (RO) treatment trains that would filter the brackish water to produce drinking water. Based on the anticipated groundwater salinity, approximately 70 percent of the brackish feed water is expected to become potable product. The other 30 percent would be the RO concentrate. The brackish water source would be sized to produce enough water to meet the maximum day water demand, taking into account the recovery rate by the RO treatment trains and an operating time of 24 hours per day. The potable water would be a blend of RO

product water from the RO treatment trains and untreated brackish water. Blending the brackish and RO water allows the capacity of the RO treatment units to be smaller, since not all of the brackish water would need to be treated.

The RO-WTP would consist of a treatment plant building that would house the RO treatment trains and other ancillary equipment, such as the brackish water feed pumps, air blowers/compressors, chemical cleaning and disinfection systems, electrical and control panels, etc. The treatment plant building would also likely house the potable water pumps for pumping the treated water into the transmission/distribution system and a fire pump for the fire protection system. (See Exhibit 2-9 – RO-WTP Process Schematic, Alternative 3.)

2.2.4.3 Reverse Osmosis Water Treatment Plant Process Location

Two alternatives are being considered for locating the RO-WTP. Alternative 3A would be to locate the RO-WTP near the northeast corner of the DLNR Industrial and Business Park site at an approximate elevation of 128 feet msl. (See Exhibit 2-10 – Proposed Water System, Alternative 3A – Brackish Water System (DLNR)). Alternative 3B would be to locate the RO-WTP within the DHHL Pūlehuui South project site at the same location as the proposed S-WTP, at an approximate elevation of 116 feet msl. (See Exhibit 2-11 – Proposed Water System, Alternative 3B – Brackish Water System (DHHL)). Approximately two to three acres of land is expected to be required for the RO-WTP. Further analysis of the most feasible location of the RO-WTP will be determined as part of the engineering design process for this project.

2.2.4.4 Water Storage Tank

As with Alternative 2, the recommendation is to construct a 1.9 MG concrete water storage tank at the RO-WTP Site. The tank would store the potable water prior to the water entering the distribution system, and would most likely also be used as a chlorine contact tank for disinfection.

2.2.4.5 RO Concentrate Disposal

The RO concentrate from the RO treatment process could possibly be used for irrigation of salt-tolerant plants. However, the preferred primary method of disposal would be to utilize disposal wells. Two disposal wells would be needed, one for back up. The wells

should be located a minimum of 1,320 feet (1/4 mile) from any brackish water supply source. The RO concentrate production rate would be approximately 600 gpm, which is equivalent to about 865,000 gpd.

The RO concentrate would be discharged into the groundwater at a depth at which the salinity of the groundwater is of equal or greater salinity than the RO concentrate. Therefore, disposal of the concentrate should not adversely impact the receiving groundwater.

2.2.4.6 Transmission System

All new transmission waterlines would be required. A new brackish waterline would be needed to convey the brackish water from brackish water source to the RO-WTP. The RO concentrate would be conveyed in a separate waterline, either to the disposal wells, or possibly to green areas or agricultural lots for use as irrigation water. The brackish waterline and RO concentrate waterline would be of PVC or HDPE pipes.

New potable and fire transmission waterlines from the RO-WTP to the DHHL Pūlehuui North project site would need to be installed under Maui Veterans Highway at the southern intersection of the highway and Mehamaha Loop.

Other potable and fire transmission waterlines would convey water between the DLNR Industrial and Business Park and the DHHL Pūlehuui South project. Two options are currently under consideration. The "Lower Route" would be along Maui Veterans Highway. The "Upper Route" would be at a higher elevation, through Maui Raceway Park and DLNR State-owned land (TMK: 3-8-08:38.)

The potable water and fire transmission system waterlines would conform to the requirements of DWS's WSS, and be of D.I. pipe.

2.2.4.7 Distribution System

Each project will require distribution waterlines to convey potable water to the lots within the project areas. There would be separate waterlines for the potable water system and fire system. All the distribution waterlines would be located within the project roadways. The potable and fire waterlines would conform to the requirements of DWS's WSS, and be of D.I. pipe. Fire hydrants would be installed off the fire waterlines at a maximum of 250-foot intervals within the site.

Further analysis of the water transmission and distribution system will be undertaken as part of the engineering design process for this project.

2.3 PREFERRED WATER SYSTEM ALTERNATIVE

The preferred water system alternative may be Alternative 1, which is to have DWS supply water for the Pūlehuui Regional Project. The primary advantage of Alternative 1 is that DWS owns and operates their water system, whereas with Alternatives 2 and 3, a private company would need to be hired to operate the on-site treatment facilities. Additionally, Alternative 1 is favorable because it does not require constructing new water treatment facilities. Further, Alternative 1 has the advantage of being serviced by a large water system which can more easily accommodate disruptions in the system, e.g., a power failure at a well or a treatment facility. From a cost standpoint, Alternative 1 may be favorable pending further research.

2.4 SUMMARY

The preferred alternative may be Alternative 1. For Water Alternative 1, the Pūlehuui Regional Project's water system would connect to DWS's nearby water system which would supply water for potable, non-potable and fire protection purposes. New tank(s) to provide 2.5 MG of storage would be required to service the anticipated regional developments. The preferred location for the new 2.5 MG tank(s) is in the vicinity of DWS's existing Waihe'e Tank.

For Water Alternative 2, a new private surface water system would supply water to the Pūlehuui Regional Project. Surface water from EIMI's ditch system would be treated using a membrane filtration process. The surface water treatment plant would be sized to produce the maximum day potable water demand. The membrane system would be located within a new building, which would house the membrane filters and other ancillary equipment. A 1.9 MG potable water storage tank would be located at the S-WTP site.

Backwash from the membrane units and other waste streams would be sent to detention basins. Decanted water from the detention basins could be used for irrigation of green areas or agricultural crops. Approximately two to three acres of land is expected to be required for the WTP.

For Water Alternative 3, a new private brackish water system would supply water to the Pūlehuui Regional Project area. Since the groundwater underlying the Pūlehuui Regional Project area is not of potable water quality, the proposed potable water source for the private system would be from RO treatment of brackish groundwater.

The RO-WTP would be sized to produce the maximum day potable water demand. The RO system would be located within a new building, which would house the RO filters and other ancillary equipment. A 1.9 MG potable water storage tank would be located at the RO-WTP site.

The RO concentrate from the RO treatment process could possibly be used for irrigation of salt tolerant plants. However, the preferred primary method of disposal would be to utilize disposal wells. Two disposal wells would be needed, one for back up. The RO concentrate production rate would be approximately 600 gpm, which is equivalent to about 865,000 mgd.

The RO concentrate would be discharge into the groundwater at a depth at which the salinity of the groundwater is of equal or greater salinity than the RO concentrate. Therefore, disposal of the concentrate should not adversely impact the receiving groundwater.

2.5 IRRIGATION WATER SYSTEM

As mentioned previously, a strictly non-potable system will be used to supply irrigation water to the 146-acre area at Pūlehuui South designated for Farms. Non-potable water will also be used to irrigate other areas of Pūlehuui South, including Agricultural Homesteads, Beneficiary Gardens and other open space areas such as landscaping.

The agricultural irrigation demand is expected to range from an average day demand of 1,500 gpd/acre to a maximum day demand of 3,500 gpd/acre. Table 2-3 shows the projected non-potable water demand. The average day irrigation demand would be approximately 784,000 gpd, and the maximum day demand would be approximately 1,830,000 gpd.

The previous irrigation system for HC&S's sugar cane fields included an 18-inch supply line and parallel 15-inch irrigation line that decreased to a 10-inch irrigation line. Smaller irrigation lines branched off from these main irrigation lines to supply water to the fields.

The irrigation water source was HC&S Reservoir 90, where a pump/filter station was located to filter the surface water prior to conveying the water to the fields.

One option would be to utilize, to the extent possible, the major components of the existing system, to convey the ditch water to the Pūlehuui South project site. Each lot owner/fessee would be responsible for installing their own irrigation system within their lot to irrigate their agricultural fields, as necessary.

A second option would be to essentially replicate the existing irrigation system, if the existing system cannot be utilized either due to the condition of the components or issues regarding ownership.

Any new distribution irrigation lines would be located within the Pūlehuui South roads to supply irrigation water to the lots.

Table 2-3: Projected Non-Potable Water Demands For Pūlehunui South

| Land Use Description | Area (acres) | Floor Area Ratio (FAR) | Area requiring potable water (acres) | Irrigation Area (acres) | Average Daily Unit Demand (gpd) | Total Average Daily Demand (gpd) | Maximum Daily Unit Demand (gpd) | Total Maximum Daily Demand (gpd) |
|---|--------------|------------------------|--------------------------------------|-------------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
| PŪLEHUNUI SOUTH | | | | | | | | |
| Beneficiary Farmer's Cooperative | 146 | NA | 0.0 | 146.0 | 1,500 | 219,000 | 3,500 | 511,000 |
| Farm Lots ¹ | 24 | 0.20 | 4.8 | 19.2 | 1,500 | 28,800 | 3,500 | 67,200 |
| Ag. Support ² | 238 | NA | 20.7 | 217.3 | 1,500 | 325,950 | 3,500 | 760,550 |
| Ag. Homestead ³ | 27 | NA | 0.0 | 27.0 | 1,500 | 40,500 | 3,500 | 94,500 |
| Beneficiary Gardens ⁴ | 70 | 0.20 | 14.0 | 56.0 | 1,500 | 84,000 | 3,500 | 196,000 |
| Commercial Enterprises ⁵ | 11 | 0.02 | 0.2 | 10.8 | 1,500 | 16,170 | 3,500 | 37,730 |
| Farmers Market ⁶ | 18 | 0.10 | 1.8 | 16.2 | 1,500 | 24,300 | 3,500 | 56,700 |
| Arts & Cultural Center ⁷ | 33 | 0.10 | 3.3 | 29.7 | 1,500 | 44,550 | 3,500 | 103,950 |
| Education ⁸ | - | - | - | - | - | - | - | - |
| Wastewater Treatment Plant ⁹ | - | - | - | - | - | - | - | - |
| Roadways & Exist. Gulch Areas ¹⁰ | 79 | - | - | - | - | - | - | - |
| Sub-Total (rounded) | 646 | | | | | 784,000 | | 1,830,000 |

¹ Assumed entire area will need non-potable water.

² FAR includes area for parking.

³ Assumed 10,000 sf homes for 90 lots that will not require a non-potable water demand.

⁴ Assumed entire area will need non-potable water.

⁵ FAR includes area for parking.

⁶ FAR includes area for parking.

⁷ FAR includes area for parking.

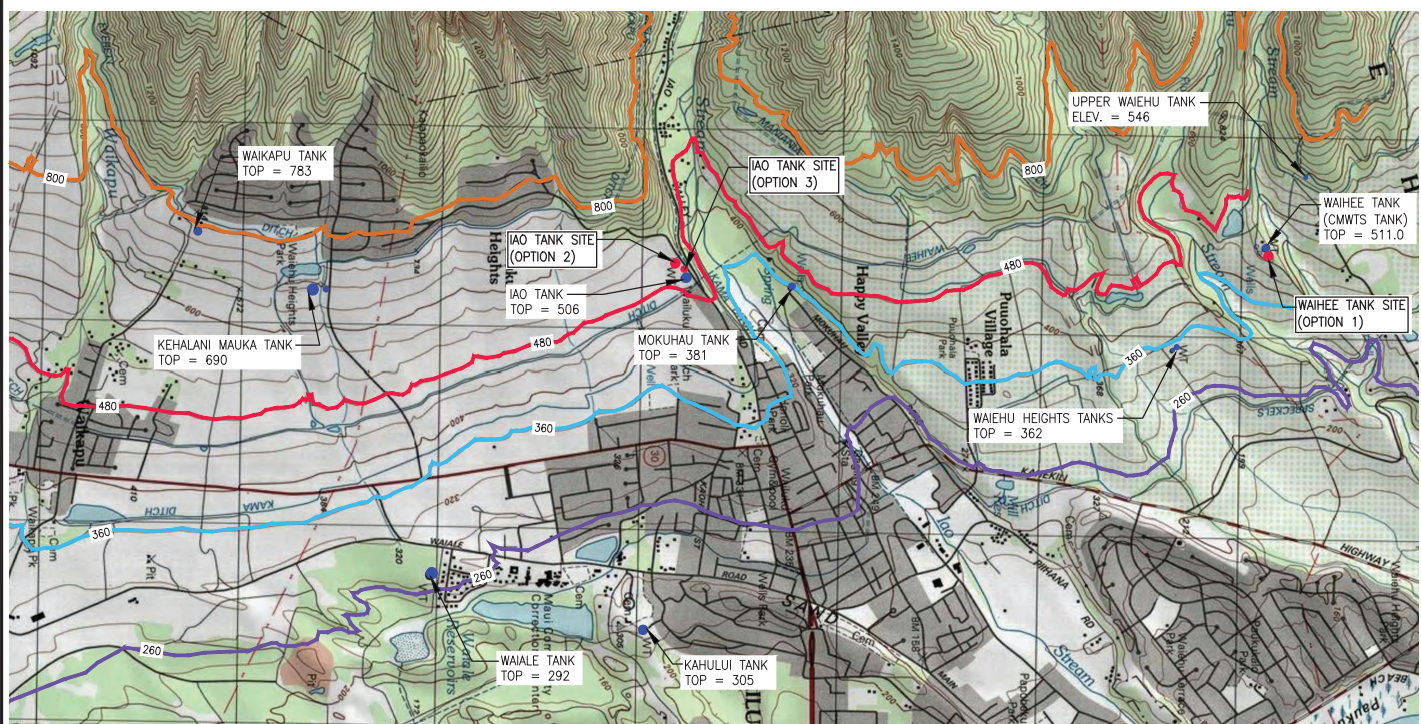
⁸ Assumed 0.1 FAR for buildings and parking.

⁹ Assumed any irrigation of WWTP will be with effluent from the WWTP.

¹⁰ Roadways and existing gulch areas do not require irrigation.

CHAPTER 2

EXHIBITS



LEGEND

- PROPOSED TANK
- EXISTING TANK



SCALE: 1" = 1500'

PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

PULEHUNUI REGIONAL PROJECTS

PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

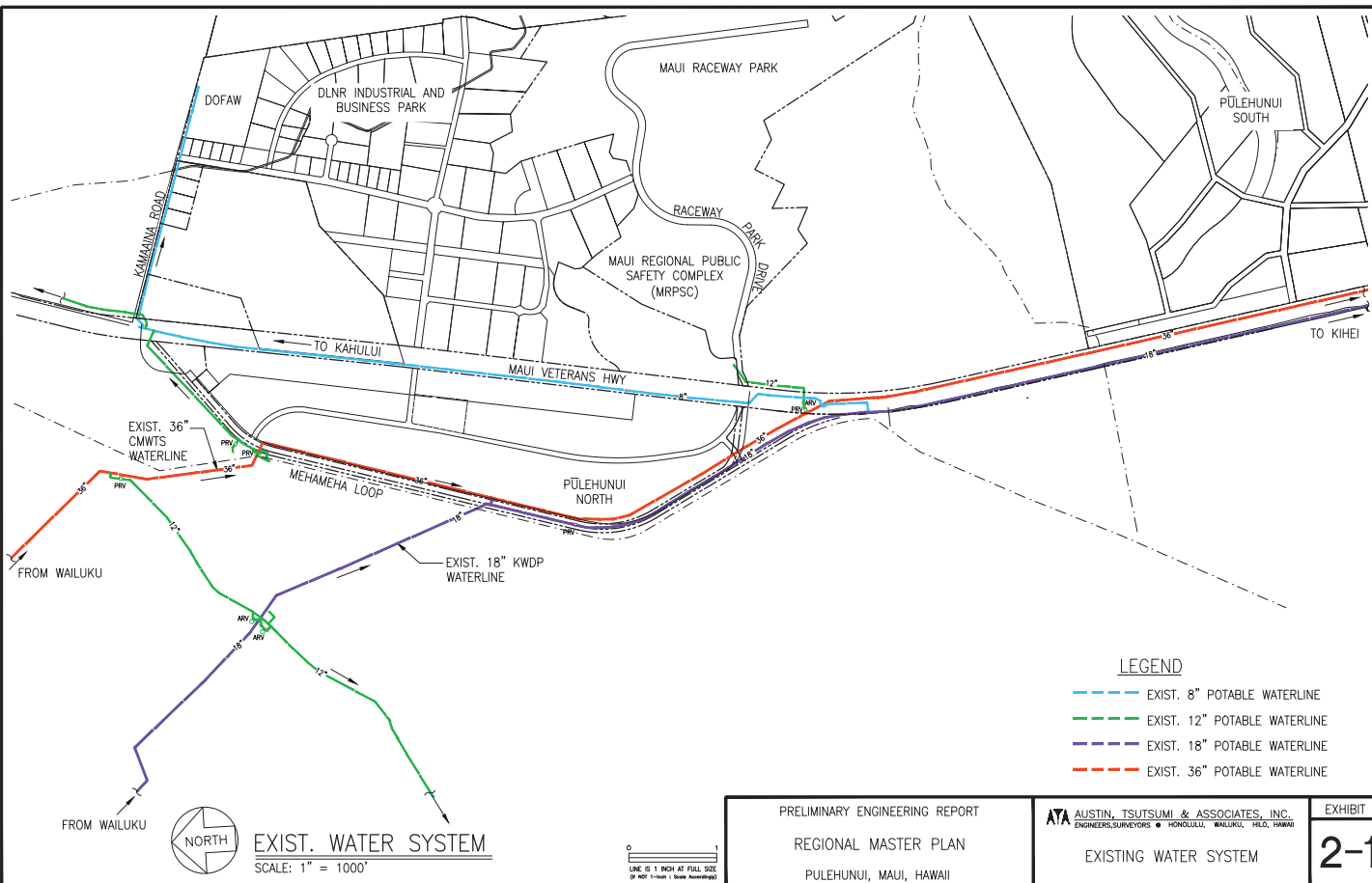
OFF-SITE WATER TANK
OPTIONS

EXHIBIT

2-2

JOB NO. M-16-576
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JANUARY 2018



LEGEND

- EXIST. 8" POTABLE WATERLINE
- EXIST. 12" POTABLE WATERLINE
- EXIST. 18" POTABLE WATERLINE
- EXIST. 36" POTABLE WATERLINE

PRELIMINARY ENGINEERING REPORT

REGIONAL MASTER PLAN

PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

EXISTING WATER SYSTEM

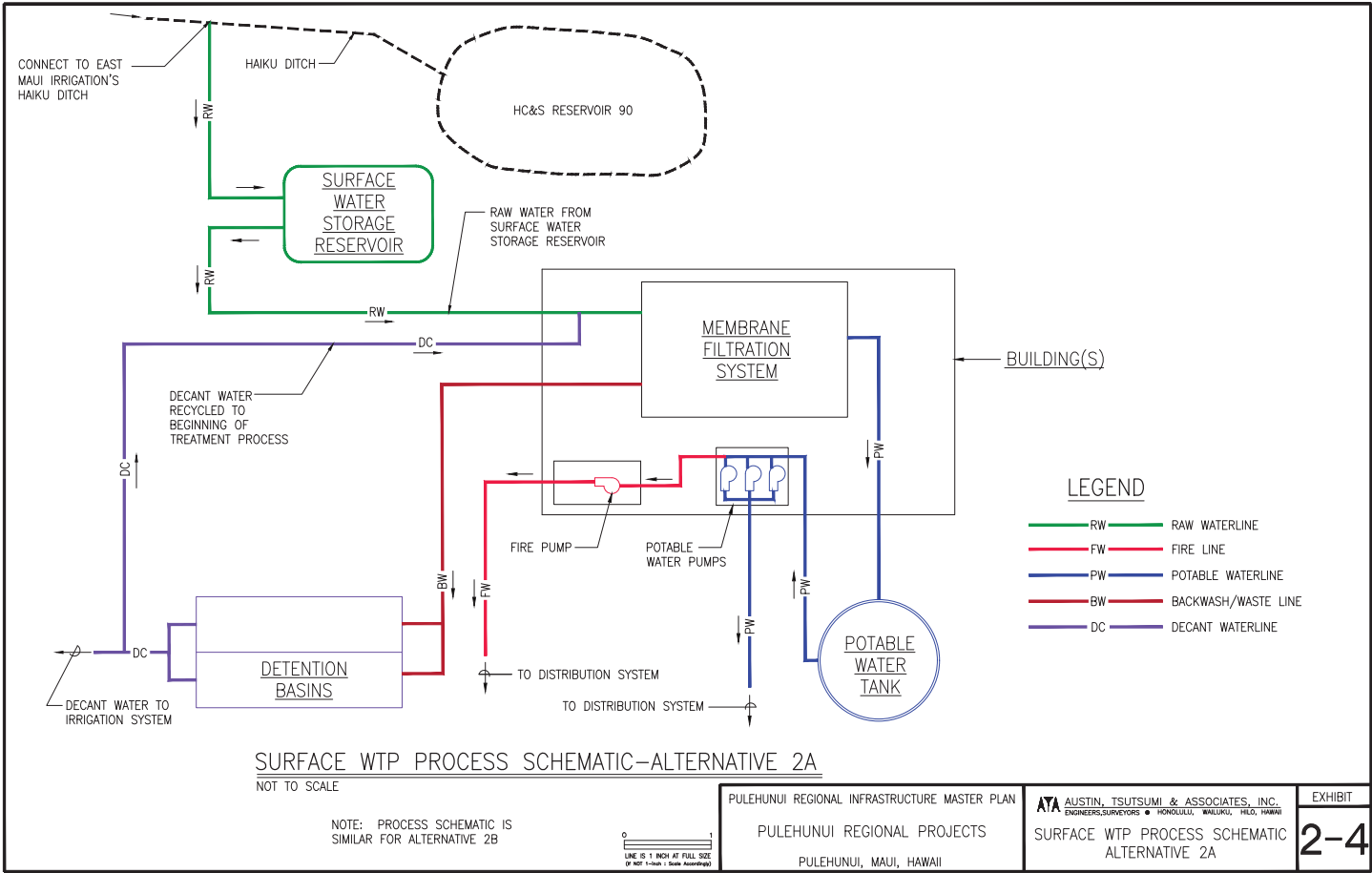
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2-1

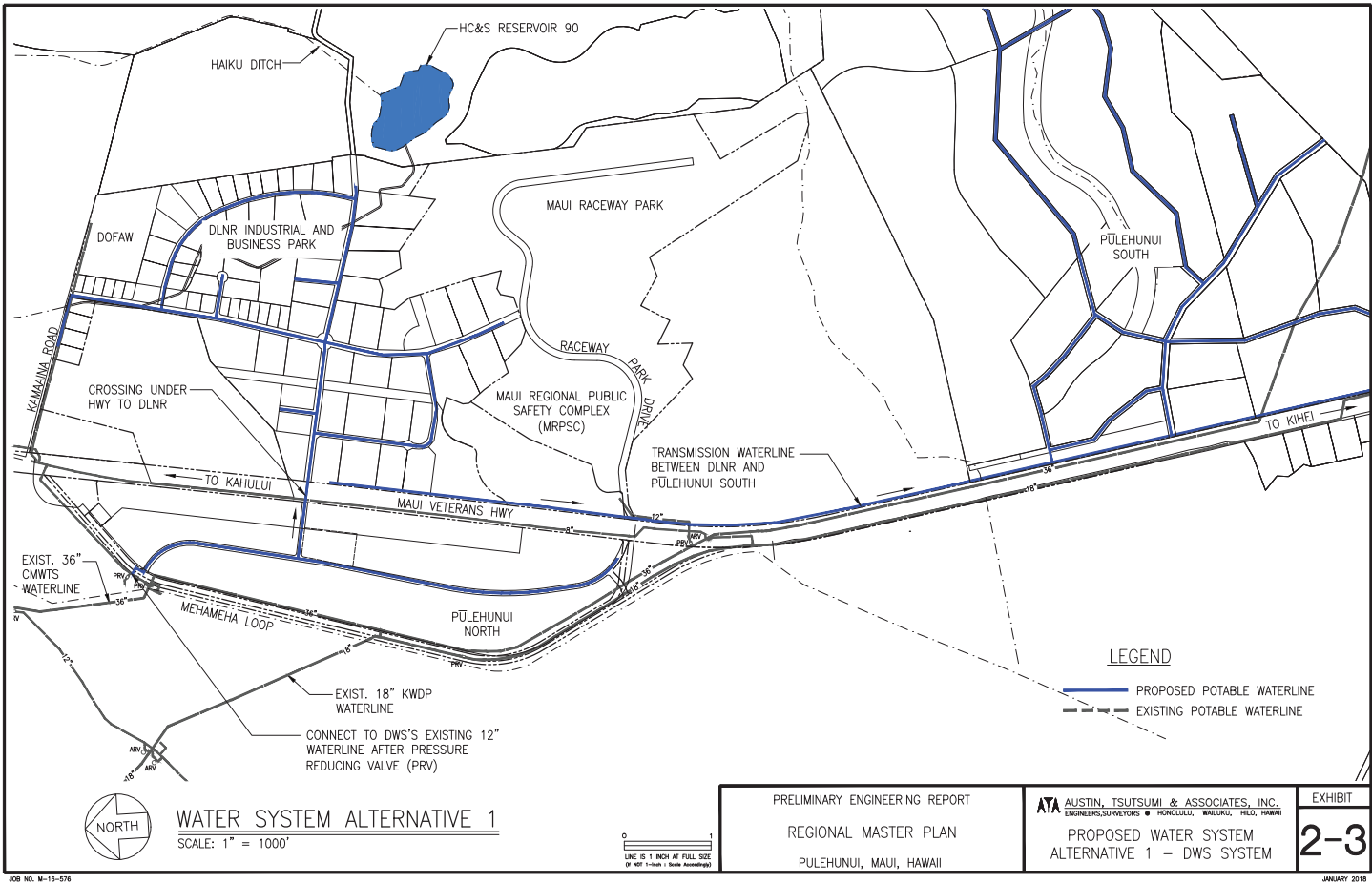
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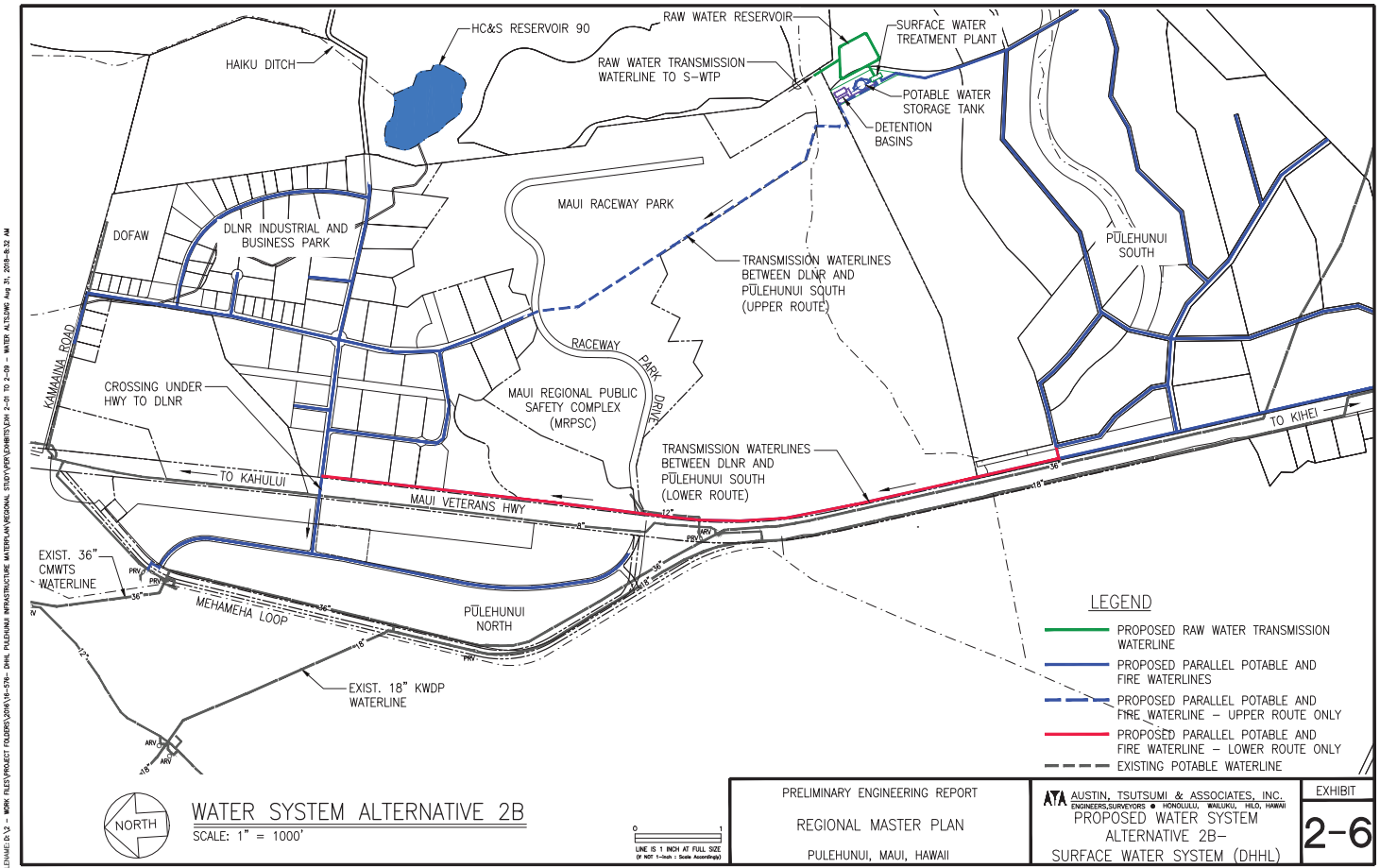
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JOB NO. M-16-576



WATER SYSTEM ALTERNATIVE 2B

SCALE: 1" = 1000'

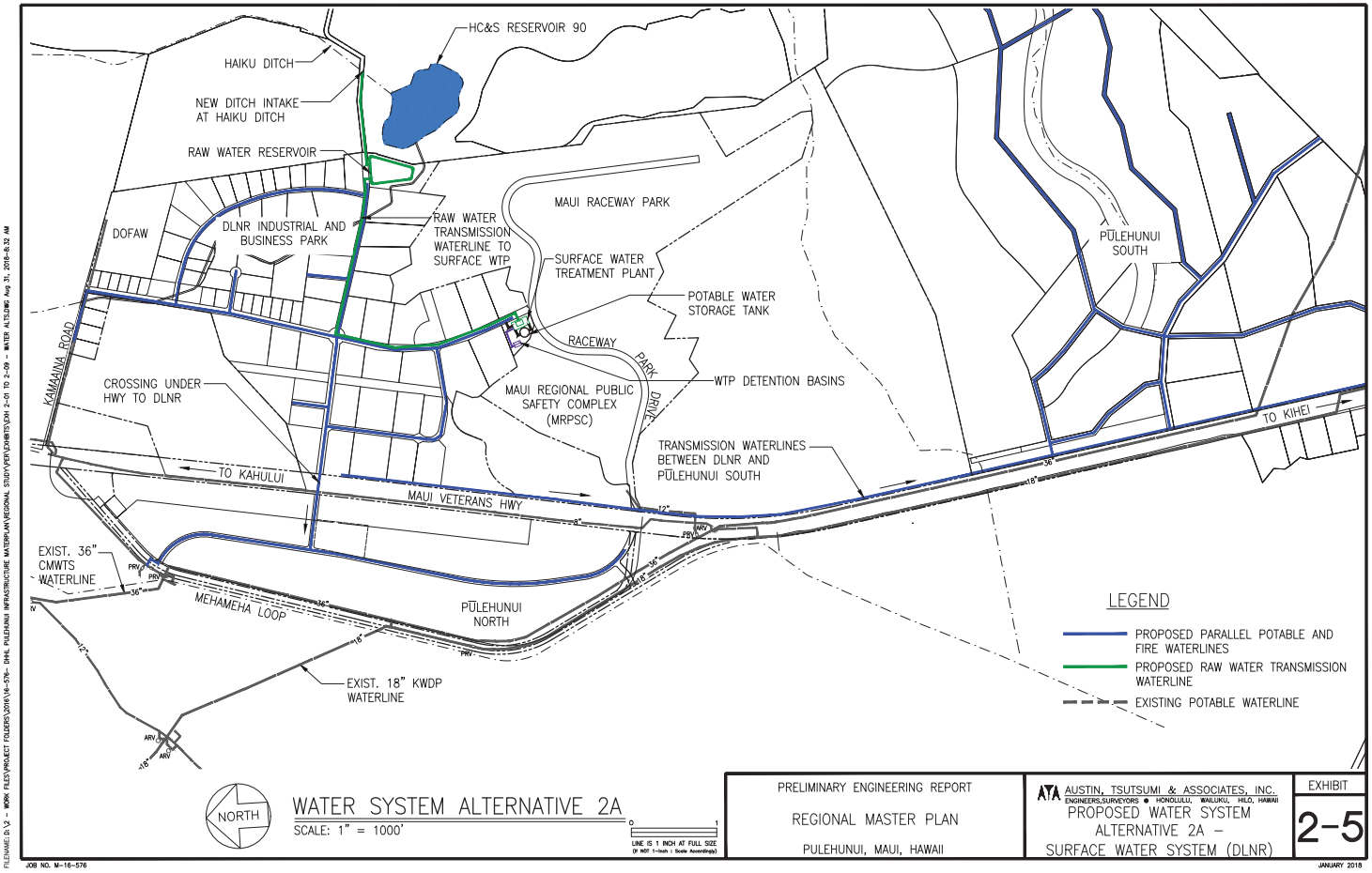
PRELIMINARY ENGINEERING REPORT
REGIONAL MASTER PLAN
PŪLEHUNUI, MAUI, HAWAII

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PROPOSED WATER SYSTEM
ALTERNATIVE 2B -
SURFACE WATER SYSTEM (DHHL)

EXHIBIT
2-6

JOB NO. M-16-576

JANUARY 2018



WATER SYSTEM ALTERNATIVE 2A

SCALE: 1" = 1000'

PRELIMINARY ENGINEERING REPORT
REGIONAL MASTER PLAN
PŪLEHUNUI, MAUI, HAWAII

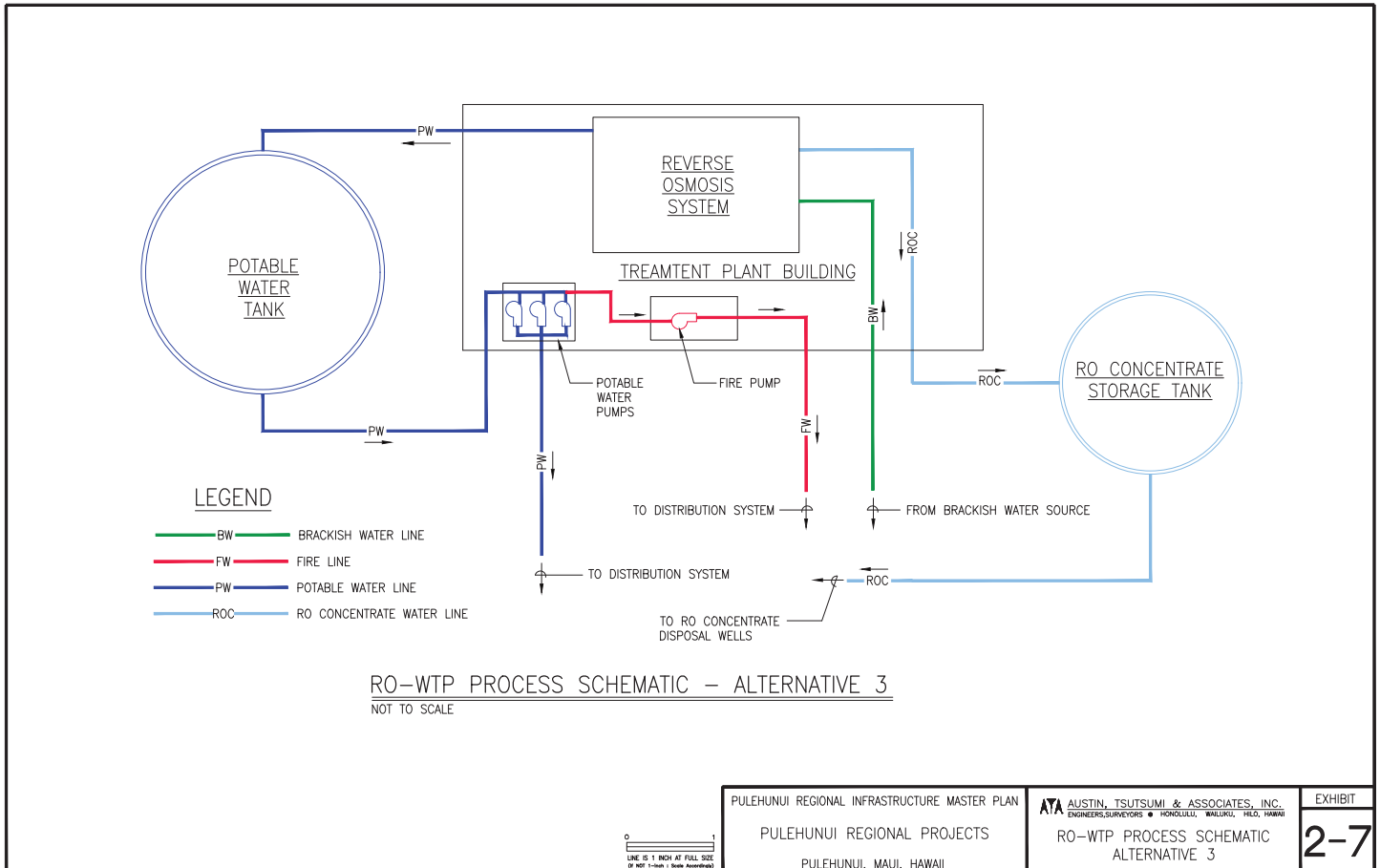
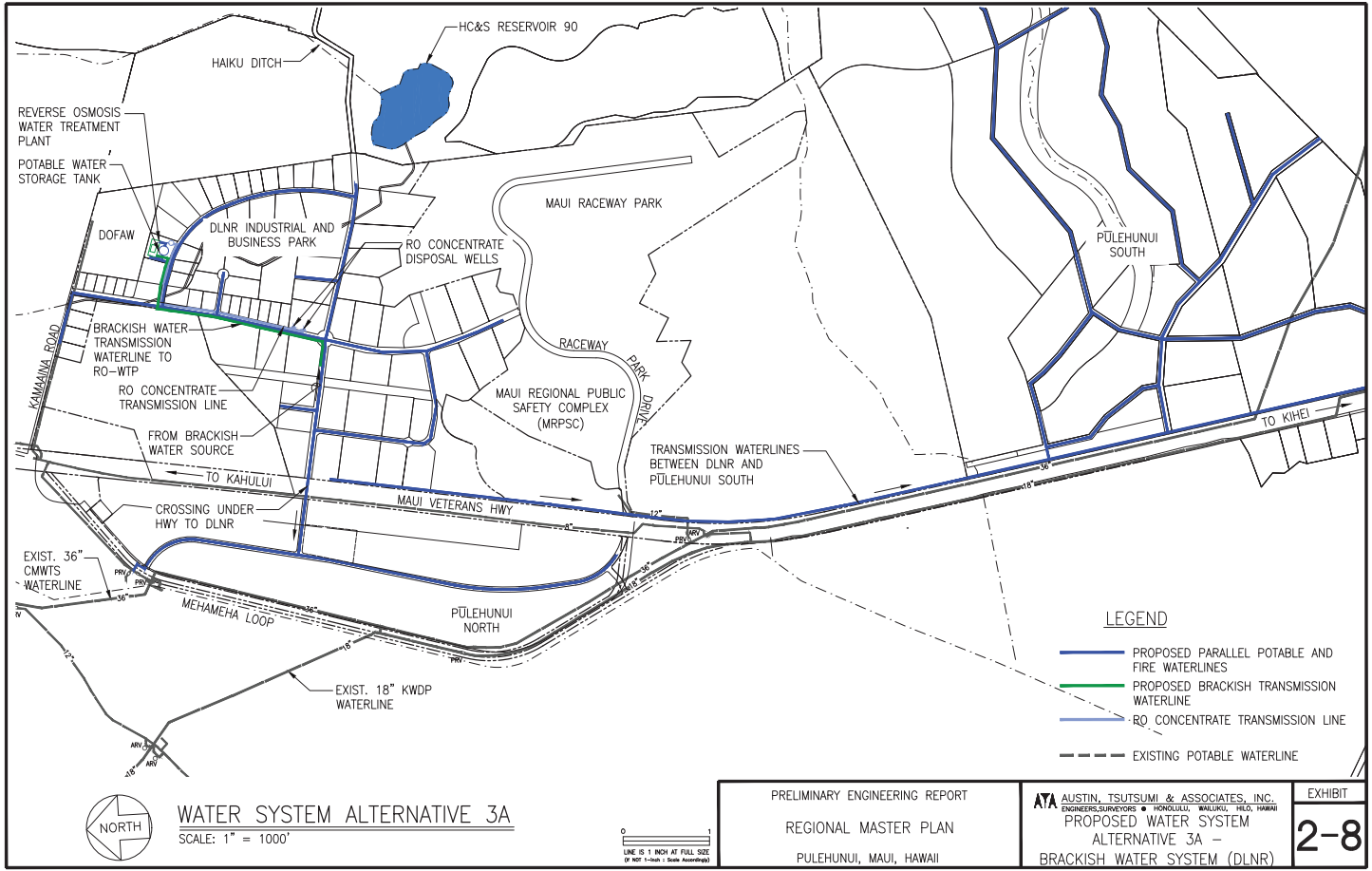
ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII
PROPOSED WATER SYSTEM
ALTERNATIVE 2A -
SURFACE WATER SYSTEM (DLNR)

EXHIBIT
2-5

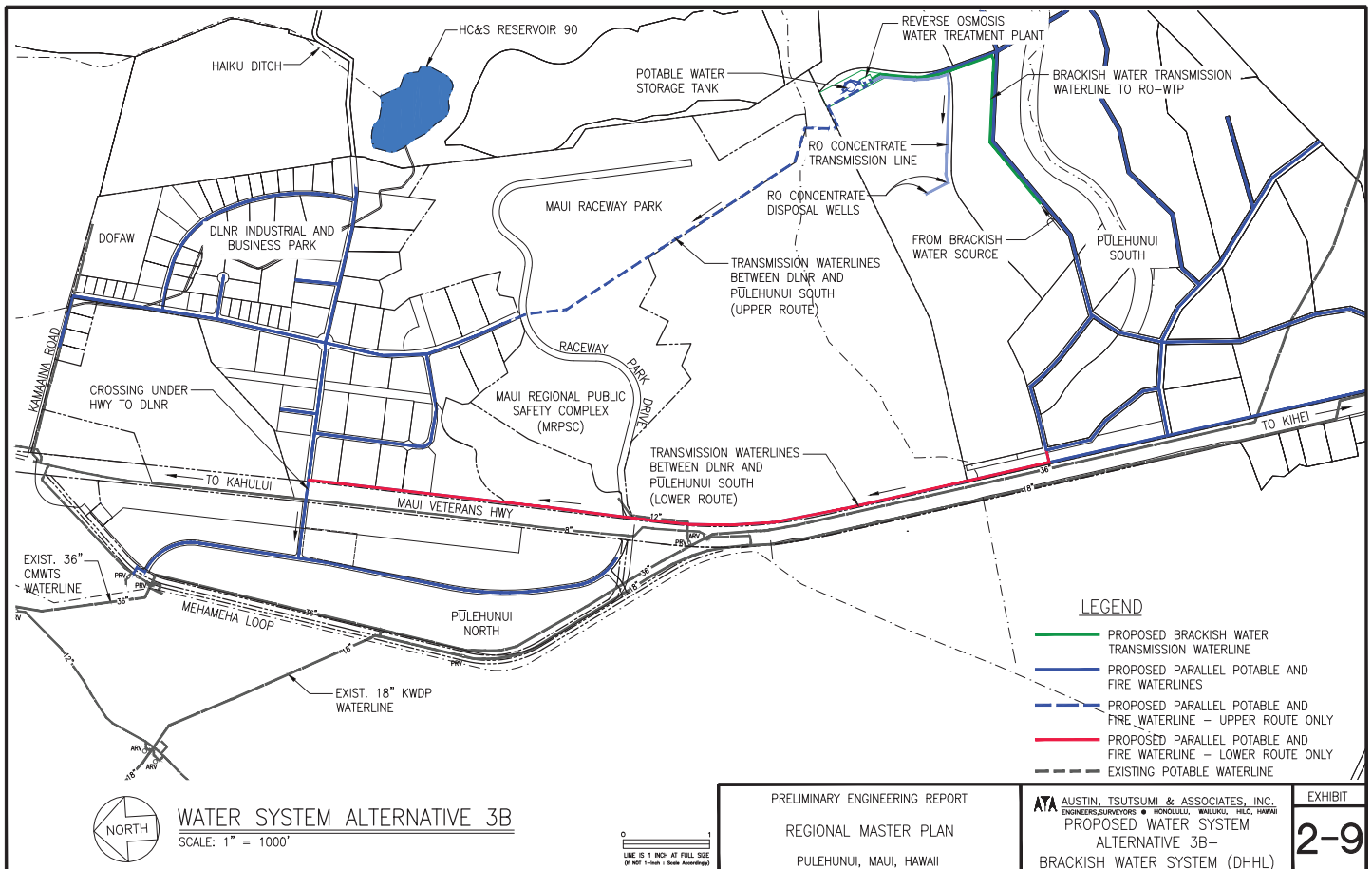
JOB NO. M-16-576

JANUARY 2018

RELEASED IN ACCORDANCE WITH PUBLIC INFORMATION ACT (PIA) - THIS INFORMATION IS UNCLASSIFIED AND IS BEING RELEASED TO THE PUBLIC. DATE OF DECLASSIFICATION: 01/01/2030. AUTHORITY: 5 U.S.C. 552, 49 CFR 1.101. FOR MORE INFORMATION, CONTACT: (808) 586-1111.



CHAPTER 3 WASTEWATER SYSTEM



RELEASE D-12 - WORK FIELD PROJECT FOLDER\2018\18-078 - PHE - PULEHUNI INFRASTRUCTURE WATER AND REGIONAL STUDY\PROJECTS\2018-078 TO 2-09 - WATER ALTERNATIVE 3B - 2018-01-31 AM

JOB NO. M-16-576

CHAPTER 3 - WASTEWATER

3.1 INTRODUCTION

This chapter discusses various alternatives to transfer and/or treat the wastewater generated from the Pūlehuui Regional Project. The wastewater alternative selected shall provide sufficient capacity for growth up to the fully projected build out. Wastewater flow projections were calculated using available documentation provided by the stakeholders, the County of Maui Wastewater Reclamation Division (WWRD) standards, and proposed land uses. Various locations for each wastewater treatment alternative were evaluated including connecting to existing and future county wastewater treatment facilities.

3.2 EXISTING WASTEWATER TREATMENT FACILITIES

The County of Maui does not have a sewer collection system or wastewater treatment facility within the project vicinity. Adjacent lots to the Pūlehuui Regional Project have on-site treatment systems for disposal of their wastewater. The wastewater facilities nearest the project site are the Wailuku-Kahului (W-K) and Kihei Wastewater Reclamation Facility (WWRF). Each existing facility is described as follows:

Wailuku-Kahului Wastewater Reclamation Facility (W-K WWRF)

The Wailuku-Kahului (W-K) WWRF is located approximately seven miles north of the Pūlehuui Regional Project site. The design capacity of this WWRF is 7.9 million gallons per day (mgd). The WWRD has stated that the W-K WWRF is near capacity, and that treatment capacity is allocated on a first come first served basis with multiple requests already in place for capacity allocation. WWRD does not plan on expanding the capacity of the W-K WWRF due to issues associated with the location of this WWRF being adjacent to the shoreline and within a coastal flood and tsunami zone. Due to the uncertainty of whether wastewater could be treated at the W-K WWRF, and the cost of conveying the wastewater to this WWRF, this option was not pursued further.

Kihei Wastewater Reclamation Facility (Kihei WWRF)

The Kihei WWRF, which produces R-1 water, is located approximately five miles south of the Pūlehuui Regional Project in Kihei along Piliame Highway. The Kihei WWRF

serves the South Maui area from Wailea to Sugar Beach. The R-1 effluent that the WWRF produces is pumped to a 1.0 MG storage tank above the plant. The system services areas as far north as Waipulani Road and as far mauka as the Eileair Golf Course. The design capacity of the Kihei WWRF is 8.0 mgd. Recent conversations with WWRD revealed the average dry weather wastewater flow to the Kihei WWRF was 4.9 mgd. However they further stated that 7.0 mgd has already been allocated to permitted /infill projects. With 87% of the design capacity of the WWRF already allocated, it is unsure if this facility will be able to accommodate the wastewater flows from the Pūlehuui Regional Project. Available wastewater capacity will depend upon the number of permitted projects to be developed prior to the completion of the Pūlehuui Regional Project. Flow to the facility will be allowed on a first come first serve basis.

The Kihei District wastewater collection system consists of ten wastewater pump stations (WWRP). Five of these wastewater pump stations (WWRP) are used to pump, in series, wastewater generated north of the Kihei WWRF. If the wastewater from the Pūlehuui Regional Project is to be transferred to this existing system, the closest connection point will be at the Kihei No. 2 WWRP. Four downstream WWRP (Kihei No. 3, No. 4, No. 5 and No.6) would also be impacted by the Project flows.

3.3 ESTIMATED SEWER FLOWS

The Pūlehuui Regional Project includes projects proposed by various government agencies and will contain residential, light industrial, commercial and possible hotel uses. Preliminary wastewater contributions were estimated based on WWRD's Wastewater Flow Standards. The following criteria were used to determine the estimated wastewater generated by the Project site. This criteria is based upon "Design Standards of the Department of Wastewater Management July 1993", which is the current standards adopted by the County of Maui WWRD.

The design average daily flows and the design peak flows were calculated using the design average wastewater flows, maximum wastewater flows, dry weather infiltration/inflow ("I/I"), design maximum flows, and wet weather /I. The County of Maui design standards has set forth the definitions to be used in estimating wastewater flows from projects, as follows:

1. Average Daily Wastewater Flow: The average wastewater flow is the sum of the products of wastewater flow rates multiplied by the number of residential units or lot area.
2. Peaking Factor: The peaking factor was determined by using the Babbitt equation to determine the maximum hour wastewater flow.
3. Maximum Wastewater Flow: The maximum wastewater flow is obtained by multiplying the average flow by a flow factor. The flow factor shall be obtained utilizing the Babbitt formula or other rationale method.
4. Dry Weather I/I: Assuming that the sewer lines will be laid above the normal groundwater table, an additional factor of 5 gallons per capita per day (gpcd) was assumed to account for water entering the collection system through pipe and manhole joints.
5. Design Average Flow: The design average flow is the sum of the average wastewater flow and the applicable dry weather I/I.
6. Design Maximum Flow: The design maximum flow is the sum of the maximum wastewater flow and dry weather I/I.
7. Wet Weather I/I: Assuming that the sewer lines will be laid above the normal groundwater table, an additional factor of 1,250 gallons per acre per day (gad) was assumed to account for water entering the collection system through pipe joints and sewer structures.
8. Design Peak Flow: The design peak flow is the sum of the design maximum flow and wet weather I/I.

3.3.1 Residential Flow Determination

Residential flows will apply to the "Subsistence Ag./Homesteads" lots. The State of Hawaii, Department of Health requires a wastewater treatment plant for developments that exceed 50 lots. The residential flow was determined based on the County of Maui "Wastewater Flow Standards" (2006).

Residential Wastewater Demand

Residential Demand: 350 gpd/lot

3.3.2 Commercial Flow Determination

This commercial flow was determined based on the County of Maui "Wastewater Flow Standards" (2006).

Commercial Wastewater Demand

Commercial Contribution: 15 gpd/employee
 Storage/Industrial Employees: 1 per 350 square feet of floor area

3.3.3 Light Industrial/Agricultural Processing Flow Determination

The light industrial/agricultural flow was determined based on the County of Maui "Wastewater Flow Standards" (2006).

Light Industrial Wastewater Demand

Industrial Shop Contribution: 25 gpd/employee
 Storage/Industrial Employees: 1 per 500 square feet of floor area

3.3.4 Hotel Flow Determination

Hotel flows will apply to a portion of Pulehunui North as a way to account for potential developments at this property consistent with DHHL's Maui Island Plan designation. This hotel flow was determined based on the County of Maui "Wastewater Flow Standards" (2006).

Hotel Wastewater Demand

Hotel, Average with Laundry: 300 gpd/room

3.3.5 Wastewater Flows Generated

A summary of the design average daily flow and design peak flow is shown in Table 3-1 on the following page. A design average daily flow of 618,000 gpd will be generated from the Pūlehunui Regional Project at full buildout.

TABLE 3-1: PRELIMINARY WASTEWATER CALCULATIONS

| Land Use Description | Area (acres) | Floor Area Ratio (FAR) | Building Area Per Acre (sf/acre) | Building Area (sf) | Average Day Flow | | Average Daily Flow (gpd) |
|--|--------------|------------------------|----------------------------------|--------------------|------------------|-------------|--------------------------|
| | | | | | Demand | Unit | |
| PŪLEHUNUI NORTH | | | | | | | |
| Sandwich Isles (existing) ¹ | 1 | - | - | 1,830 | 25 | gpd/500 sf | 100 |
| Commercial/Light Industrial | 135 | 0.38 | 16,500 | 2,227,500 | 25 | gpd/500 sf | 111,400 |
| Hotel ² | 5 | - | - | - | 300 | gpd/unit | 60,000 |
| Roadway ³ | 13 | - | - | - | - | - | - |
| Open Space/Ag Buffer | 30 | - | - | - | - | - | - |
| Sub-Total (rounded) | 184 | | | | | | 172,000 |
| PŪLEHUNUI SOUTH | | | | | | | |
| Beneficiary Farmer's Cooperative | | | | | | | |
| Farm Lots ⁴ | 146 | - | - | - | - | - | - |
| Ag. Support | 24 | 0.10 | 4,400 | 105,600 | 15 | gpd/350 sf | 4,600 |
| Ag. Homestead ⁵ | 238 | - | - | - | 350 | gal/unit | 31,500 |
| Beneficiary Gardens ⁶ | 27 | - | - | - | - | - | - |
| Commercial Enterprises | 70 | 0.10 | 4,400 | 308,000 | 25 | gpd/350 sf | 22,000 |
| Farmers Market | 11 | 0.01 | 440 | 4,840 | 25 | gpd/350 sf | 400 |
| Arts & Cultural Center | 18 | 0.05 | 2,200 | 39,600 | 25 | gpd/350 sf | 2,900 |
| Education ⁷ | 33 | - | - | - | 25 | gpd/student | 10,000 |
| Wastewater Treatment Plant | - | - | - | - | 25 | gpd/capita | 250 |
| Roadways and Exist. Gulch Areas ⁸ | 79 | - | - | - | - | - | - |
| Sub-Total (rounded) | 646 | | | | | | 72,000 |
| DLNR INDUSTRIAL AND BUSINESS PARK | | | | | | | |
| Light Industrial ⁹ | 158.9 | 0.40 | 17,424 | 2,768,674 | 25 | gpd/500sf | 138,500 |
| Commercial | 68.1 | 0.40 | 17,424 | 1,186,574 | 15 | gpd/350sf | 50,900 |
| Roadway ³ | 22.8 | - | - | - | - | - | - |
| Green Area ³ | 30.6 | - | - | - | - | - | - |
| Sub-Total (rounded) | 280.4 | | | | | | 190,000 |
| MRPSC³ | | | | | | | |
| Light Industrial ¹⁰ | 40-45 | | | | | | 170,000 |
| MAUI RACEWAY PARK | | | | | | | |
| Commercial/Light Industrial ¹¹ | 222.6 | | | | | | 13,500 |
| TOTAL - All Developments (Rounded) | | | | | | | 618,000 |

¹ Approximate building area was calculated from aerial map.
² Hotel flow based on 200 rooms with laundry.
³ Wastewater flow for Roadways and Existing Gulch Areas are 0.
⁴ Open Field Farm Lots will produce no wastewater flow.
⁵ Assumed wastewater flow of 350 gpd for 90 lots (average).
⁶ Assumed the Beneficiary Gardens will produce no wastewater flow.
⁷ Wastewater flow is based on 400 Students.
⁸ Average Day Demand includes demand for 20-acre DOFAW site.
⁹ MRPSC stands for Maui Regional Public Safety Complex.
¹⁰ Average Day Demand based on consultation memo from PSD.
¹¹ Demand based on 900 visitors using 20 gpd. However, this would only occur 13 times per year, so the demand of 13,500 gpd is conservative.

3.4 PROPOSED REGIONAL WASTEWATER SYSTEM ALTERNATIVES

This study is based on four alternatives. Alternatives 1A and 1B is based on collecting the wastewater from the Project and transferring the collected wastewater to the Maui County Kihei WWRF by way of new pump stations and force mains.

Alternatives 2A, 2B, and 2C are based on collecting the wastewater from the Project and transferring it to a regional WWRF located either on DLNR or DHHL properties that are slated for development.

Alternative 3A and 3B, identifies potential areas where a regional WWRF can be located within adjacent DLNR properties that are not slated for development in the near future.

The final Alternative 4, discusses pumping all wastewater generated from the Project to a future County of Maui Regional WWRF located south of the Pūlehuunui Project sites along Kuihelani Highway.

Listing of each Alternative:

- Alternative 1A – Connect to Maui County's Existing System, South Kihei Road
- Alternative 1B – Connecting to Maui County's Proposed Collection System, Liloa Drive
- Alternative 2A – WWRF on DHHL Pūlehuunui South Site (Central)
- Alternative 2B – WWRF on DLNR Industrial and Business Park
- Alternative 2C - WWRF on DHHL Pūlehuunui South Site (East)
- Alternative 3A – WWRF on DLNR land adjacent to DHHL Pūlehuunui South Site
- Alternative 3B - WWRF on DLNR remnant parcel
- Alternative 4 – Connect to a Future Maui County Regional WWRF

3.4.1 Alternative 1A – Connect to Maui County's Existing Collection System via South Kihei Road

WWRD is currently conducting a study to upgrade their wastewater collection system to the Kihei WWRF. Two of WWRD's preferred options under consideration are:

Option A - Upgrading the collection system along South Kihei Road – This option consists of replacing/upgrading approximately 11,000 lineal feet of gravity sewer/force main lines along with upsizing four existing pump stations.

Option B - Adding a new collection system on Liloa Drive – This option consists of adding gravity sewer/force main lines and two pump stations through Liloa Drive. This new line would intercept and transport flows generated from mauka areas directly to the Kihei WWRF. This would help to alleviate the overtaxed wastewater system on South Kihei Road.

WWRD has not yet decided on the option upgrade they will pursue. As such, this study considers both options. Alternative 1A describes connection to WWRD's Option A upgrade. Alternative 1B describes connection to WWRD's Option B upgrade.

Under Alternative 1A, the Project's wastewater would be conveyed to the County's upgraded collection system on South Kihei Road. This alternative considers the installation of two pump stations and a force main line that will convey wastewater flow from the Project area to the South Kihei Road. Exhibit 3-1 provides a general layout of the proposed upgrades under WWRD's Option A. Exhibit 3-2 provides a general layout of the proposed force main lines and pump stations.

The first pump station (Pump Station No. 1) will be located at the southern end of the Pūlehuunui North site. Pump Station No. 1 will collect wastewater generated from the Pūlehuunui North site, the DLNR Industrial and Business Park, MRPSC, and the Maui Raceway Park. Each of these individual project sites is capable of using gravity sewer lines to transfer their generated wastewater to Pump Station No. 1. From Pump Station No. 1, a force main will be constructed outside the Maui Veterans Highway right-of-way to a second pump station (Pump Station No. 2). Pump Station No. 2 will collect and transfer all the wastewater generated from the Pūlehuunui South site and Pump Sta. No. 1. This pump station would then transfer the wastewater to the County's upgraded system on South Kihei Road.

A new reclaimed water line from the County's reclaimed water system is proposed to service the agricultural needs for the DHHL Pūlehuunui South area. Approximately 23,200 lineal feet of reclaimed water line is proposed to traverse through various private properties with a connection at Lipoa Street. Exhibits 3-1 and 3-2 show the general layout of this line.

Several meetings and email conversations were conducted with WWRD staff engineers to determine the possibility of the County allowing the Pūlehuunui Regional Project to connect to their wastewater system in Kihei. WWRD has stated that they will not allow the Project flows to connect to the Kihei wastewater system for the following reasons:

1. The Pūlehuunui Regional Project flows are not generated in the Kihei area.
2. The Department of Health (State of Hawaii) has advised them to decentralize their treatment plants.
3. WWRD must eliminate their existing injection wells at the Kihei WWRF. Added flows to the treatment plant would require upgrades to their R-1 Reclaimed Water System.

The rough order of magnitude cost to install the offsite improvements for Alternative 1A wastewater system is approximately \$13,600,000. A reclaimed waterline from the County's reclaimed water system to DHHL Pūlehuunui South site would cost approximately \$8,000,000. Total cost for this alternative is \$21,600,000. This total cost does not include a pro-rata share of the cost to the County's Option A upgrade.

The pros and cons to this alternative are as follows:

1. Although this alternative entails the lowest improvement costs, the stakeholders' pro-rata share to connect to the County's system is not known. Additional costs to upgrade the County's Sewer Pump Station No. 2 will be required.
2. Installation of the reclaimed waterline involves negotiation and land acquisition from private land owners.
3. No maintenance and operations expenses incurred by the stakeholders at the treatment plant facility.
4. WWRD will not allow DHHL to connect to their Kihei wastewater system.
5. If WWRD had allowed DHHL to connect to their Kihei wastewater system, there is uncertainty as to when the County upgrades would be completed and may not

accommodate the schedule of the Project. As such, a temporary wastewater treatment facility must be installed prior to any Project development.

3.4.2 Alternative 1B – Connect to Maui County's Proposed Collection System via Liloa Drive

As stated in Alternative 1A, WWRD is currently conducting a study to upgrade their wastewater collection system to the Kihei WWRF. Since WWRD has not yet decided on the option upgrade, Alternative 1B describes connection to WWRD's Option B upgrade.

Under Alternative 1B, the Project's wastewater would be conveyed to the County's upgraded collection system through Liloa Drive. This Option B entails the installation of two new pump stations, force mains and a new gravity collection system along Liloa Drive. This option originates at Kaonoulu Estates and terminates at the Kihei WWRF. Exhibit 3-3 provides a general layout of the proposed upgrades under WWRD's Option B.

To connect to this proposed County system, the same two pump stations and force main will be required as in Alternative 1A. Additional force main from Pump Station No. 2 will follow within the Piliāni Highway right-of-way until it terminates at a gravity manhole that feeds the County's new pump station located along Kenolio Street. Exhibit 3-4 provides a general layout of the proposed force main lines and pump stations for Alternative 1B.

A new reclaimed water line from the County's reclaimed water system is proposed to service the agricultural needs for the DHHL Pūlehuunui South area. Approximately 23,200 lineal feet of reclaimed water line is proposed to traverse through various private properties with a connection at Lipoa Street. Exhibits 3-3 and 3-4 show the general layout of this line.

As mentioned in Alternative 1A, several meetings and email conversations were conducted with WWRD staff engineers to determine the possibility of the County allowing DHHL to connect to their wastewater system in Kihei. WWRD has stated that they will not allow the Project flows to connect to the Kihei wastewater system for the following reasons:

1. The DHHL Project Area's flows are not generated in the Kihei area.
2. The Department of Health (State of Hawaii) has advised them to decentralize their treatment plants.
3. WWRD must eliminate their existing injection wells at the Kihei WWRF. Added flows to the treatment plant would require upgrades to their R-1 Reclaimed Water System.

The rough order of magnitude cost to install the offsite improvements for Alternative 1B wastewater system is approximately \$14,900,000. A reclaimed waterline from the County's reclaimed water system to DHHL Pūlehuui South site would cost approximately \$8,000,000. Total cost for this alternative is \$22,900,000. This total cost does not include a pro-rata share of the cost to the County's Option B upgrade.

The pros and cons to this alternative are as follows:

1. Although this alternative entails the lower improvement costs, the stakeholders' pro-rata share to connect to the County's system is not known.
2. Installation of the reclaimed waterline involves negotiation and land acquisition from private land owners.
3. No maintenance and operations expenses incurred by the stakeholders at the treatment plant facility.
4. WWRD will not allow DHHL to connect to their Kihei wastewater system.
5. If WWRD had allowed DHHL to connect to their Kihei wastewater system, there is uncertainty as to when the County upgrades would be completed and may not accommodate the schedule of the Project. As such, a temporary wastewater treatment facility must be installed prior to any Project development.

3.4.3 Alternative 2A – WWRF on DHHL Pūlehuui South Central

Alternative 2A, investigates a private WWRF on DHHL Pūlehuui South along the northern property line as shown in Exhibit 3-5. The WWRF capacity will be constructed to accommodate the ultimate design average flow of 618,000 gpd.

Collection of the wastewater from the individual project sites will entail a trunk sewer to be constructed on the north of Maui Veterans Highway that will collect all wastewater from the DLNR Industrial and Business Park, MRP and the MRPSC. A trunk sewer manhole will be required within Mehamaha Loop Road to collect all wastewater from the

Pūlehuui North project site. Both collection sewers will flow to a pump station located on DHHL Pūlehuui North at an elevation of 38.0. The pump station will pump the collected wastewater via a new force main to the DHHL Pūlehuui South WWRF. For DHHL Pūlehuui South, individual properties located above the WWRF may be able to flow by gravity directly to the WWRF. Lower lying properties will require a sewer collection system that flows to a small pump station to be located at the lower elevation along the Maui Veterans Highway, then be pumped to the WWRF.

The WWRF would be designed to produce R-1 Water, in accordance with the State of Hawaii Department of Health (DOH) "Reuse Guidelines", January 2016. This would allow for spray irrigation, surface drip or subsurface drip irrigation reuse with minimal restrictions.

Land area required to facilitate an R-1 system is estimated to be 2 acres for the wastewater treatment facility only. The WWRF will include the following:

- Headworks – involves screening equipment that removes large debris from the wastewater flow stream to prevent damaging to the equipment further down the process and flow monitoring.
- Equalization Tank – Allows stabilizing the incoming wastewater flows by absorbing and storing the peak flows in a basin. Incorporating an equalization tank allows for a design and construction of a smaller wastewater facility which translates to lower capital costs.
- Biological Tanks – This is where the microorganisms consume the organics in the incoming wastewater.
- Membrane Tanks or Filters – Semi permeable membranes are used to filter the waste stream from the biological tanks creating a "clear" effluent.
- Ultraviolet Channel – The effluent from the membrane tanks pass thru a channel lined with ultraviolet submersed bulbs to render any pathogens harmless.

- Solids Processing Facility – Sludge created from the biological process will be stabilized through an aerobic digester then dewatered and finally be hauled to a landfill for disposal.
- Operations Building – This building will contain the laboratory, offices, the motor control center for all electrical equipment, maintenance/storage area and restroom facilities.

To estimate the amount of farm area that could be irrigated at the ultimate flow of 618,000 gpd, information gathered from the University of Hawaii, College of Tropical Agriculture and Human Resources had reported turf grass should receive between 0.75 to 1 inch of water (465 to 620 gallons per 1000 square feet) every two to three days depending where the property is located. This Project is located on the drier side of Maui, where rainfall averages about 13 inches/year as compared to Iao Valley where rainfall averages 70 inches/year. Using a daily application rate of 250 gallons/1000 square feet/day, the area of farm land that can be irrigated using R-1 water at an average daily flow of 618,000 gpd is approximately 60.3 acres. The amount of R-1 effluent to be used as irrigation will not be enough, and must be supplemented if the entire projected farm area within DHH, Pūlehuui South is to be irrigated.

A backup system of effluent disposal would be required to address periods of rainy weather when irrigation is not being used as well as for disposal of non-compliant wastewater. The recommendation is to use a soil aquifer treatment system (SAT) to dispose of any excess R-1 Water, and discharges that do not meet (non-compliant) R-1 water requirements as shown in Figure 3-1. These SATs will be sized, based upon infiltration tests prior to design.

The proposed SAT will be a bermed, above ground single unit. Application rates for surface percolation vary considerably, depending on the type of soil. Typical application rates can

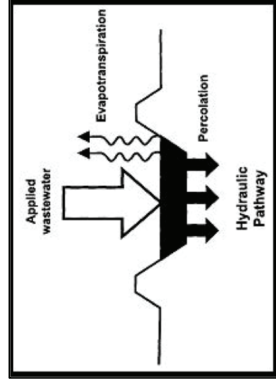


Figure 3-1: Soil Aquifer Treatment System

range from as low as 1.2 gpd/sf to as high as 8.0 gpd/sf. Ideally, this alternative would be contingent upon finding a site with very well drained soils, to maximize the hydraulic application rate. An initial conservative assumption is an application rate of 2.0 gpd/sf which includes a safety factor for future binding of the soil matrix; this rate would be verified as part of the design. Since this is a year-round land application strategy, maximum-month flows should be used for conservative sizing. Using the aforementioned application rate of 2.0 gpd/sf for an average daily flow of 618,000 gpd, an area of approximately 7.8 acres will be required for secondary disposal.

Approximately 10 acres of land is preliminarily determined for the 618,000 GPD WWRF including a secondary means of disposal. This same WWRF and disposal system will be used for the following Alternatives 2B, 2C, 3A and 3B as well.

The rough order of magnitude cost to install the stakeholder improvements for Alternative 2A wastewater system is approximately \$25,450,000. The operation and maintenance costs for this private facility, which includes associated electrical, maintenance, equipment repair and chemical costs can exceed \$100,000 per month.

The pros and cons to this alternative are as follows:

1. The schedule to install the private system is not dependent on the County's schedule.
2. Initial costs for the private system are high.
3. Operation and maintenance costs are high.
4. R-1 effluent generated from the private WWRF can be used to irrigate the planned agricultural farmland without the construction of long pipe line routes. This property has enough land area to provide a secondary means of disposal as required by the State of Hawaii, Department of Health without reducing revenue generation of the property.
5. The WWRF is within close proximity to the Kealia Pond National Wildlife Refuge

3.4.4 Alternative 2B – WWRF on DLNR Industrial and Business Park

Alternative 2B, investigates a private WWRF on DLNR Industrial and Business Park along the southwestern portion of the site as shown in Exhibit 3-6. The type of processes involved and the required land size is similar to what was described under Alternative 2A. The elevation at this site ranges between 85 feet to 101 feet msl.

At this elevation, the majority of wastewater flows must be pumped from all stakeholders to the WWRF. A shared pump station will be located at DHHL Pūlehuunui North that will collect all wastewater generated from all stakeholders as identified in Alternative 2A. DHHL Pūlehuunui South will require its own pump station that will transport all the wastewater flow generated from the site and a force main running parallel with the Maui Veterans Highway to the stakeholder Pump Station.

Locating the WWRF here has no apparent advantages. As stated in Alternative 2A, the primary means of disposal is irrigation. A minimum of 60.3 acres within the DLNR Industrial and Business Park is required.

The rough order of magnitude cost to install the stakeholder improvements for Alternative 2B wastewater system is approximately \$24,200,000. The operation and maintenance costs for this private facility, which includes associated electrical, maintenance, equipment repair and chemical costs can exceed \$100,000 per month.

The pros and cons to this alternative are as follows:

1. The schedule to install the private system is not dependent on the County's schedule.
2. Initial costs for the private system are high.
3. Operation and maintenance costs are high.
4. Land used for the WWRF will entail lost revenues for DLNR.
5. R-1 effluent generated from the private WWRF can be used to irrigate DLNR open spaces, MRPSC and Maui Raceway Park.
6. There may be potential odor and noise complaints from adjacent lessees.

3.4.5 Alternative 2C – WWRF on DHHL Pūlehuunui South Upper

Alternative 2C investigates a 618,000 GPD WWRF at the eastern corner of the DHHL Pūlehuunui South area as shown on Figure 3-7.

The advantage of this location is that it is fairly remote meaning odor and noise emitting from the facility will not bother nearby occupants. During a natural disaster, any subsequent spills will not affect the Kealia Pond National Wildlife Sanctuary due to the large land buffer. There is a nearby dry gulch which can be bermed to prevent spillage from entering. The elevation of this alternative location may allow for gravity irrigation to

be used in adjacent farmlands with reclaimed water. Agriculture lands around the WWRF will still require pumps to pressurize the irrigation system.

The disadvantage of this alternative is the costs associated with construction and operations. Due to the remote location, longer piping and larger pumps will be required to operate the facility and serve the project as needed.

The rough order of magnitude cost to install the stakeholder improvements for Alternative 2C wastewater system is approximately \$27,030,000. The operation and maintenance costs for this private facility, which includes associated electrical, maintenance, equipment repair and chemical costs can exceed \$100,000 per month.

The pros and cons to this alternative are as follows:

1. The schedule to install the private system is not dependent on the County's schedule.
2. Initial costs for the private system are high.
3. Operation and maintenance costs are high.
4. R-1 effluent generated from the private WWRF can be used to irrigate the planned agricultural farmland. This property has enough land area to provide a secondary means of disposal as required by the State of Hawaii, Department of Health without reducing revenue generation of the property.
5. The WWRF is far away from the Kealia Pond National Wildlife Sanctuary.

3.4.6 Alternative 3A – WWRF on DLNR Property (TMK: (2)3-8-008:001)

Alternative 3A investigates a private WWRF along the southern property line of the DLNR parcel located between the County of Maui Raceway Park and DHHL Pūlehuunui South as shown on Figure 3-8. The type of processes involved and required land size is similar to what was described under Alternative 2A. Nothing is being presently planned for this area and there is ample space for future expansion.

The rough order of magnitude cost to install the stakeholder improvements for Alternative 3A wastewater system is approximately \$25,620,000. The operation and maintenance costs for this private facility, which includes associated electrical, maintenance, equipment repair and chemical costs can exceed \$100,000 per month.

The pros and cons to this alternative are as follows:

1. The schedule to install the private system is not dependent on the County's schedule.
2. Initial costs for the private system are high.
3. Operation and maintenance costs are high.
4. The parcel is currently zoned as "agriculture". Therefore rezoning or a Special Use Permit is required.
5. R-1 effluent generated from the private WWRF can be used to irrigate DLNR open spaces, MRPSC and Maui Raceway Park.
6. The WWRF is within close proximity to the Kealia Pond National Wildlife Sanctuary.

3.4.7 Alternative 3B – WWRF on DLNR Property (TMK: (2)3-8-008:001)

Alternative 3B investigates a private WWRF on a DLNR owned, 71 acre flag lot east of the DLNR Industrial and Business Park and adjacent to the existing HC&D quarry as shown in Figure 3-9.

The rough order of magnitude cost to install the stakeholder improvements for Alternative 3B wastewater system is approximately \$28,053,000. The operation and maintenance costs for this private facility, which includes associated electrical, maintenance, equipment repair and chemical costs can exceed \$100,000 per month.

The pros and cons to this alternative are as follows:

1. The schedule to install the private system is not dependent on the County's schedule.
2. Initial costs for the private system are high.
3. Operation and maintenance costs are high.
4. The parcel is currently zoned as "agriculture". Therefore rezoning or a Special Use Permit is required.
5. R-1 effluent generated from the private WWRF can be used to irrigate DLNR open spaces, MRPSC and Maui Raceway Park.
6. The WWRF is isolated from existing and planned developments and Kealia Pond.
7. There is room for future facility expansion.

8. An R-2 WWRF is possible, although installation costs will be higher than an R-1 facility.

- a. An R-2 WWRF facility is cost effective operationally.
- b. Initial construction costs for an R-2 facility are higher due to longer force mains, water and fire protection, and electrical and communication applications.

3.4.8 Alternative 4 – New County WWRF

Alternative 4 describes the conveyance of the Project's wastewater flows to a newly proposed wastewater treatment facility located along Kuihelani Highway. The proposed treatment facility is referred to as the "Central Maui WWRF" and is located approximately 2 miles away from the DHHL Pūlehuui North site. The location is shown on Exhibit 3-10.

During our meetings with WWRD, their staff engineers expressed interest in this new treatment facility. WWRD noted that this would be the most feasible option as this would be a joint venture effort to fund the construction of this new facility. This new facility would have a disposable method that is environmentally acceptable. WWRD is proposing to commence on obtaining funds, and the entitlement/design process of this treatment facility. Completion of the facility is anticipated in 2025.

To accomplish this alternative a series of pump stations and force mains are proposed from DHHL Pūlehuui North through A&B properties with connection to the new Central Maui WWRF. A small pump station will collect all wastewater from DHHL Pūlehuui South and pump it to the Stakeholder Pump Station No. 1. This station will collect flows from DLNR, DHHL, MRPSC and PMP, and pump it to a second stakeholder Pump Station No. 2. From there this wastewater will be pumped to the new Central Maui WWRF.

The status of the new Central Maui WWRF is still in its preliminary stages and construction of the facility is anticipated to be completed in 2025. If this does not meet with the DHHL schedule, an interim collection and treatment system can be designed and constructed. This interim design will consist of the following:

- Construct a duplex submersible pump station at DHHL Pūlehuui South

- Construct the force main from DHHL Pūlehuui South to DHHL Pūlehuui North
- Construct a Stakeholder pump station at DHHL Pūlehuui North to accept flows from DHHL Pūlehuui South and all periphery projects around DHHL Pūlehuui North. This pump station construction will be sized and constructed for the future, but pump size will suit the interim conditions and pump the collected wastewater to the temporary WWRF.
- Construct a temporary 250,000 gpd WWRF using an advanced lagoon system using Biolac technology with an integral clarification unit.
- Construct two temporary SAT basins for disposal of the effluent.

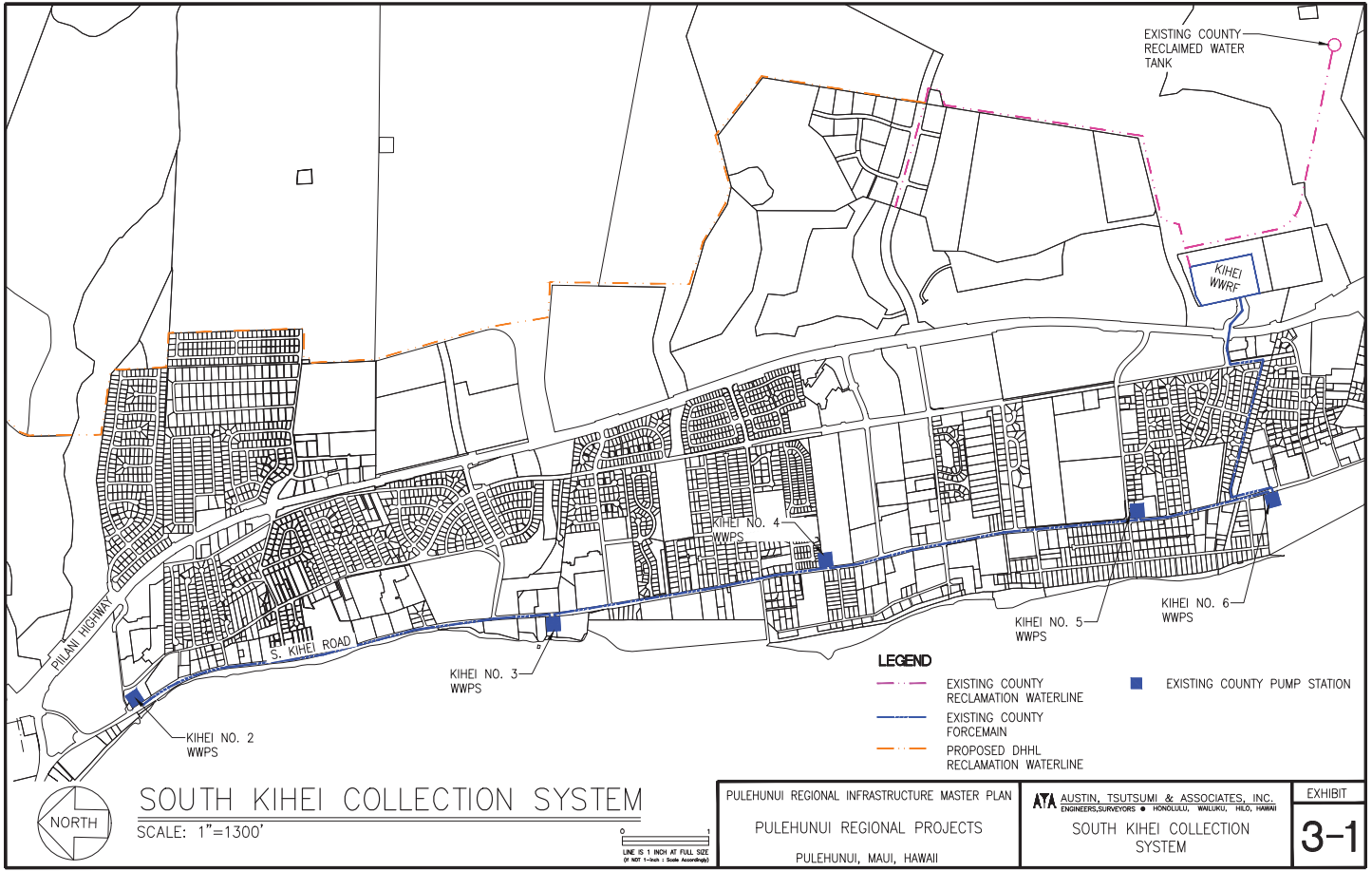
The rough order of magnitude cost to install the stakeholder improvements for Alternative 4 wastewater system is approximately \$18,070,000. The pro-rata contribution to the new Central Maui WWRF is approximately \$9,545,000. The cost interim wastewater treatment system is approximately \$5,520,000. Total cost for this alternative is \$33,135,000.

The pros and cons to this alternative are as follows:

1. WWRD is in agreement with this option and will allow DHHL to connect to this new facility.
2. Installation of the force main and pump stations involve negotiation and land acquisition from private land owners.
3. No maintenance and operations expenses incurred by the stakeholders at the treatment plant facility.
4. There is an element of uncertainty as to when the County will complete the facility and may not accommodate the schedule of the Project. As such, a temporary wastewater treatment facility must be installed prior to any Project development.

3.5 PREFERRED WASTEWATER SYSTEM ALTERNATIVE

The preferred wastewater system alternative is Alternative 4, which is to connect to the County's newly proposed Central Maui WWRF. The primary advantage of Alternative 4 is the State will not have to privately operate and maintain a wastewater treatment facility. WWRD would operate and maintain this wastewater treatment facility and WWRD is open to the idea of the State connecting to this facility.

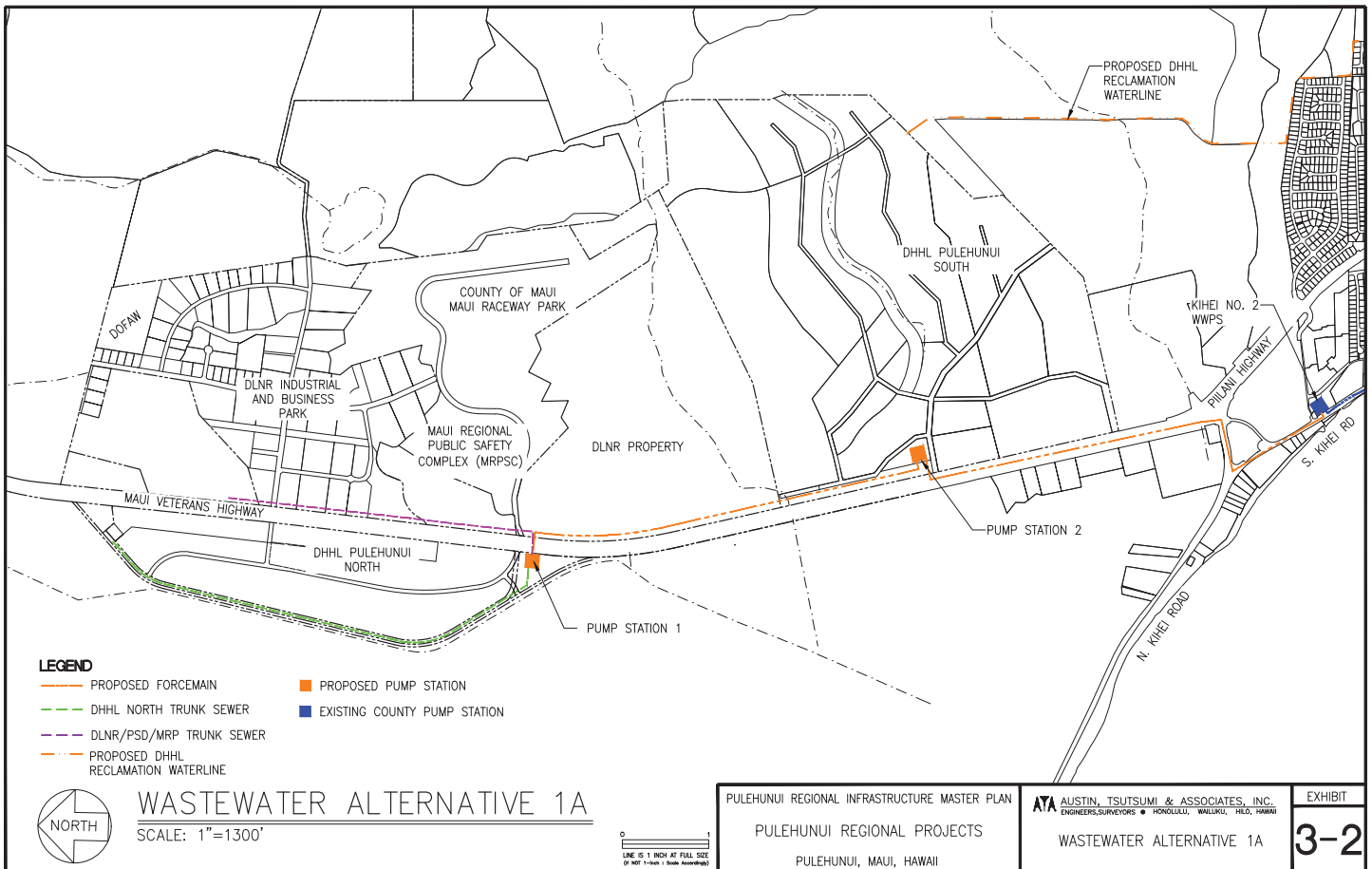
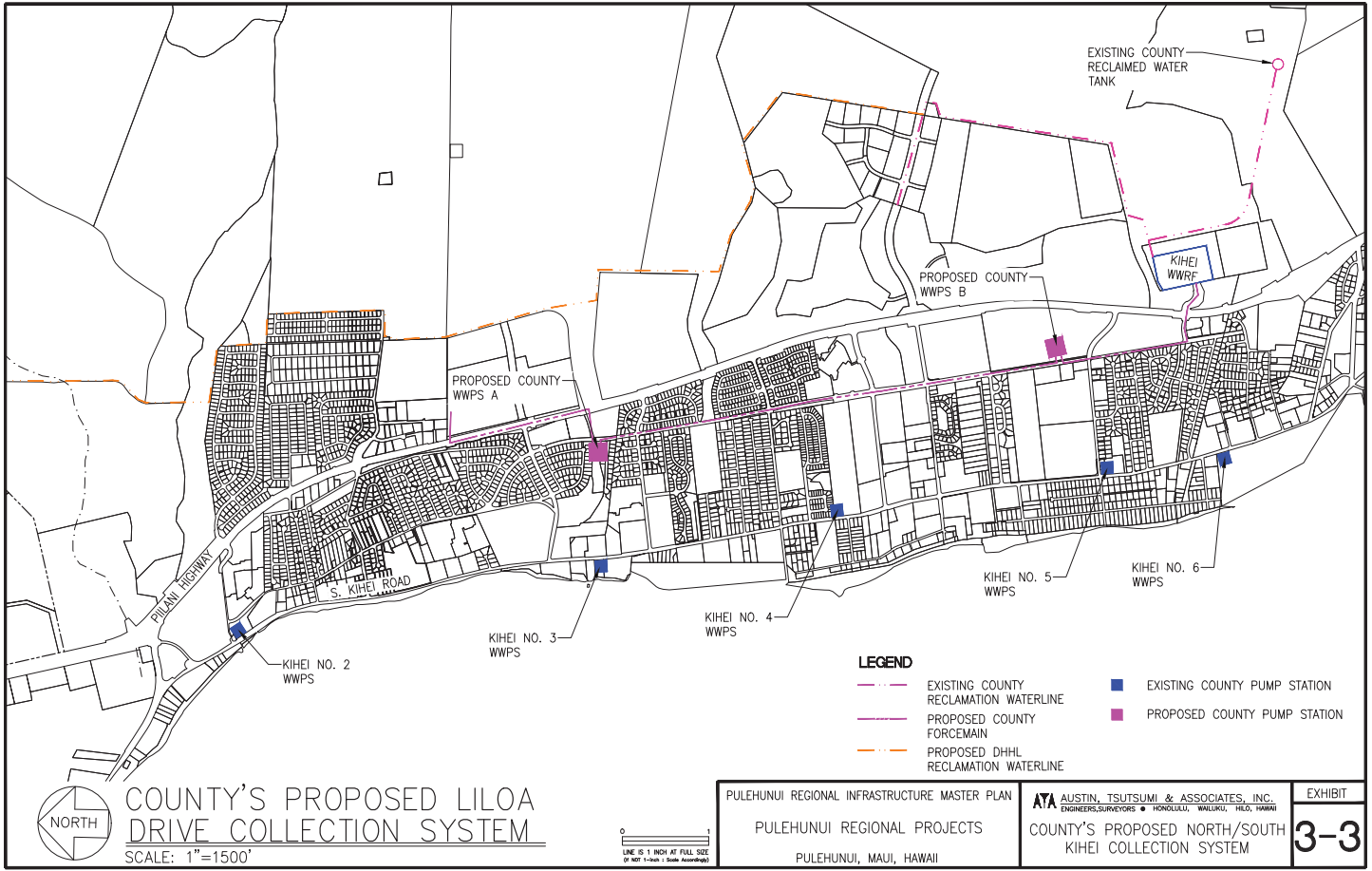


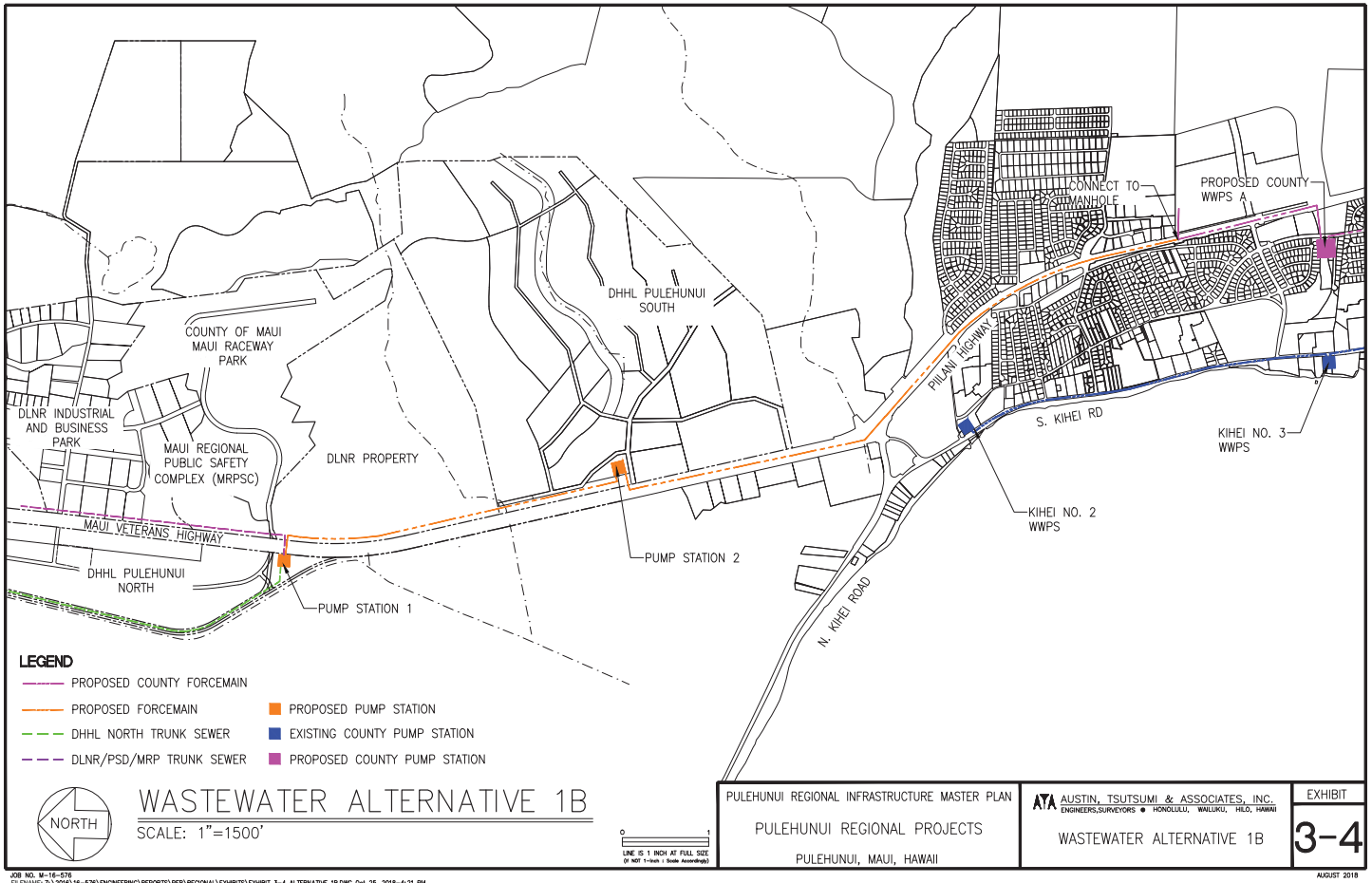
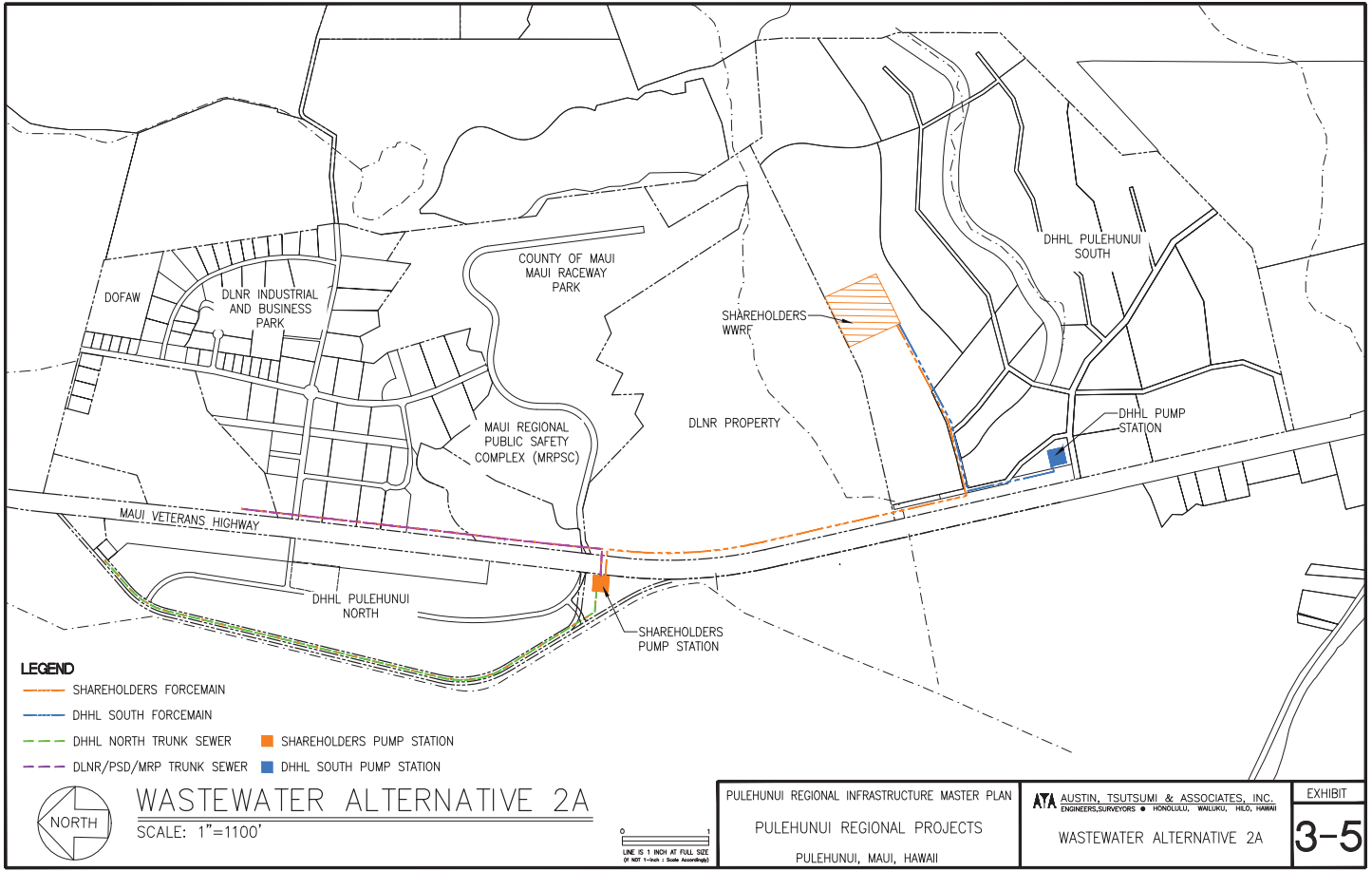
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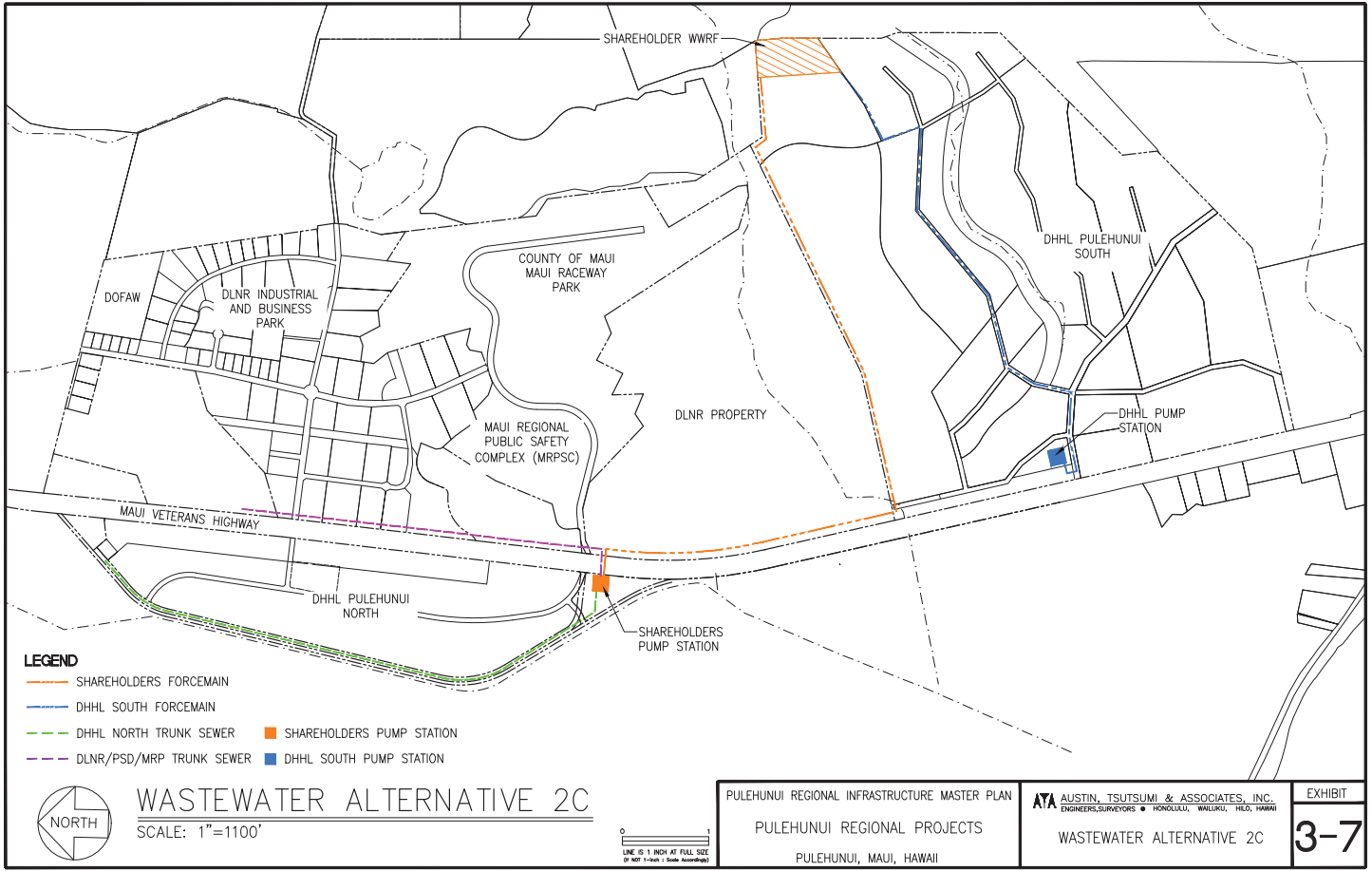
CHAPTER 3

EXHIBITS

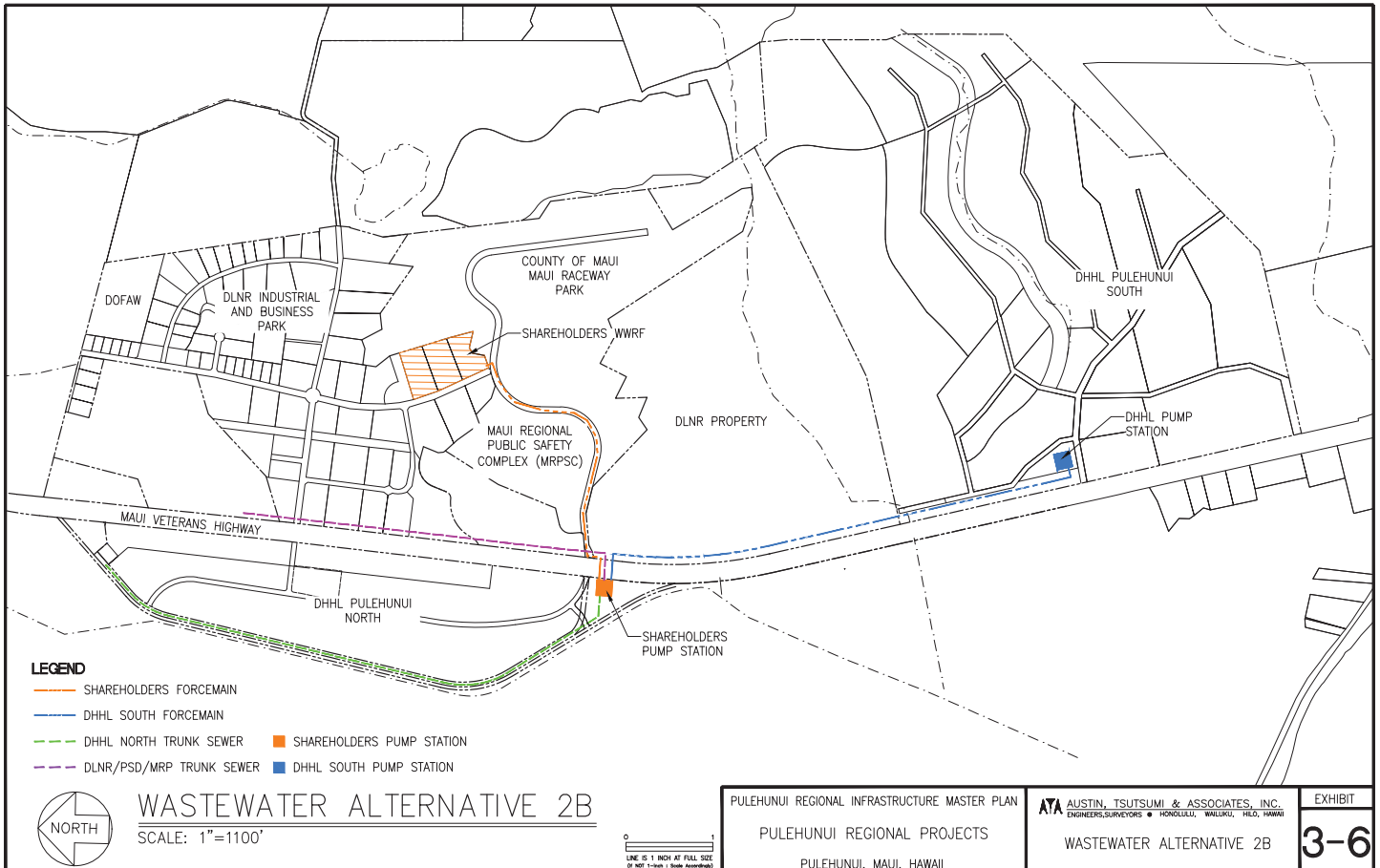
AUGUST 2018



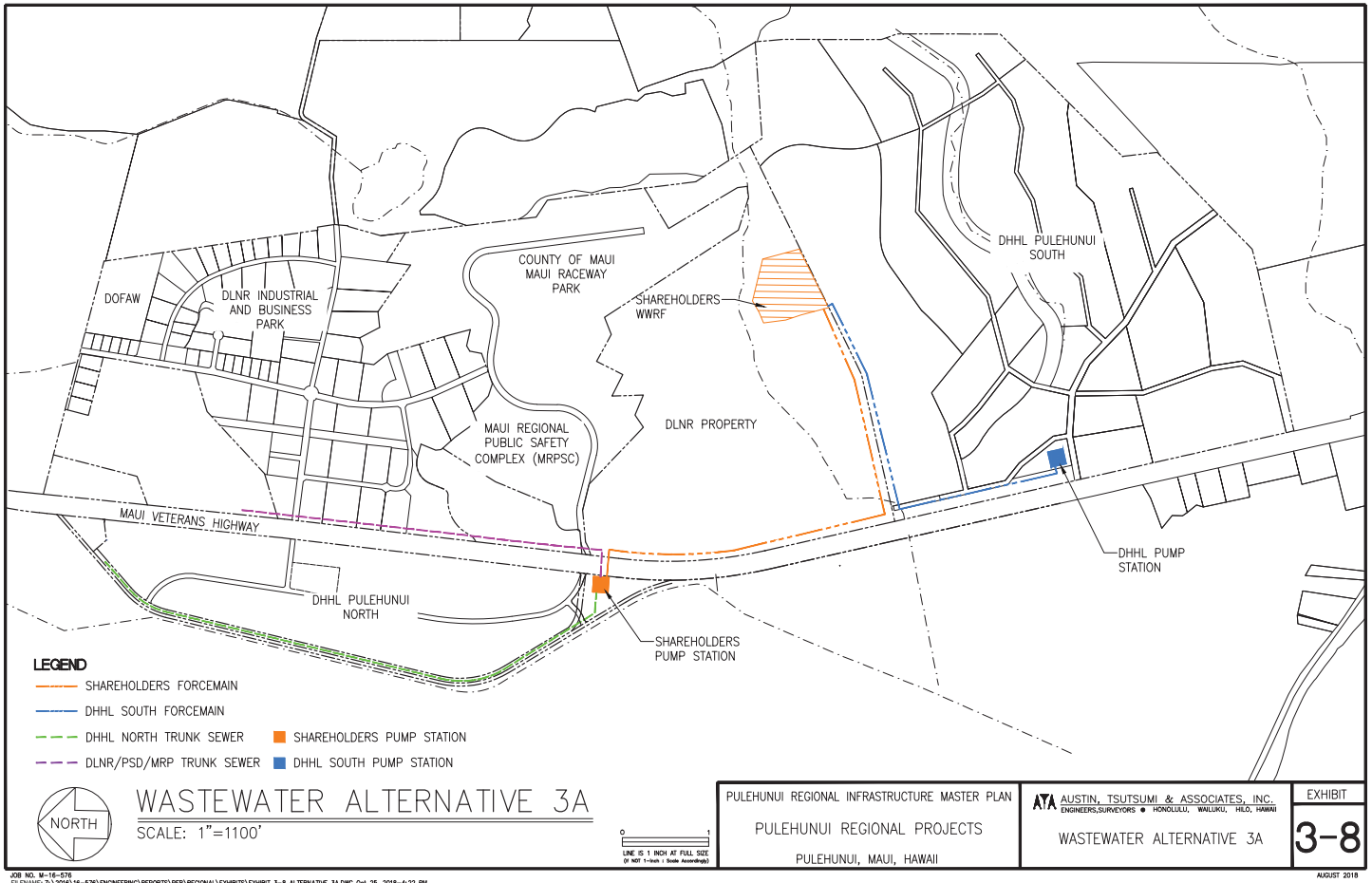
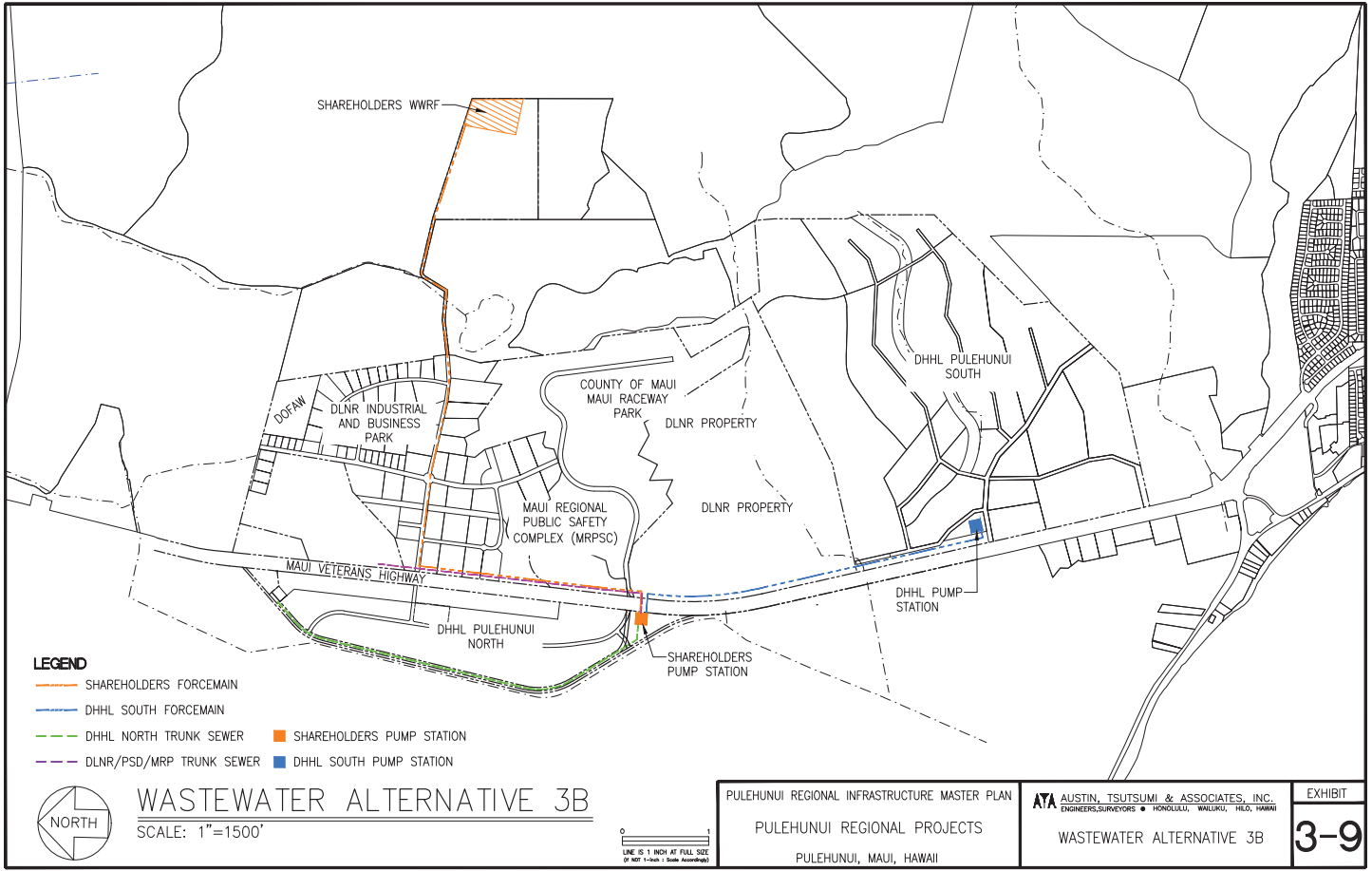


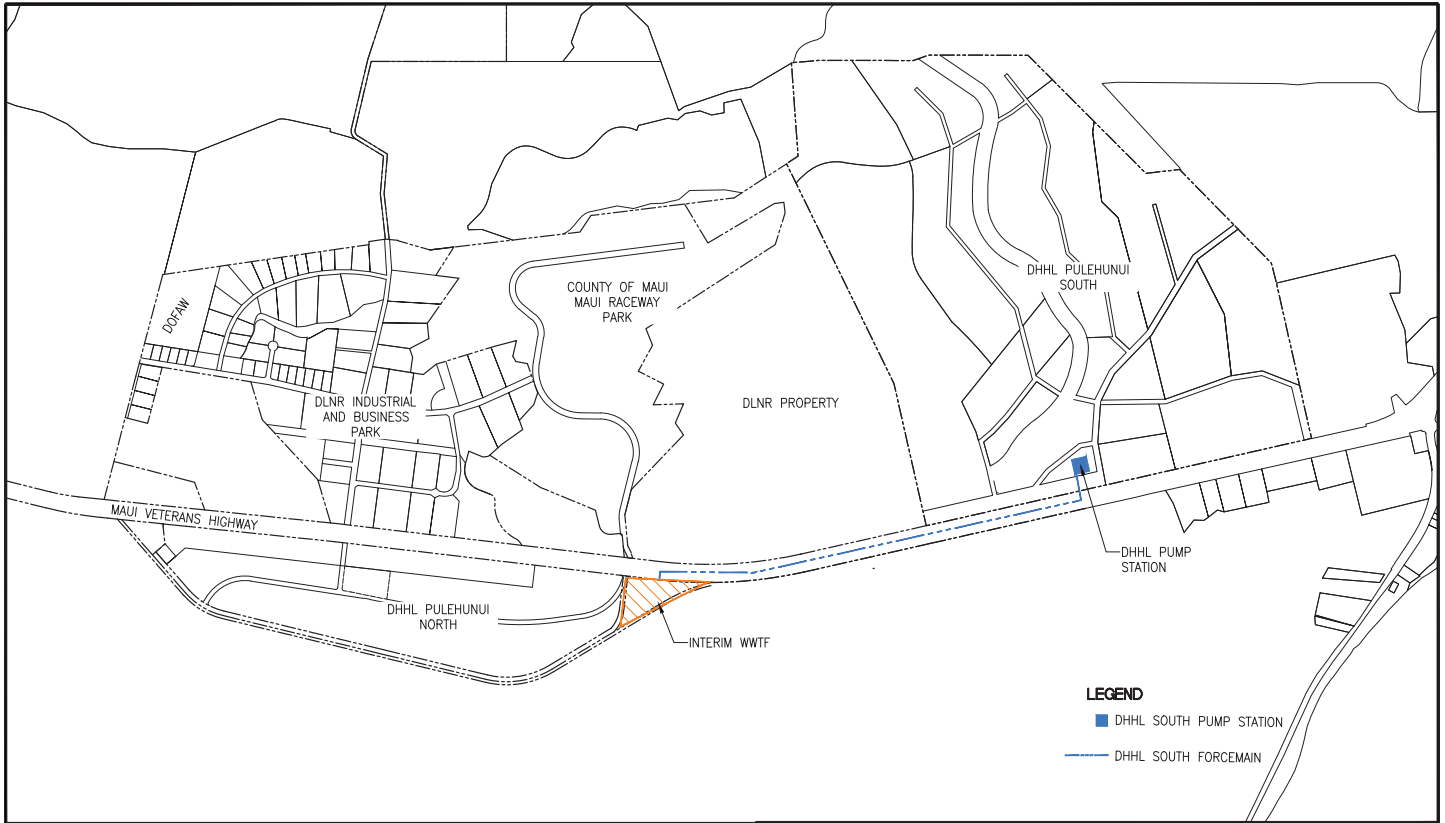


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- LEGEND**
- DHHL SOUTH PUMP STATION
 - DHHL SOUTH FORCEMAIN



WASTEWATER ALTERNATIVE 4 INTERIM
SCALE: 1" = 2,000'

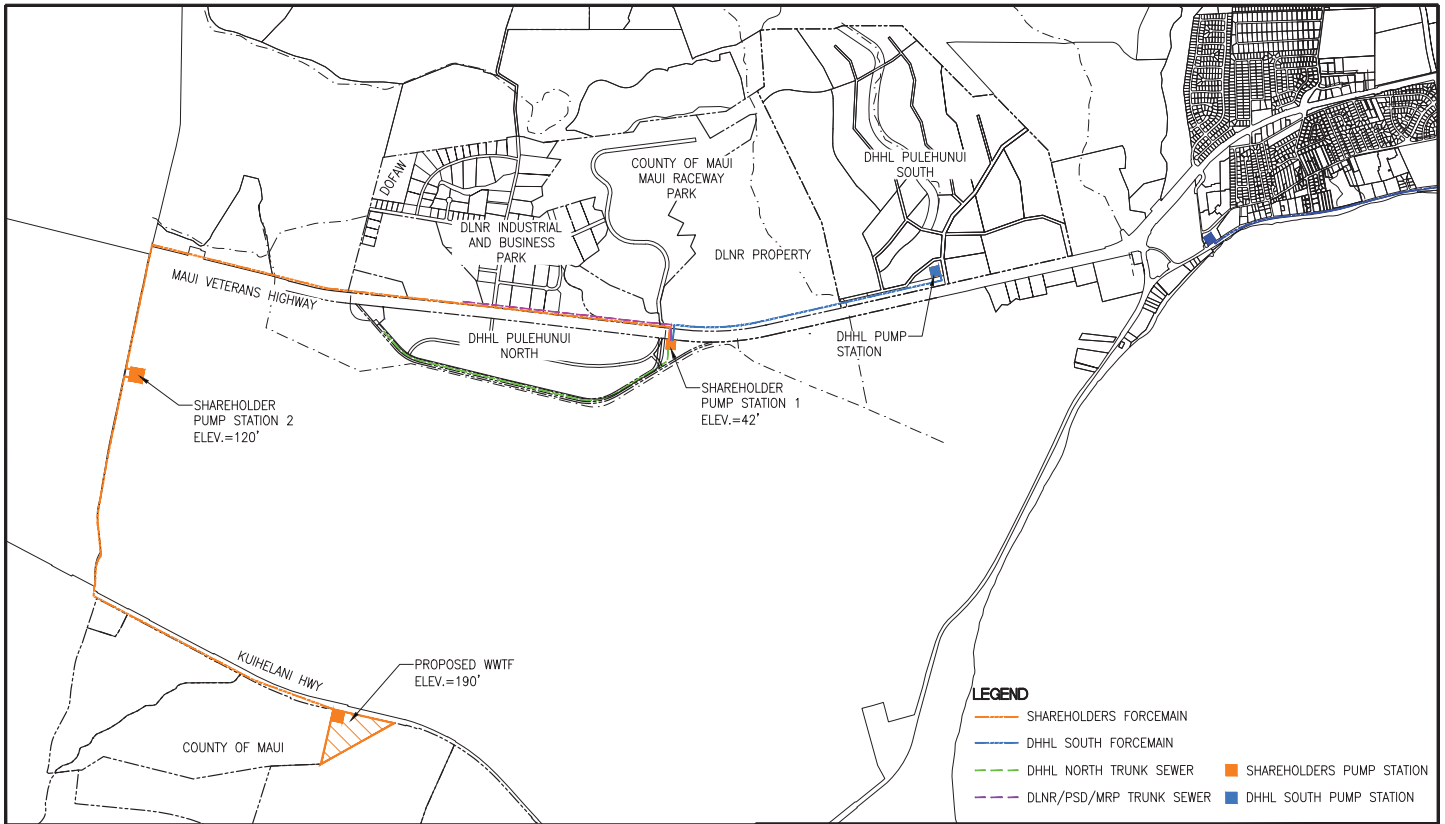


PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

EXHIBIT
3-11
AUGUST 2018

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- LEGEND**
- SHAREHOLDERS FORCEMAIN
 - DHHL SOUTH FORCEMAIN
 - - - DHHL NORTH TRUNK SEWER
 - - - DLNR/PSD/MRP TRUNK SEWER
 - SHAREHOLDERS PUMP STATION
 - DHHL SOUTH PUMP STATION



WASTEWATER ALTERNATIVE 4
SCALE: 1" = 2,000'



PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

EXHIBIT
3-10
AUGUST 2018

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CHAPTER 4 - DRAINAGE

4.1 EXISTING CONDITIONS

4.1.1 Land Use and Soils

Much of the land where the proposed projects are located was used for sugar cane cultivation for many years. However, Hawaiian Commercial and Sugar Company (HC&S) ceased their sugar cane cultivation operations at the end of 2016. Because of this, the majority of the land is now growing back as a mixture of cane grass and weeds, with dispersed crop residue. Existing dirt roads that were formerly used for cane operations are still present throughout the Pūlehuui areas, although many are becoming overgrown.

The land where the Maui Regional Public Safety Complex (MRPSC) is proposed is the exception, not having been used for sugar cane cultivation. The MRPSC site is currently used for emergency services vehicular training and for racing by the Maui Sports Car Club of America. The ground cover on that site is mostly bare soil, along with some areas of deteriorating pavement and concrete pads left over from past uses of the area.

The soils in the Pūlehuui region are generally well drained with good infiltration characteristics. They can contain rocks and cobbles, but solid bedrock is generally very deep. Shallow groundwater is also not a concern at these project sites.

The climate in the area is semi-arid, with an average of only 11 to 13 inches of rainfall annually. Semi-arid landscapes that are not irrigated tend to have higher than average rates of runoff due to thinner and less vigorous groundcover.

4.1.2 Drainage Patterns

The topography in the area is relatively flat and uniform with slopes generally in the one to two percent range. The projects located east of Maui Veterans Highway generally slope westward toward the highway. The Pūlehuui North site, which is west of the highway slopes in a more southward direction. Ultimately all runoff collects in drainage ditches that lead to Kealia Pond. The drainage conditions for

CHAPTER 4

DRAINAGE SYSTEM

each project site within the Infrastructure Regional Study Area are discussed in more detail on the following pages.

4.1.2.1 DLNR Industrial and Business Park

Stormwater runoff from the DLNR Industrial and Business Park site generally flows overland in a westerly direction towards Maui Veterans Highway. At Maui Veterans Highway, the roadway is raised slightly above the existing ground, which creates a sort of barrier to runoff. Runoff flows along the mauka side of the highway to one of the existing culvert locations that pass runoff under the highway. In low-intensity storm events, runoff is drained by the periodically spaced double 24-inch culverts to a parallel swale on the opposite (west) side of Maui Veterans Highway. Runoff in the west highway swale continues to flow in a southerly direction to a larger existing drainage ditch that leads to Kealia Pond. Refer to Exhibit 4-1 for the Existing Conditions Drainage Area Map.

In addition to onsite stormwater runoff, the DLNR Industrial and Business Park site can be subject to a large volume of offsite stormwater runoff during high-intensity or high rainfall storm events. In larger storm events, the small 24-inch culverts at Maui Veterans Highway do not have enough capacity for the mauka runoff, so the flows must travel south in the swale along the east side of the highway towards the intersection of Raceway Park Drive. At Raceway Park Drive, runoff passes under the Maui Veterans Highway through a HDOT triple 24-inch culvert, or overtops the roadway due to insufficient culvert capacity. From there, runoff continues to flow in a southerly direction for another 1,500 feet before reaching a triple twelve-foot by eight-foot box culvert that crosses under Maui Veterans Highway. Downstream of the highway culvert, the stormwater flows connect to the same larger drainage ditch as described in the low-intensity storm event that leads to Kealia Pond.

The existing conditions runoff is summarized in Table 4-1 on the following page.

Table 4-1: Existing Conditions Runoff Summary –

DLNR Industrial and Business Park

| Drainage Area | Area (ac) | Runoff Q ₅₀ (cfs) |
|---------------------|----------------|------------------------------|
| E-1 | 84.669 | 64.35 |
| E-2 | 74.498 | 52.15 |
| E-3 | 115.698 | 74.05 |
| E-4 | 5.277 | 0* |
| ONSITE TOTAL | 280.142 | 190.55 |
| O-1 | 806.6 | 586.13** |
| O-2 | 78.097 | 53.11 |
| O-3 | 86.954 | 59.13 |

* The 50-year runoff from Drainage Area E4 is fully retained in the existing retention basin located within that drainage area.

** The runoff listed above for Drainage Area O-1 is for the 100-year, 24-hour storm.

Since the proposed stormwater management system would be divided into contributing areas of less than 100 acres, the 50-year storm is also used for the analysis of existing conditions for consistency. However, since offsite Drainage Area O-1 is over 100 acres in size, the 100-year, 24-hour storm is used specifically for the design of that area and its receiving drainage systems. The other Pūlehuui regional projects will use a similar approach, with detention systems serving areas less than 100-acres and the 50-year storm being used for comparison of overall site runoff.

There is an existing reservoir and dam located above the DLNR Industrial and Business Park site that has several known deficiencies and poses a possible risk to the downstream properties. The Reservoir 90 dam is classified as a high hazard dam by the State Dam Safety Program. If the dam's earthen embankment were to ever overtop or fail, the reservoir's water could inundate DLNR, MRPSC, and Pūlehuui North sites with destructive flood flows. The reservoir is owned and operated by HC&S.

4.1.2.2 Pūlehuunui North

Stormwater runoff from Pūlehuunui North generally flows in a south or southwesterly direction towards an existing offsite drainage ditch that runs along the west edge of Mehamaha Loop. The ditch is the downstream continuation of Pulehu Gulch. There are no drainage systems along most of Mehamaha Loop and stormwater must surface flow across the road. Since the site is relatively flat, runoff is widely dispersed and enters the ditch at various locations as opposed to converging into one concentrated area. The Pulehu Gulch drainage ditch continues beyond Mehamaha Loop in a southwesterly direction, crossing agricultural land, and eventually discharges to Kealia Pond. Refer to Exhibit 4-2 for the Existing Conditions Drainage Area Map.

According to the Maui Veterans Highway (formerly Mokulele Highway) Drainage Report from March 2000, the drainage area for Pulehu Gulch is 7,813 acres and the 100-year flow rate is 8,630 cfs. It is not known if the existing ditch west of Mehamaha Loop, which is a continuation of the Pulehu Gulch, has sufficient capacity for these flow rates. If the ditch were to flood, it could spill over Mehamaha Loop and affect the project site.

The runoff from the DLNR Industrial and Business Park site that discharges through the fourteen 24-inch culverts at Maui Veterans Highway generally doesn't affect the Pūlehuunui North site. There is a swale along the west side of the highway that captures runoff and carries it south. The swale runoff eventually reaches the south intersection of Mehamaha Loop where there is a HDOT double 24-inch culvert under the loop road. Considering that fourteen 24-inch culverts contribute runoff to the upstream highway swale, the double 24-inch culvert at Mehamaha Loop is undersized. During big storm events, this culvert, like the culvert across the highway at Raceway Park Drive, will be exceeded resulting in flow overtopping the roadway.

The existing conditions 50-year runoff for Pūlehuunui North is summarized in Table 4-2 on the following page.

Table 4-2: Existing Conditions Runoff Summary – Pūlehuunui North

| Drainage Area | Area (ac) | Runoff Q ₅₀ (cfs) |
|---------------------|--------------|------------------------------|
| E-1 | 88.47 | 41.58 |
| E-2 | 90.04 | 43.20 |
| E-3 | 6.52 | 4.55 |
| ONSITE TOTAL | 185.1 | 89.33 |

4.1.2.3 Pūlehuunui South

The Pūlehuunui South site is served by three major drainage systems at Maui Veterans Highway: an eight unit (8x) twelve-foot by eight-foot box culvert at Kolaloa Gulch, a triple twelve-foot by six-foot box culvert at the center of the site, and a nine unit (9x) twelve-foot by eight-foot box culvert south of the site at Keahuaiwi Gulch. The majority (about 90 percent) of the project site drains to the triple twelve-foot by six-foot box culvert located near the center of the site's frontage with the highway. The southwest corner (about ten percent) of the site drains to Keahuaiwi Gulch. And only about one acre (less than one percent) of the site in the very northwest corner drains to Kolaloa Gulch. All drainage systems eventually flow into Kealia Pond. Refer to Exhibit 4-3 for the Existing Conditions Drainage Area Map.

An unnamed drainage-way bisects the Pūlehuunui South site. While the drainage-way is unnamed, it is significant in that it has an offsite drainage area of almost 2,000 acres. Most of the drainage-way within the site has a defined channel, however, as the drainage-way gets closer to Maui Veterans Highway, the defined channel ends and the runoff disperses on more level terrain. It is assumed that the lower segment of the drainage-way channel was graded out and erased as part of sugar cane cultivation operations.

Runoff from the southwest corner of the site collects in a low area just mauka of the highway right-of-way. A large box culvert was planned to be installed in this area as

part of the improvement of Maui Veterans Highway (formerly known as Mokulele Highway) in the early 2000s. However, for reasons unknown, this culvert was never installed. With no drainage systems at Maui Veterans Highway, runoff from this area must drain through an undersized 24-inch culvert located at an access drive near the southwest corner of the site. Runoff then flows in the highway ditch along the Monsanto property frontage to the box culvert at Keahuaiwi Gulch, about 1,000 feet south of the site.

The existing conditions 50-year runoff for Pūlehunui South summarized in Table 4-3 below.

Table 4-3: Existing Conditions Runoff Summary - Pūlehunui South

| Drainage Area | Area (ac) | Runoff Q ₅₀ (cfs) |
|---------------------|---------------|------------------------------|
| E-1 | 1.20 | 1.77 |
| E-2 | 580.55 | 270.37 |
| E-3 | 64.33 | 61.92 |
| ONSITE TOTAL | 646.00 | 334.06 |
| O-1 | 5,846.8 | 5,540** |
| O-2a | 1,983.7 | 1,188.70** |

** The runoff listed above for Drainage Areas O-1 and O-2 is for the 100-year, 24-hour storm.

There are two FEMA mapped 100-year flood zones on the Pūlehunui South site. The first is in the northwest corner of the site at Kolaloa Gulch. The second is in the southwest corner of the site and is related to Keahuaiwi Gulch. There is no delineated 100-year flood zone for the unnamed gulch at the center of the project site.

4.1.2.4 Maui Regional Public Safety Complex

There are no drainage systems on the MRPSC site and runoff drains overlain to the National Guard Armory property and toward Raceway Park Drive. Runoff flows under Raceway Park Drive through a triple 24-inch culvert near the intersection with Maui Veterans Highway. From there, stormwater continues south along the mauka side of

Maui Veterans Highway to a triple twelve-foot by eight-foot box culvert that runs under the highway. The stormwater runoff then combines with the main Pūlehu Gulch Drainage Ditch that leads to Kealia Pond. Existing Condition runoff rates have not been estimated for this 40.3 acre site.

4.1.3 Existing Deficiencies

The lack of adequate drainage systems fronting the DLNR Industrial and Business Park site and at Raceway Park Drive present a challenge to the DLNR and MRPSC projects. When Maui Veterans Highway was designed, only small 24-inch diameter culverts were provided along the DLNR frontage, which do not have capacity for the 50 or 100-year runoff. A triple twelve-foot by eight-foot box culvert was provided south of Raceway Park Drive, but there is only a triple 24-inch culvert under Raceway Park Drive to convey runoff to this location. Due to this lack of downstream capacity, the DLNR Industrial and Business Park site and the MRPSC site may have to retain more of their proposed conditions runoff than just the increase from existing conditions. Another option could be to upgrade the culvert at Raceway Park Drive, but this would involve coordination with HDOT, would likely be more expensive, and excessive flows could still negatively affect the National Guard Armory.

The Pūlehunui North site has a similar situation where there is a lack of drainage systems at Mehamaha Loop road. There is only a double 24-inch culvert to pass the highway swale runoff under the Mehamaha Loop near its south intersection with Maui Veterans Highway. This culvert is undersized for the amount of runoff coming to it. The remaining portion of Mehamaha Loop that borders the Pūlehunui North site has no drainage systems at all and runoff must surface flow over the roadway. The Pūlehunui North project will need to add Mehamaha Loop drainage systems if Mehamaha Loop is widened. The effect of the undersized HDOT double 24-inch culvert near Maui Veterans Highway on the Pūlehunui North site will need to be further evaluated to see if a replacement is warranted.

At the Pūlehunui South site, the southwestern corner of the site lacks adequate drainage systems. A large twelve-foot by eight-foot box culvert that was proposed for this area in the Maui Veterans Highway (formerly known as Mokulele Highway) Widening project's March 2000 Drainage Report was never installed. Instead, runoff from this southwest corner of the site collects just mauka of the highway and

eventually releases south to Keahuaui Gulch by draining along the Monsanto property highway frontage. Due to lack of drainage systems in the southwest corner of this site, extra retention may be needed for proposed conditions runoff from this portion of the site.

4.1.4 Flood Zone

The majority of all project areas are in Zone X, outside the 500-year (two-tenths percent annual chance) floodplain. The exceptions are at the Pūlehuui South site where there is a Zone A 100-year (one percent annual chance) flood area in the northwest corner of the site at Kōialoa Gulch, and a Zone AE 100-year flood area in the southwest corner of the site that is related to Keahuaui Gulch. There are also shaded Zone X areas in the Pūlehuui North and South sites adjacent to Maui Veterans Highway. Shaded Zone X areas are defined by FEMA as "areas of two-tenths percent annual chance flood; areas of one percent annual chance flood with average depths of less than one foot or with drainage areas less than one square mile, and areas protected by levees from the one percent annual chance flood". Refer to Exhibits 4-7 to 4-9 for Flood Maps.

4.2 PROPOSED CONDITIONS

The general concept for the proposed drainage designs is to break up each site into sub-areas, providing localized detention basins within each area to manage peak flows. This decentralized approach provides several advantages. By limiting proposed drainage areas to areas less than 100 acres, County regulations allow drainage collection systems and stormwater detention basins to be designed for smaller storms (50-year versus 100-year recurrence interval). Storage systems that manage the 100-year, 24-hour storm runoff can end up being three times as large as those that manage the 50-year, 1-hour storm runoff.

The proposed stormwater management plan for each site will also need to provide water quality treatment of stormwater in addition to reducing peak flow rates. Example treatment practices that are planned to be employed in each proposed drainage basin include grass swales, reduced impervious coverage, and stormwater retention.

4.2.1 DLNR Industrial and Business Park

New detention basins are proposed at various locations throughout the DLNR Industrial and Business Park site to manage runoff increases. Some basins will be designed to slowly release runoff over time through low-flow outlets, while others will be designed for full stormwater retention. The basins will work together in series or in parallel to ensure that the amount of runoff in the proposed condition does not exceed the existing condition. Drain inlets and piped storm drain systems will be placed under roadways or in landscaped areas to convey runoff to the proposed basins. Swales will also be used wherever possible. Refer to Exhibit 4-4 for the Proposed Conditions Drainage Area Map.

Since there is a significant amount of offsite runoff currently passing through the project site, diversions and thru conveyance systems will be used to allow this runoff to continue to pass safely through. No detention systems will be placed within the thru conveyance systems because of the large volume of runoff flowing through them and to avoid restricting the conveyance capacity.

The proposed conditions runoff for the DLNR Industrial and Business Park site is summarized in Table 4-4 on the following page.

Table 4-4: Proposed Conditions Runoff Summary - DLNR

| Drainage Area | Area (ac) | Runoff Q ₅₀ Before Retention (cfs) | Runoff Q ₅₀ After Retention (cfs) |
|---------------------|----------------|---|--|
| P-1 | 81.899 | 357.57 | 0 |
| P-2 | 33.846 | 135.25 | 24.14 |
| P-3 | 30.199 | 129.61 | 18.50 |
| P-4 | 71.034 | 289.11 | 0 |
| P-5 | 57.887 | 248.45 | 81.78 |
| P-6 | 5.277 | 26.16 | 0 |
| ONSITE TOTAL | 280.142 | 1,186.15 | 124.42 |
| O-1 | 806.6 | 586.13** | 586.13** |
| O-2 | 78.097 | 53.11 | 53.11 |
| O-3 | 86.954 | 59.13 | 59.13 |

** The runoff listed above for Drainage Area O-1 is for the 100-year, 24-hour storm.

As can be seen in the table, the total onsite 50-year runoff after detention/ retention will be 124.42 cfs, which is a 35 percent reduction from existing conditions. The existing downstream culvert at Raceway Park Drive will remain undersized, however, the reduction in site runoff will help to improve the current condition. The bulk of the flows to the culvert are from offsite areas.

As mentioned previously, a number of deficiencies have been identified in HC&S Reservoir 90 by the State Dam Safety Program and the dam poses a potential risk to DLNR and other makai properties. It is recommended that DLNR and other stakeholders work with and/ or negotiate with HC&S to further assess the dam and make the required repairs and upgrades.

4.2.2 Pūlehunui North

New retention basins are proposed in each individual lot of the development. These basins are planned to be designed to fully retain the stormwater runoff generated from each lot independent of the others. Piped overflow conveyance systems or surface flow paths will be provided from each basin to safely manage excess flows.

Stormwater runoff generated from the proposed roadways will be collected through periodic drain inlets and underground drain pipes. Like the lot runoff, the roadway runoff will be retained and managed by a retention basin. The roadway runoff will be conveyed to a basin located southern end of the project site (Retention basin P-9). Refer to Exhibit 4-5 for the Proposed Conditions Drainage Area Map. The proposed conditions runoff is summarized in Table 4-5 on the following page.

Table 4-5: Proposed Conditions Runoff Summary - Pūlehunui North

| Drainage Area | Area (ac) | Runoff Q ₅₀ Before Retention (cfs) | Runoff Q ₅₀ After Retention (cfs) |
|---------------------|------------|---|--|
| P-1 | 16.2 | 4.39 | 0 |
| P-2 | 6.0 | 2.15 | 0 |
| P-3 | 11.2 | 1.67 | 0 |
| P-4 | 20.5 | 65.56 | 0 |
| P-5 | 4.8 | 16.67 | 0 |
| P-6 | 18.6 | 61.10 | 0 |
| P-7 | 14.8 | 52.12 | 0 |
| P-8 | 8.8 | 26.04 | 0 |
| P-9 | 84.1 | 302.67 | 0 |
| ONSITE TOTAL | 185 | 532.55 | 0 |

As shown in the table, there will be no site runoff from the site for the 50-year, 1-hour storm after retention. The full retention of site runoff will reduce storm drain infrastructure needs within the project.

As mentioned previously, there are some onsite areas that are potentially at risk for flooding due to insufficient drainage capacities from offsite flows. One area is along the west side of Mehamaha Loop where high flows from the existing ditch extending from Pulehu Gulch could potentially flood into Mehamaha loop and the project site. A detailed hydraulic analysis should be conducted in the design phase of the project to determine the potential for flooding in this area. It is possible that Mehamaha Loop or the project site will need to be raised above the flood elevation. Another alternative could be to widen or improve the existing ditch to increase capacity.

A second potential area of flooding is at the existing HDOT double 24-inch culvert at the south end of Mehamaha Loop. The Pūlehunui North site slopes away from the highway and doesn't actually contribute any runoff to this culvert. If this culvert were to flood,

runoff could flow into the one of the adjacent proposed light industrial lots, near the southern intersection of Mehamaha Loop and Maui Veterans Highway. To reduce the risk of flooding, it is recommended that either a larger culvert be added at Mehamaha Loop or that accommodations be made for protecting the future developed Pūlehunui North site from surface flow (particularly to address potential runoff from offsite as noted above), such as raised grades or berm additions. Further analysis of the existing HDOT culvert is also planned to be conducted in the future design phase.

4.2.3 Pūlehunui South

New retention basins are proposed in each individual lot of the development. These basins are planned to be designed to fully retain the stormwater runoff generated from each lot independent of the others. Piped overflow conveyance systems or surface flow paths will be provided from each basin to safely manage excess flows.

Offsite runoff generated by drainage area O-2a will be allowed to pass through the site by means of the existing onsite gulch. As mentioned in the existing conditions, the gulch eventually ends and disperses runoff before actually reaching Maui Veterans Highway. This will be modified through swales and culverts to divert the runoff to the existing 12' x 6' box culverts at Maui Veterans Highway. Refer to Exhibit 4-6 for the Proposed Conditions Drainage Area Map.

The proposed conditions runoff for Pūlehunui South is summarized in Table 4-6 on the following page.

Table 4-6: Proposed Conditions Runoff Summary – Pūlehuunui South

| Drainage Area | Area (ac) | Runoff Q ₅₀ Before Retention (cfs) | Runoff Q ₅₀ After Retention (cfs) |
|---------------------|--------------|---|--|
| P-1 | 1.23 | 1.44 | 0 |
| P-2a | 38.60 | 26.64 | 0 |
| P-2b | 29.00 | 40.60 | 0 |
| P-2c | 13.19 | 18.93 | 0 |
| P-2d | 58.37 | 31.52 | 0 |
| P-2e | 61.02 | 83.29 | 0 |
| P-2f | 93.82 | 124.78 | 0 |
| P-2g | 46.97 | 65.76 | 0 |
| P-2h | 61.64 | 31.44 | 0 |
| P-2i | 25.67 | 71.86 | 0 |
| P-2j | 11.42 | 32.77 | 0 |
| P-2k | 28.57 | 93.71 | 0 |
| P-2l | 29.71 | 36.54 | 0 |
| P-2m | 33.37 | 86.11 | 0 |
| P-2n | 12.11 | 29.79 | 0 |
| P-2o | 14.43 | 47.33 | 0 |
| P-2p | 24.77 | 14.74 | 14.74 |
| P-3a | 26.57 | 85.04 | 0 |
| P-3b | 35.33 | 115.88 | 0 |
| ONSITE TOTAL | 646.0 | 1,038.17 | 14.74 |
| O-1 | 5,846.8 | 5,540** | 5,540** |
| O-2a | 1,983.7 | 1,188.7** | 1,188.7** |

* The runoff listed above for Drainage Areas O-1 and O-2a is for the 100-year, 24-hour storm.

As can be seen in the table above, the total onsite runoff after retention will be approximately 14.74 cfs, which is a 96% percent reduction from existing conditions.

As mentioned in the discussion of existing conditions, there are FEMA mapped 100-year flood zones in the northwest and southwest corners of the site. Development of structures within these flood zone areas will need to be avoided or the areas will need to be filled so that structures will be above the flood zone. The Koloa Gulch channel itself will need to remain free of encroachment so that flood flows can continue to pass through.

4.2.4 Maui Regional Public Safety Complex

Runoff from the developed site is planned to be managed by a combination of open retention basins and an underground perforated pipe storage system. The goal will be to retain the increase in 50-year, 1-hour storm runoff so that flow rates are kept to pre-development levels. Runoff stored in the basins will be allowed to infiltrate into the ground, while excess runoff will overflow to the south.

4.3 SUMMARY/ RECOMMENDATIONS

The existing HDOT triple 24-inch culvert at Raceway Park Drive near the intersection with Maui Veterans Highway is currently undersized. The DLNR Industrial and Business Park and the MRPSC project plan to reduce their site runoff so that the existing condition is not exacerbated. Since the DLNR project proposes to reduce flow rates and their site is not affected by the culvert, they likely wouldn't have an interest in improving the culvert. Since Raceway Park Drive provides the only access to the National Guard Armory and the MRPSC sites, they and other users of Raceway Park Drive would have an interest in collaborating on the upgrade of the culvert to reduce the risk of the road becoming flooded or damaged in large storm events. Because of this, they may wish to negotiate with DLNR to see if they would also collaborate on a culvert upgrade.

A similar situation exists on the opposite side of Maui Veterans Highway at Mehamaha Loop where the existing HDOT double 24-inch culvert is undersized. Even though the DLNR Industrial and Business Park project proposes to reduce their proposed runoff rates below existing conditions, the culvert will still be undersized for the proposed flows. Flooding at the Mehamaha Loop culvert could affect the future Pūlehuunui North site and they may also wish to negotiate with DLNR on the culvert upgrade. However, like the

culvert at Raceway Park Drive, DLNR likely wouldn't have an interest in improving the culvert since the DLNR Industrial and Business Park Project proposes to reduce flow rates and their site is not affected by the culvert.

There don't appear to be other reasons for the DLNR, Pūlehuui North, Pūlehuui South, or MRPSC projects to combine or collaborate on new retention systems, conveyance systems, or any other drainage improvements. No site is directly upstream or downstream of the other and drainage systems are mostly separate. The land slope in the area is relatively flat, so even if it was desired to combine drainage for retention, it may be difficult or impossible to do so with gravity flow.

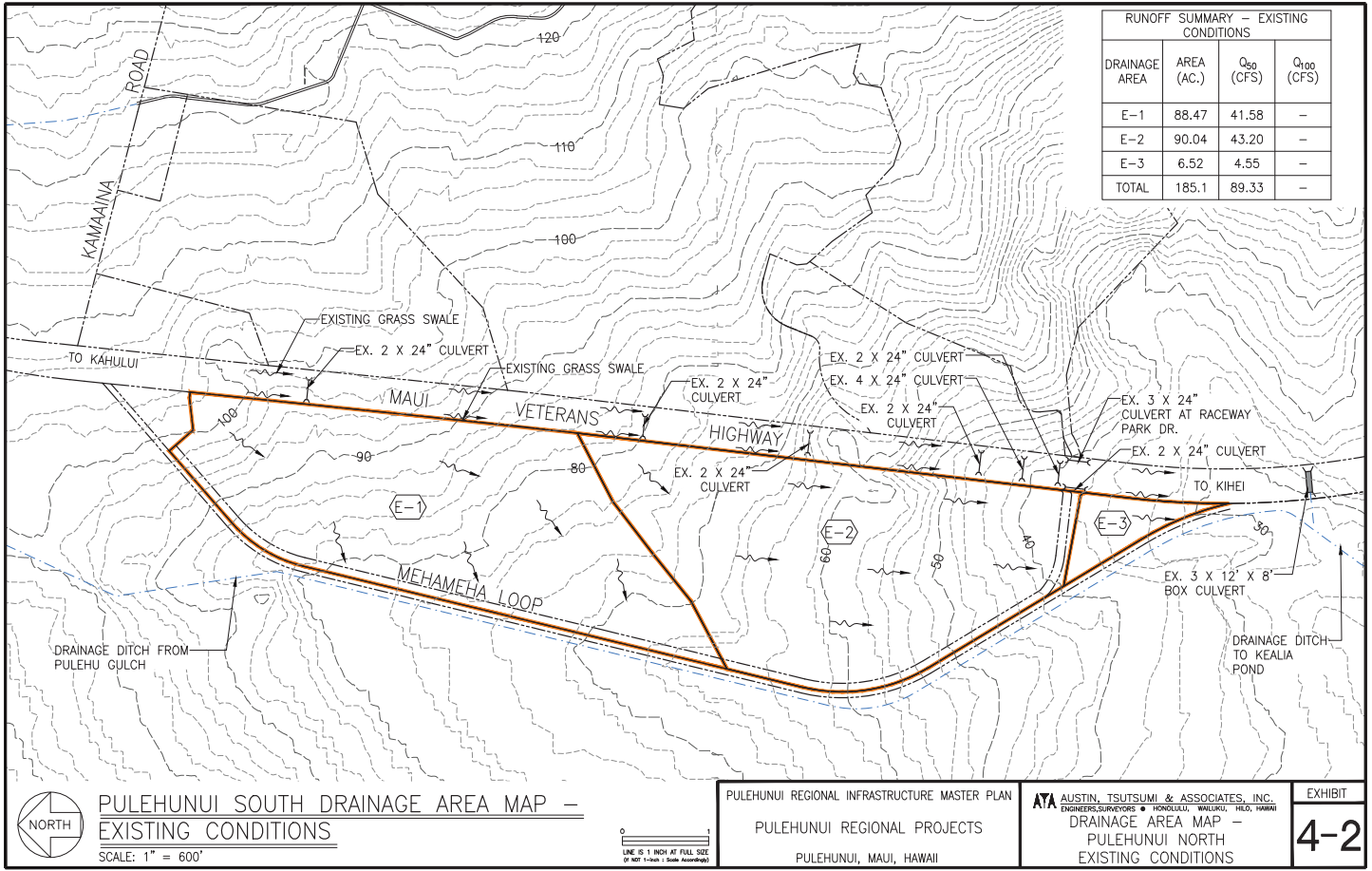
Another reason not to combine drainage systems between projects is because it is advantageous to manage runoff with localized retention basins that have contributing areas less than 100 acres. When contributing areas become larger than 100 acres, the County requires the use of the 100-year, 24-hour storm for design rather than the 50-year, 1-hour storm. Storage systems that are required to manage the 100-year, 24-hour storm runoff can end up being three times as large as those that manage the 50-year, 1-hour storm runoff. In addition to larger storage systems, a combined or centralized approach would require the storm drain conveyance systems to also be significantly larger to carry the increased flow rates. Using a decentralized approach will lead to cost savings by using smaller drainage infrastructure, smaller storage systems, and less developable land.

One non-infrastructure item the Pūlehuui Regional Projects may want to collaborate on is the deficient condition of HC&S Reservoir 90, mauka of the DLNR Industrial and Business Park site. A number of deficiencies in the dam have been identified by the State Dam Safety Program and the dam poses a potential risk to all makai properties. It is recommended that DLNR, DHHL, PSD, and other stakeholders work with and/or negotiate with HC&S to further assess the dam and make the required repairs and upgrades.

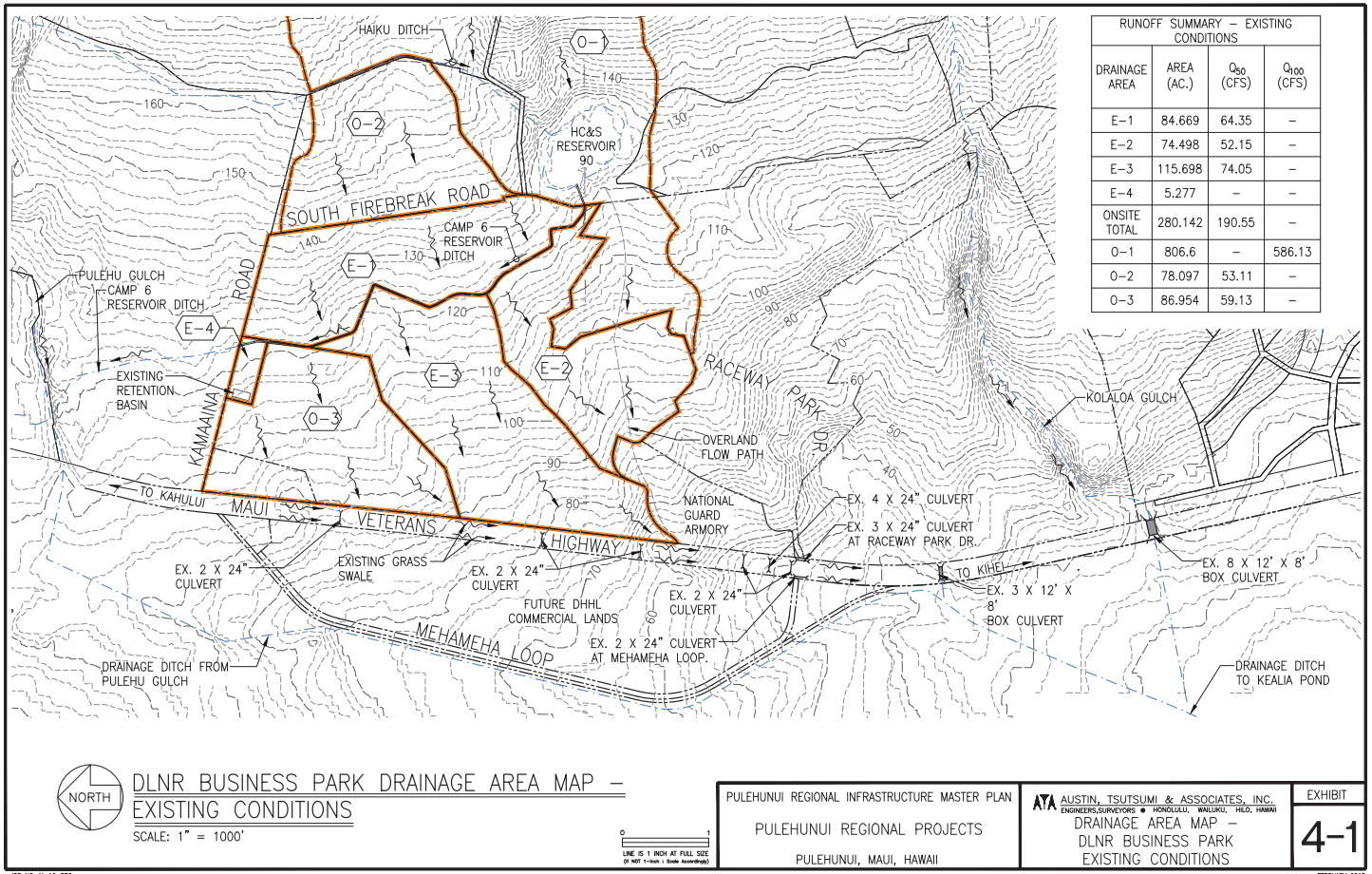
Another item that the Pūlehuui Regional Projects may wish to collaborate on is earthwork. Grading plans have not been developed at this time, but it is possible that some projects may have excess cut, while others may require fill material. During the construction plan development process it is recommended that the projects assess overall earthwork requirements to see if sharing material can provide any cost savings.

CHAPTER 4

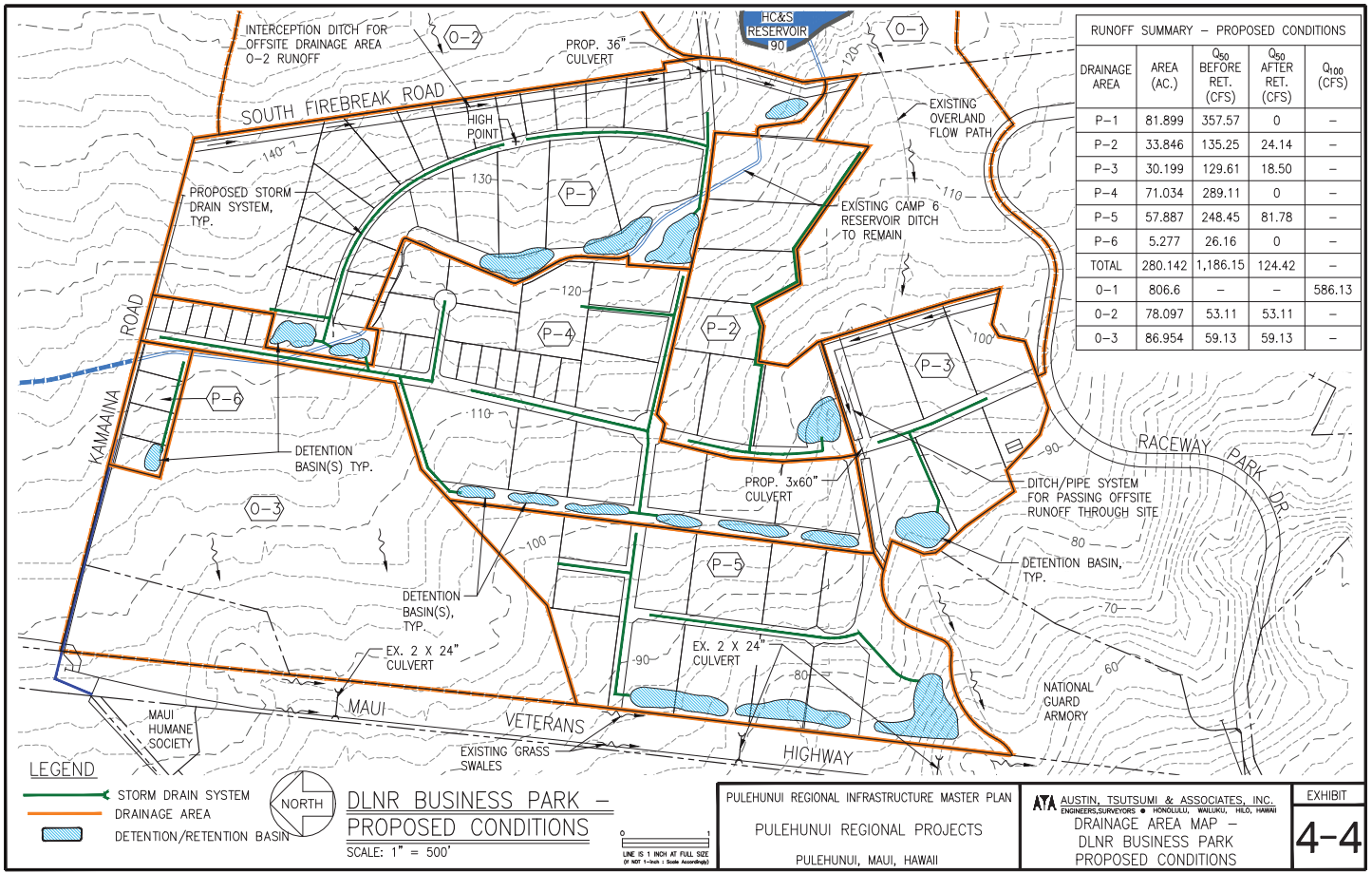
DRAINAGE EXHIBITS



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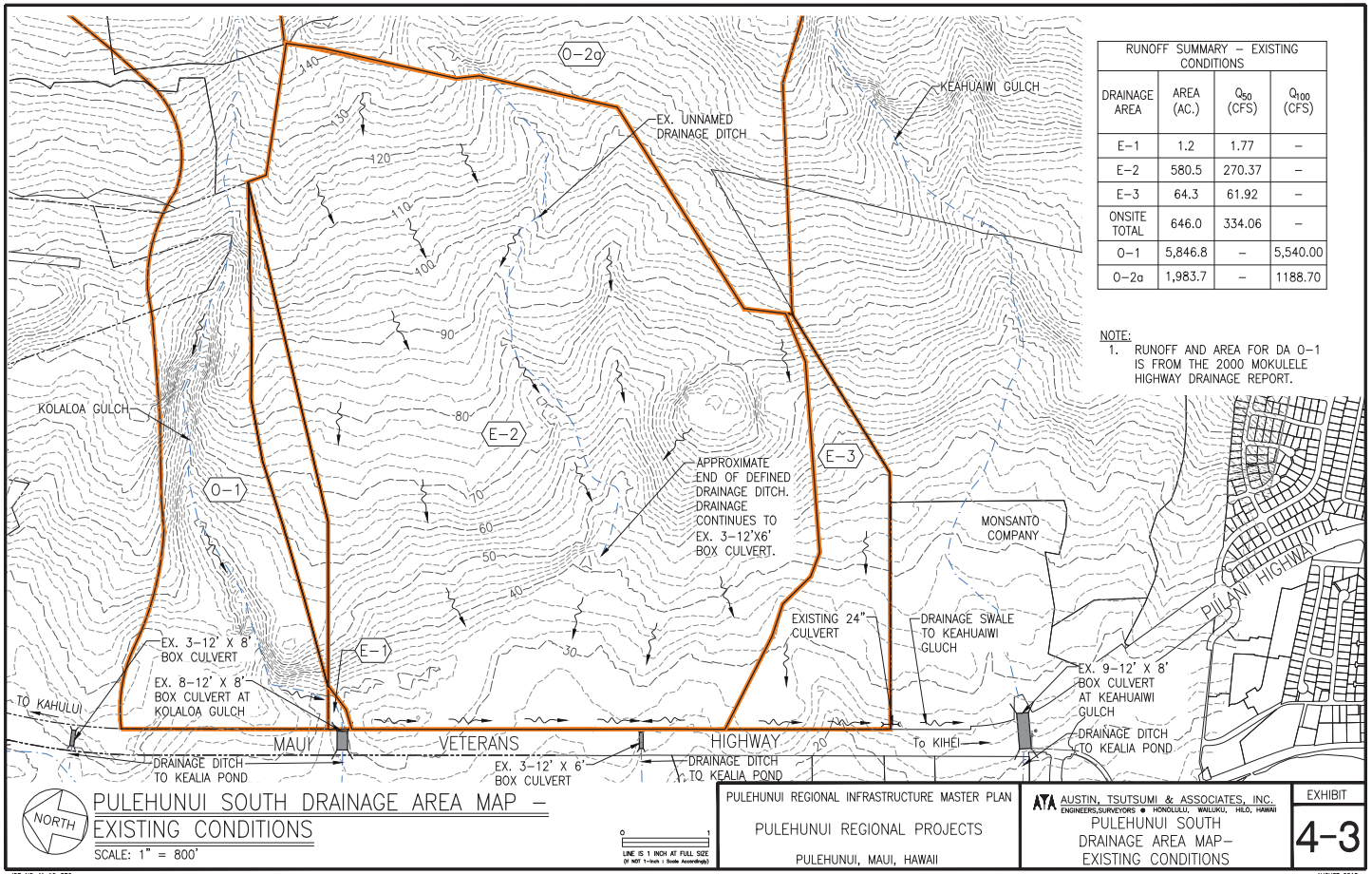


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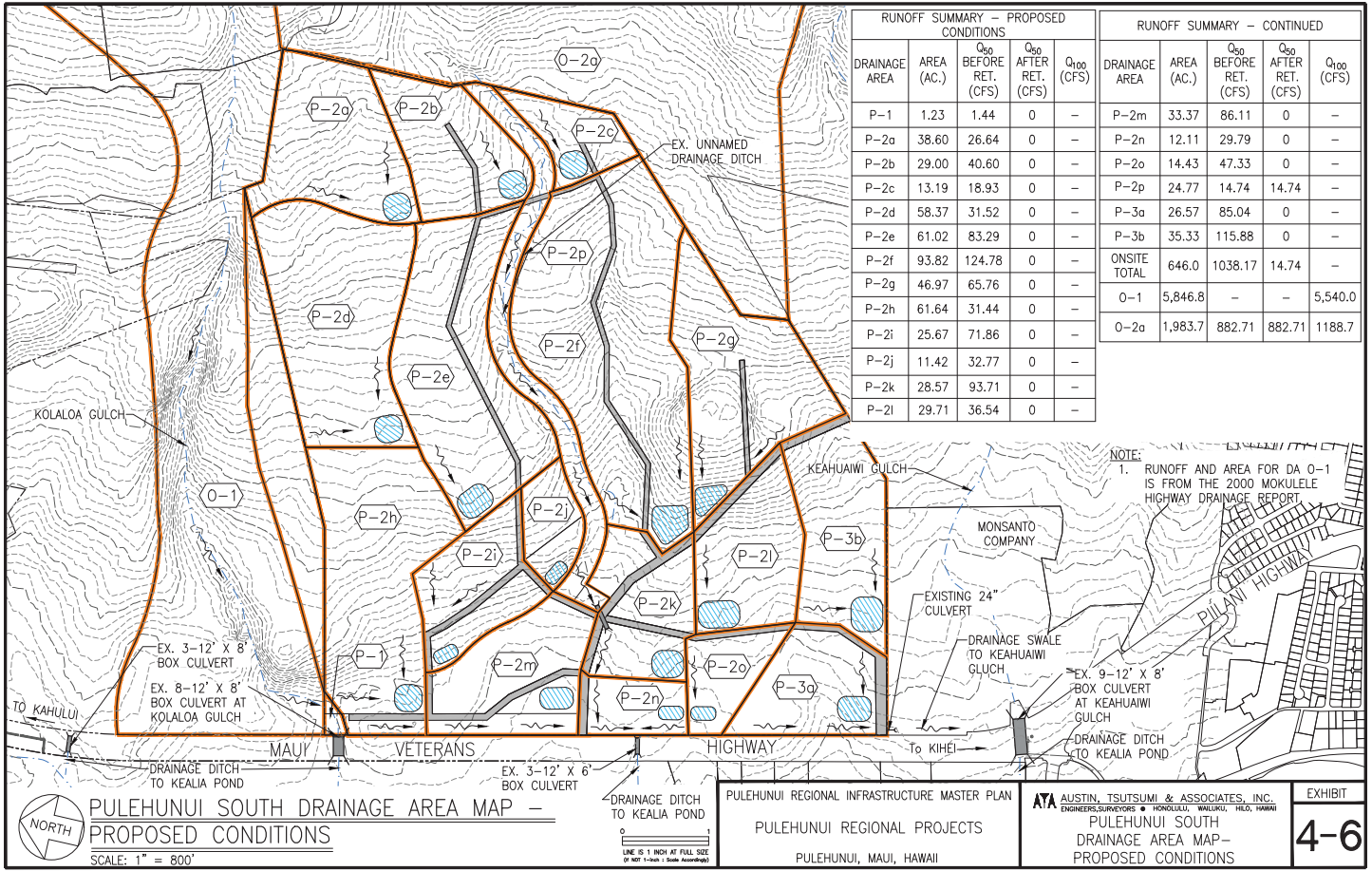
DLNR BUSINESS PARK - PROPOSED CONDITIONS
 SCALE: 1" = 500'
 PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
 PULEHUNUI REGIONAL PROJECTS
 PULEHUNUI, MAUI, HAWAII
 ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
 ENGINEERS/SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII
 EXHIBIT 4-4
 FEBRUARY 2018

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PULEHUNUI SOUTH DRAINAGE AREA MAP - EXISTING CONDITIONS
 SCALE: 1" = 800'
 PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
 PULEHUNUI REGIONAL PROJECTS
 PULEHUNUI, MAUI, HAWAII
 ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
 ENGINEERS/SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII
 EXHIBIT 4-3
 AUGUST 2018

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| RUNOFF SUMMARY - PROPOSED CONDITIONS | | | | |
|--------------------------------------|------------|-----------------------------------|----------------------------------|------------------------|
| DRAINAGE AREA | AREA (AC.) | Q ₅₀ BEFORE RET. (CFS) | Q ₅₀ AFTER RET. (CFS) | Q ₁₀₀ (CFS) |
| P-1 | 1.23 | 1.44 | 0 | - |
| P-2a | 38.60 | 26.64 | 0 | - |
| P-2b | 29.00 | 40.60 | 0 | - |
| P-2c | 13.19 | 18.93 | 0 | - |
| P-2d | 58.37 | 31.52 | 0 | - |
| P-2e | 61.02 | 83.29 | 0 | - |
| P-2f | 93.82 | 124.78 | 0 | - |
| P-2g | 46.97 | 65.76 | 0 | - |
| P-2h | 61.64 | 31.44 | 0 | - |
| P-2i | 25.67 | 71.86 | 0 | - |
| P-2j | 11.42 | 32.77 | 0 | - |
| P-2k | 28.57 | 93.71 | 0 | - |
| P-2l | 29.71 | 36.54 | 0 | - |

| RUNOFF SUMMARY - CONTINUED | | | | |
|----------------------------|------------|-----------------------------------|----------------------------------|------------------------|
| DRAINAGE AREA | AREA (AC.) | Q ₅₀ BEFORE RET. (CFS) | Q ₅₀ AFTER RET. (CFS) | Q ₁₀₀ (CFS) |
| P-2m | 33.37 | 86.11 | 0 | - |
| P-2n | 12.11 | 29.79 | 0 | - |
| P-2o | 14.43 | 47.33 | 0 | - |
| P-2p | 24.77 | 14.74 | 14.74 | - |
| P-3a | 26.57 | 85.04 | 0 | - |
| P-3b | 35.33 | 115.88 | 0 | - |
| ONSITE TOTAL | 646.0 | 1038.17 | 14.74 | - |
| 0-1 | 5,846.8 | - | - | 5,540.0 |
| 0-2a | 1,983.7 | 882.71 | 882.71 | 1188.7 |

NOTE:
1. RUNOFF AND AREA FOR DA 0-1 IS FROM THE 2000 MOKULELE HIGHWAY DRAINAGE REPORT



PULEHUNUI SOUTH DRAINAGE AREA MAP - PROPOSED CONDITIONS
SCALE: 1" = 800'

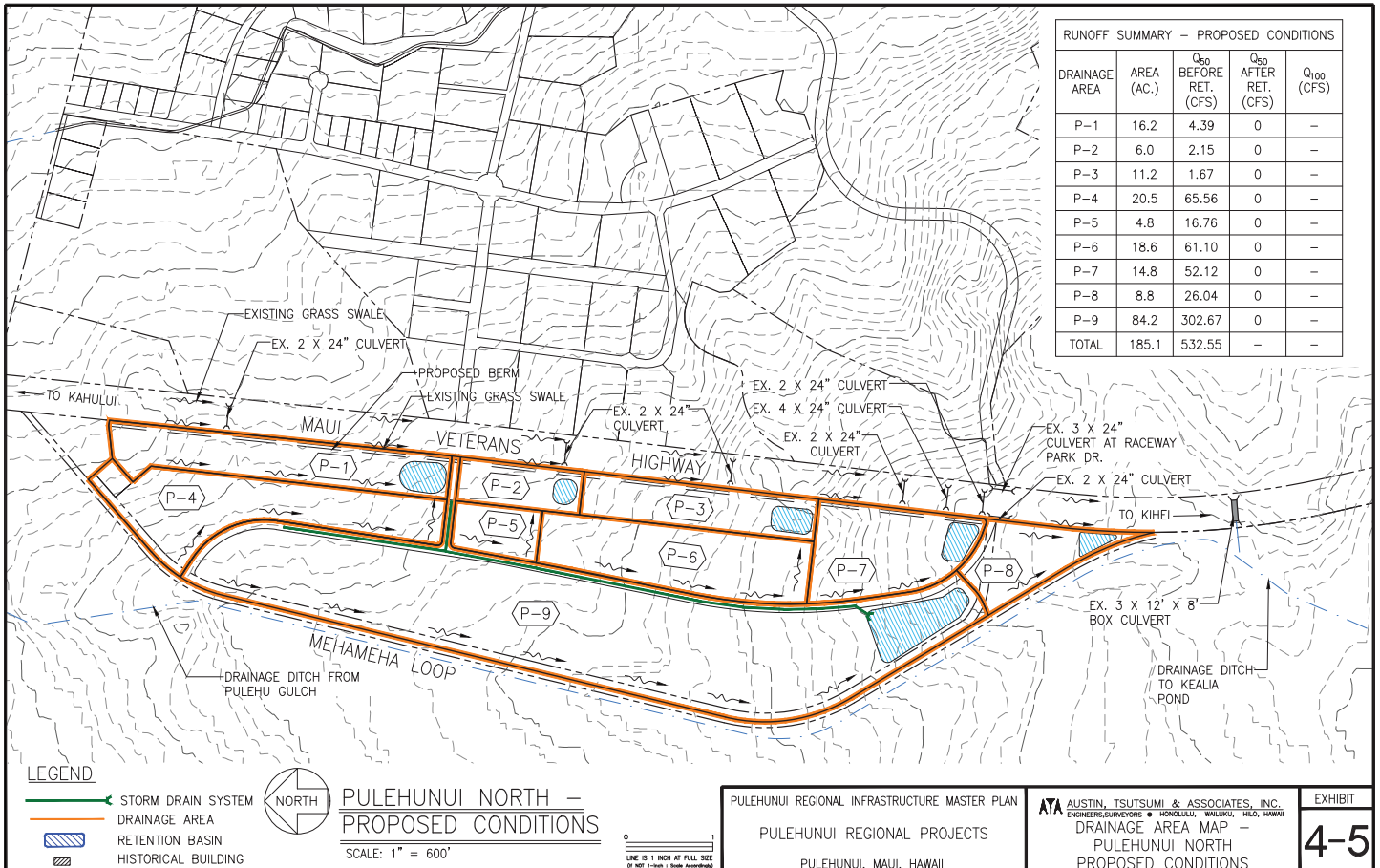


PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

EXHIBIT
4-6

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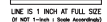
| RUNOFF SUMMARY - PROPOSED CONDITIONS | | | | |
|--------------------------------------|------------|-----------------------------------|----------------------------------|------------------------|
| DRAINAGE AREA | AREA (AC.) | Q ₅₀ BEFORE RET. (CFS) | Q ₅₀ AFTER RET. (CFS) | Q ₁₀₀ (CFS) |
| P-1 | 16.2 | 4.39 | 0 | - |
| P-2 | 6.0 | 2.15 | 0 | - |
| P-3 | 11.2 | 1.67 | 0 | - |
| P-4 | 20.5 | 65.56 | 0 | - |
| P-5 | 4.8 | 16.76 | 0 | - |
| P-6 | 18.6 | 61.10 | 0 | - |
| P-7 | 14.8 | 52.12 | 0 | - |
| P-8 | 8.8 | 26.04 | 0 | - |
| P-9 | 84.2 | 302.67 | 0 | - |
| TOTAL | 185.1 | 532.55 | - | - |

LEGEND

- STORM DRAIN SYSTEM
- DRAINAGE AREA
- RETENTION BASIN
- HISTORICAL BUILDING



PULEHUNUI NORTH - PROPOSED CONDITIONS
SCALE: 1" = 600'

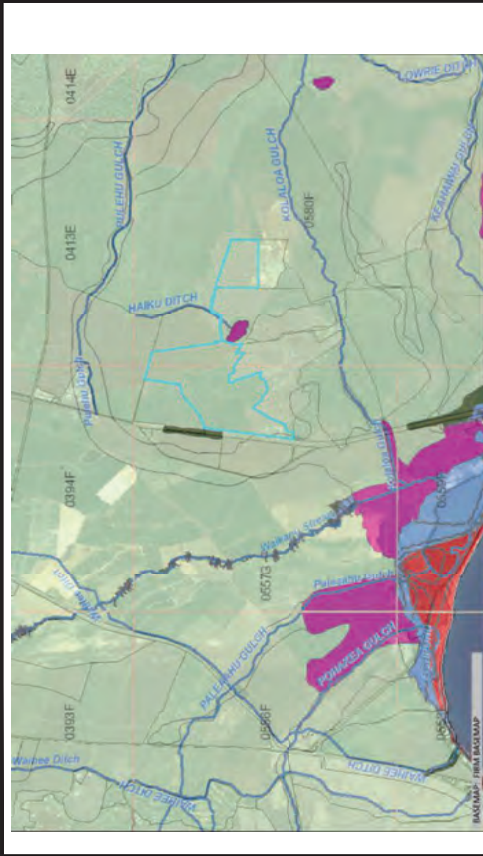


PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

EXHIBIT
4-5

JOB NO. M-16-076
FILENAME: Z:\2016\16-076\ENGINEERING\REPORTS\PER\REGIONAL\EXHIBITS\EXHIBIT 4-5 PN PROPOSED CONDITIONS.DWG Aug 14, 2018-10:42 AM



Flood Hazard Assessment Report

www.hawaiiifip.org

SPECIAL FLOOD HAZARD AREAS (SFHA) SUBJECT TO INUNDATION BY Floods beyond base flood elevation with a 1% annual chance flood (1% ACF). Areas shown on this map are shown in Zone A, AE, AH, X, X1, or X2. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

| | |
|---|--|
|  | Zone A: No BFE determined. |
|  | Zone AE: BFE determined. |
|  | Zone VE: Coastal flood zone with velocity hazard (wave action). |
|  | Zone V: Coastal flood zone with velocity hazard (wave action). |
|  | Zone X1: Flood depths of 1 to 3 feet (usually areas of ponding). |
|  | Zone X2: Flood depths of 1 to 3 feet (usually areas of ponding). |

Notes:

NOVEMBER 04, 2015
NONE
130000057G - SEPTEMBER 13, 2013

Property Information

COUNTY: MAUI
TIME NO: C11-4-08201
WATERSHED: WAIKES
PARCEL ADDRESS: 2701 MOULILELE HWY
KALI, HI 96753

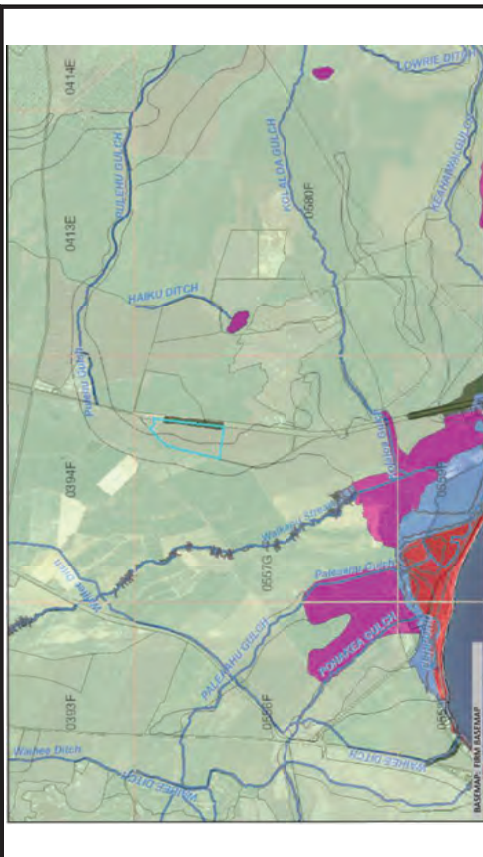
Flood Hazard Information

FORM INDEX DATE: NOVEMBER 04, 2015
LETTER OF MAP CHANGE: NONE
FORM PANEL: 130000057G - SEPTEMBER 13, 2013
PANEL EFFECTIVE DATE: NOVEMBER 04, 2015

THIS PROPERTY IS WITHIN A TSUNAMI HAZARDOUS ZONE: **NO**
FOR MORE INFO, VISIT: <http://www.scd.hawaii.gov/>
THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: **YES (MA-0386; MA-0390)**
FOR MORE INFO, VISIT: <http://fileeng.hawaii.gov/dam/>

 0 0.60 1.20 mi

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility for the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for their own safety and liability. This information is intended for informational purposes only and does not constitute an offer of insurance. If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determination to be used for compliance with local floodplain management regulations.



Flood Hazard Assessment Report

www.hawaiiifip.org

SPECIAL FLOOD HAZARD AREAS (SFHA) SUBJECT TO INUNDATION BY Floods beyond base flood elevation with a 1% annual chance flood (1% ACF). Areas shown on this map are shown in Zone A, AE, AH, X, X1, or X2. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

| | |
|---|--|
|  | Zone A: No BFE determined. |
|  | Zone AE: BFE determined. |
|  | Zone VE: Coastal flood zone with velocity hazard (wave action). |
|  | Zone V: Coastal flood zone with velocity hazard (wave action). |
|  | Zone X1: Flood depths of 1 to 3 feet (usually areas of ponding). |
|  | Zone X2: Flood depths of 1 to 3 feet (usually areas of ponding). |

Notes:

NOVEMBER 04, 2015
NONE
130000057G
NOVEMBER 04, 2015

Property Information

COUNTY: MAUI
TIME NO: C11-4-08201
WATERSHED: WAIKES
PARCEL ADDRESS: 2701 MOULILELE HWY
KALI, HI 96753

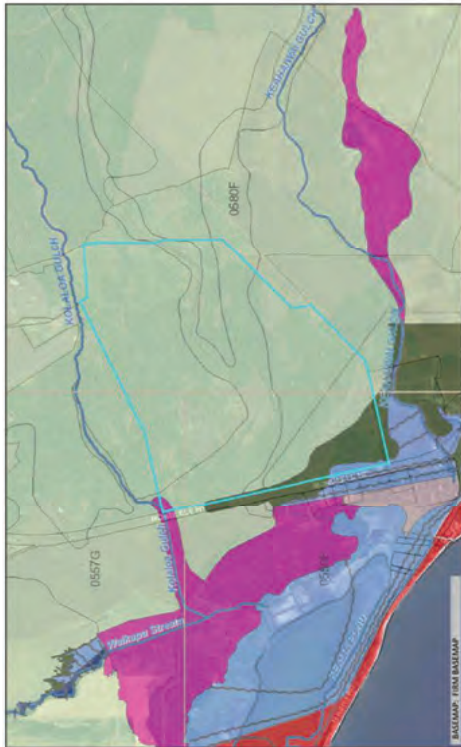
Flood Hazard Information

FORM INDEX DATE: NOVEMBER 04, 2015
LETTER OF MAP CHANGE: NONE
FORM PANEL: 130000057G
PANEL EFFECTIVE DATE: NOVEMBER 04, 2015

THIS PROPERTY IS WITHIN A TSUNAMI HAZARDOUS ZONE: **NO**
FOR MORE INFO, VISIT: <http://www.scd.hawaii.gov/>
THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: **YES (MA-0386; MA-0390)**
FOR MORE INFO, VISIT: <http://fileeng.hawaii.gov/dam/>

 0 0.60 1.20 mi

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility for the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for their own safety and liability. This information is intended for informational purposes only and does not constitute an offer of insurance. If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determination to be used for compliance with local floodplain management regulations.



Flood Hazard Assessment Report

www.hawaiiinfo.org

Property Information

COUNTY: MAUI
 TAX ID: 1-8-00000-0000
 WATERSHED: WAIKOLOA
 PARCEL ADDRESS: SHAKULUKE HWY
 PINEL N 36753

Flood Hazard Information

FIRM (INDICATE): NOVEMBER 04, 2015
 LETTER OF MAP CHANGES: NONE
 FIRM (INDICATE): NOVEMBER 04, 2015
 LETTER OF MAP CHANGES: NONE
 FIRM (INDICATE): NOVEMBER 04, 2015
 LETTER OF MAP CHANGES: NONE

Notes:

THIS PROPERTY IS WITHIN A TSUNAMI EVACUATION ZONE: NO
 FOR MORE INFO, VISIT: <http://www.sos.hawaii.gov>
 THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: YES (MA-0087, MA-0089)
 FOR MORE INFO, VISIT: <http://dmr.hawaii.gov/dam/>

Legend:

SPECIAL FLOOD HAZARD AREAS (SFHA) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD: The 1% annual chance flood (100-year return period) is the most frequent flood that is expected to be equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and XE. The Base Flood Elevation (BFE) is the water surface elevation that is expected to be equaled or exceeded by a flood of a given return period. Mandatory flood insurance purchase applies in these areas:

- Zone A: No BFE determined.
- Zone AE: BFE determined.
- Zone AH: Flood depths of 1 to 3 feet (usually areas of ponding). BFE determined.
- Zone AO: Flood depths of 3 to 6 feet (usually areas of ponding on rising terrain). Average depth determined.
- Zone V: Coastal flood zone with velocity hazard (wave action). BFE determined.
- Zone XE: Coastal flood zone with velocity hazard (wave action). BFE determined.
- Zone A99: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in pink.
- Zone A98: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in light green.
- Zone A97: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium green.
- Zone A96: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in dark green.
- Zone A95: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest green.
- Zone A94: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest green.
- Zone A93: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest yellow-green.
- Zone A92: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium yellow-green.
- Zone A91: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest yellow-green.
- Zone A90: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest yellow.
- Zone A89: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium yellow.
- Zone A88: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest yellow.
- Zone A87: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest orange.
- Zone A86: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium orange.
- Zone A85: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest orange.
- Zone A84: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest red.
- Zone A83: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium red.
- Zone A82: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest red.
- Zone A81: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest pink.
- Zone A80: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium pink.
- Zone A79: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest pink.
- Zone A78: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest purple.
- Zone A77: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium purple.
- Zone A76: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest purple.
- Zone A75: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest blue.
- Zone A74: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium blue.
- Zone A73: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest blue.
- Zone A72: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in lightest green.
- Zone A71: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in medium green.
- Zone A70: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodway areas that must be flooded to prevent the water surface elevation from exceeding the BFE. Floodway areas are shown in darkest green.

OTHER FLOOD AREAS

- Zone D: Unstable areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase applies, but coverage is available in participating communities.

Scale: 0 to 0.50 mi

CHAPTER 5

PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATE

**PULEHUNUI REGIONAL PROJECTS
PRELIMINARY COST ESTIMATE**

WATER SYSTEM ALTERNATIVE 1 - CONNECTION TO DWS SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|------------------------------|--|-----------|------|---------------|----------------------|
| DLNR BUSINESS PARK | | | | | |
| 1-1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 16,400 | LF | \$ 300 | \$ 4,920,000 |
| 1-2 | Fire Hydrant Assembly w/ Conc. Slab | 47 | EA | \$ 7,000 | \$ 329,000 |
| | SUBTOTAL | | | | \$ 5,249,000 |
| PULEHUNUI NORTH | | | | | |
| 1-3 | 12" D.I. Waterline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 1-4 | Fire Hydrant Assembly w/ Conc. Slab | 18 | EA | \$ 7,000 | \$ 126,000 |
| | SUBTOTAL | | | | \$ 2,016,000 |
| PULEHUNUI SOUTH | | | | | |
| 1-5 | 12" D.I. Waterline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 1-6 | Fire Hydrant Assembly w/ Conc. Slab | 63 | EA | \$ 7,000 | \$ 441,000 |
| | SUBTOTAL | | | | \$ 6,981,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 1-7 | 12" Transmission Potable Waterline (South) | 5,000 | LF | \$ 300 | \$ 1,500,000 |
| 1-8 | 12" Transmission Potable Waterline (North) | 250 | LF | \$ 375 | \$ 93,750 |
| 1-9 | 12" Transmission Potable Waterline (DLNR, North, South, PSD, MRP) | 2,300 | LF | \$ 300 | \$ 690,000 |
| 1-10 | 12" Transmission Potable Waterline (North, South, PSD, MRP) | 1,500 | LF | \$ 300 | \$ 450,000 |
| 1-11 | Connection to 36" CMWTS | 1 | LS | \$ 50,000 | \$ 50,000 |
| 1-12 | Off-Site Water Tank | 1 | LS | \$ 10,000,000 | \$ 10,000,000 |
| | SUBTOTAL | | | | \$ 12,784,000 |
| | TOTAL FOR WATER SYSTEM - ALTERNATIVE 1 | | | | \$ 27,030,000 |
| | TOTAL FOR WATER SYSTEM (WITH 75% CONTINGENCY) - ALTERNATIVE 1 | | | | \$ 31,085,000 |

Notes:

- 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
- 2 ASSUMES TANK LOCATED AT CMWTS SITE.
- 3 DOES NOT INCLUDE LAND ACQUISITION FOR TANK SITE.

CHAPTER 5 – PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATE

5.1 GENERAL

To provide a cost-effective overall solution to the shareholders of the Pulehunui Regional Project and surrounding neighbors, five alternatives were considered to provide a potable water source and ten alternatives were considered for wastewater disposal/treatment. Preliminary capital construction costs for both water and wastewater were pro-rated to each shareholder. The preliminary results from this analysis are considered order-of-magnitude cost estimates for planning purposes only, they are provided in the following tables. Not included were other opportunities for cost-sharing, such as improvements to Maui Veterans Highway to mitigate any increases traffic that might be attributable to one or more of the shareholders.

PULEHUNUI REGIONAL PROJECTS
PRELIMINARY COST ESTIMATE

WATER SYSTEM ALTERNATIVE 2A - DLNR SURFACE WATER TREATMENT SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|---|-----------|------|---------------|----------------------|
| DLNR BUSINESS PARK | | | | | |
| 2-1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 12,300 | LF | \$ 300 | \$ 3,690,000 |
| 2-2 | 12" D.I. Fireline, Class 52 w/ Polywrap | 12,300 | LF | \$ 300 | \$ 3,690,000 |
| 2-3 | Fire Hydrant Assembly w/ Conc. Slab | 36 | EA | \$ 7,000 | \$ 252,000 |
| | SUBTOTAL | | | | \$ 7,632,000 |
| PULEHUNUI NORTH | | | | | |
| 2-4 | 12" D.I. Waterline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 2-5 | 12" D.I. Fireline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 2-6 | Fire Hydrant Assembly w/ Conc. Slab | 18 | EA | \$ 7,000 | \$ 126,000 |
| | SUBTOTAL | | | | \$ 3,906,000 |
| PULEHUNUI SOUTH | | | | | |
| 2-7 | 12" D.I. Waterline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 2-8 | 12" D.I. Fireline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 2-9 | Fire Hydrant Assembly w/ Conc. Slab | 63 | EA | \$ 7,000 | \$ 441,000 |
| | SUBTOTAL | | | | \$ 13,521,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 2-10 | 12" Transmission Potable Waterline and Fireline (South) | 5,000 | LF | \$ 600 | \$ 3,000,000 |
| 2-11 | 12" Transmission Potable Waterline and Fireline (North) | 250 | LF | \$ 750 | \$ 187,500 |
| 2-12 | 12" Transmission Potable Waterline and Fireline (DLNR, North, PSD, MRP) | 2,200 | LF | \$ 600 | \$ 1,320,000 |
| 2-13 | 12" Transmission Potable Waterline and Fireline (South, PSD, MRP) | 3,800 | LF | \$ 600 | \$ 2,280,000 |
| | SUBTOTAL | | | | \$ 6,788,000 |
| SURFACE WATER TREATMENT SYSTEM | | | | | |
| 2-14 | Water Treatment System, including raw water reservoir and Surface Water Treatment Facility. | 1 | LS | \$ 15,000,000 | \$ 15,000,000 |
| 2-15 | 8" PVC C900 Raw Waterline | 5,500 | LF | \$ 250 | \$ 1,375,000 |
| | SUBTOTAL | | | | \$ 16,375,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2A | | | | | \$ 48,222,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2A | | | | | \$ 55,456,000 |

Notes:

- 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
- 2 DOES NOT INCLUDE MONTHLY MAINTENANCE AND POWER COSTS FOR WATER TREATMENT FACILITY.
- 3 DOES NOT CONSIDER LAND VALUE AT DLNR SITE.

PULEHUNUI REGIONAL PROJECTS
PRELIMINARY COST ESTIMATE

WATER SYSTEM ALTERNATIVE 2B - DHHL SURFACE WATER TREATMENT SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|---|-----------|------|---------------|----------------------|
| DLNR BUSINESS PARK | | | | | |
| 3-1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 16,400 | LF | \$ 300 | \$ 4,920,000 |
| 3-2 | 12" D.I. Fireline, Class 52 w/ Polywrap | 16,400 | LF | \$ 300 | \$ 4,920,000 |
| 3-3 | Fire Hydrant Assembly w/ Conc. Slab | 47 | EA | \$ 7,000 | \$ 329,000 |
| | SUBTOTAL | | | | \$ 10,169,000 |
| PULEHUNUI NORTH | | | | | |
| 3-4 | 12" D.I. Waterline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 3-5 | 12" D.I. Fireline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 3-6 | Fire Hydrant Assembly w/ Conc. Slab | 18 | EA | \$ 7,000 | \$ 126,000 |
| | SUBTOTAL | | | | \$ 3,906,000 |
| PULEHUNUI SOUTH | | | | | |
| 3-7 | 12" D.I. Waterline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 3-8 | 12" D.I. Fireline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 3-9 | Fire Hydrant Assembly w/ Conc. Slab | 63 | EA | \$ 7,000 | \$ 441,000 |
| | SUBTOTAL | | | | \$ 13,521,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 3-10 | 12" Transmission Potable Waterline and Fireline (DLNR, North, South, PSD, MRP) | 7,200 | LF | \$ 600 | \$ 4,320,000 |
| 3-11 | 12" Transmission Potable Waterline and Fireline (DLNR, North, PSD, MRP) | 5,000 | LF | \$ 600 | \$ 3,000,000 |
| 3-12 | 12" Transmission Potable Waterline and Fireline (DLNR, North) | 3,800 | LF | \$ 600 | \$ 2,280,000 |
| 3-13 | 12" Transmission Potable Waterline and Fireline (North) | 250 | LF | \$ 750 | \$ 187,500 |
| | SUBTOTAL | | | | \$ 9,788,000 |
| SURFACE WATER TREATMENT SYSTEM | | | | | |
| 3-14 | Water Treatment System, including raw water reservoir and Surface Water Treatment Facility. | 1 | LS | \$ 17,500,000 | \$ 17,500,000 |
| 3-15 | 8" PVC C900 Raw Waterline | 6,600 | LF | \$ 250 | \$ 1,650,000 |
| | SUBTOTAL | | | | \$ 19,150,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2B | | | | | \$ 56,534,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2B | | | | | \$ 65,015,000 |

Notes:

- 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
- 2 DOES NOT INCLUDE MONTHLY MAINTENANCE AND POWER COSTS FOR WATER TREATMENT FACILITY.
- 3 DOES NOT CONSIDER LAND VALUE AT DHHL SITE.

PULEHUNUI REGIONAL PROJECTS
PRELIMINARY COST ESTIMATE

WATER SYSTEM ALTERNATIVE 3A - DLNR BRACKISH WATER TREATMENT SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|--|-----------|------|---------------|----------------------|
| DLNR BUSINESS PARK | | | | | |
| 4-1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 12,000 | LF | \$ 300 | \$ 3,600,000 |
| 4-2 | 12" D.I. Fireline, Class 52 w/ Polywrap | 12,000 | LF | \$ 300 | \$ 3,600,000 |
| 4-3 | Fire Hydrant Assembly w/ Conc. Slab | 35 | EA | \$ 7,000 | \$ 245,000 |
| | SUBTOTAL | | | | \$ 7,445,000 |
| PULEHUNUI NORTH | | | | | |
| 4-4 | 12" D.I. Waterline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 4-5 | 12" D.I. Fireline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 4-6 | Fire Hydrant Assembly w/ Conc. Slab | 18 | EA | \$ 7,000 | \$ 126,000 |
| | SUBTOTAL | | | | \$ 3,906,000 |
| PULEHUNUI SOUTH | | | | | |
| 4-7 | 12" D.I. Waterline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 4-8 | 12" D.I. Fireline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 4-9 | Fire Hydrant Assembly w/ Conc. Slab | 63 | EA | \$ 7,000 | \$ 441,000 |
| | SUBTOTAL | | | | \$ 13,521,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 4-10 | 12" Transmission Potable Waterline and Fireline (DLNR, North, South, PSD, MRP) | 4,400 | LF | \$ 600 | \$ 2,640,000 |
| 4-11 | 12" Transmission Potable Waterline and Fireline (North, South, PSD, MRP) | 250 | LF | \$ 600 | \$ 150,000 |
| 4-12 | 12" Transmission Potable Waterline and Fireline (South, PSD, MRP) | 3,800 | LF | \$ 600 | \$ 2,280,000 |
| 4-13 | 12" Transmission Potable Waterline and Fireline (North) | 250 | LF | \$ 750 | \$ 187,500 |
| 4-14 | 12" Transmission Potable Waterline and Fireline (South) | 5,000 | LF | \$ 600 | \$ 3,000,000 |
| | SUBTOTAL | | | | \$ 8,258,000 |
| BRACKISH WATER TREATMENT SYSTEM | | | | | |
| 4-15 | Reverse Osmosis Water Treatment Plant | 1 | LS | \$ 10,000,000 | \$ 10,000,000 |
| 4-16 | 12" PVC Brackish Water Transmission Line | 1,800 | LF | \$ 300 | \$ 540,000 |
| 4-17 | 6" PVC RO Concentrate Line | 2,500 | LF | \$ 250 | \$ 625,000 |
| | SUBTOTAL | | | | \$ 11,165,000 |
| TOTAL FOR WATER SYSTEM - ALTERNATIVE 3A | | | | | \$ 44,295,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 3A | | | | | \$ 50,940,000 |

Notes:
 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
 2 DOES NOT INCLUDE MONTHLY MAINTENANCE AND POWER COSTS FOR WATER TREATMENT FACILITY.
 3 DOES NOT CONSIDER LAND VALUE AT DLNR SITE.

PULEHUNUI REGIONAL PROJECTS
PRELIMINARY COST ESTIMATE

WATER SYSTEM ALTERNATIVE 3B - DHHL BRACKISH WATER TREATMENT SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|--|-----------|------|---------------|----------------------|
| DLNR BUSINESS PARK | | | | | |
| 5-1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 16,400 | LF | \$ 300 | \$ 4,920,000 |
| 5-2 | 12" D.I. Fireline, Class 52 w/ Polywrap | 16,400 | LF | \$ 300 | \$ 4,920,000 |
| 5-3 | Fire Hydrant Assembly w/ Conc. Slab | 47 | EA | \$ 7,000 | \$ 329,000 |
| | SUBTOTAL | | | | \$ 10,169,000 |
| PULEHUNUI NORTH | | | | | |
| 5-4 | 12" D.I. Waterline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 5-5 | 12" D.I. Fireline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 5-6 | Fire Hydrant Assembly w/ Conc. Slab | 18 | EA | \$ 7,000 | \$ 126,000 |
| | SUBTOTAL | | | | \$ 3,906,000 |
| PULEHUNUI SOUTH | | | | | |
| 5-7 | 12" D.I. Waterline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 5-8 | 12" D.I. Fireline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 5-9 | Fire Hydrant Assembly w/ Conc. Slab | 63 | EA | \$ 7,000 | \$ 441,000 |
| | SUBTOTAL | | | | \$ 13,521,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 5-10 | 12" Transmission Potable Waterline and Fireline (DLNR, North, South, PSD, MRP) | 7,200 | LF | \$ 600 | \$ 4,320,000 |
| 5-11 | 12" Transmission Potable Waterline and Fireline (DLNR, North, PSD, MRP) | 5,000 | LF | \$ 600 | \$ 3,000,000 |
| 5-12 | 12" Transmission Potable Waterline and Fireline (DLNR, North) | 3,800 | LF | \$ 600 | \$ 2,280,000 |
| 5-13 | 12" Transmission Potable Waterline and Fireline (North) | 250 | LF | \$ 750 | \$ 187,500 |
| 5-14 | 12" Transmission Potable Waterline and Fireline (DLNR) | 250 | LF | \$ 600 | \$ 150,000 |
| | SUBTOTAL | | | | \$ 9,938,000 |
| BRACKISH WATER TREATMENT SYSTEM | | | | | |
| 5-15 | Reverse Osmosis Water Treatment Plant | 1 | LS | \$ 10,000,000 | \$ 10,000,000 |
| 5-16 | 12" PVC Brackish Water Transmission Line | 2,000 | LF | \$ 300 | \$ 600,000 |
| 5-17 | 6" PVC RO Concentrate Line | 2,700 | LF | \$ 250 | \$ 675,000 |
| | SUBTOTAL | | | | \$ 11,275,000 |
| TOTAL FOR WATER SYSTEM - ALTERNATIVE 3B | | | | | \$ 48,809,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 3B | | | | | \$ 56,131,000 |

Notes:
 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
 2 DOES NOT INCLUDE MONTHLY MAINTENANCE COSTS.
 3 DOES NOT INCLUDE MONTHLY MAINTENANCE AND POWER COSTS FOR WATER TREATMENT FACILITY.
 4 DOES NOT CONSIDER LAND VALUE ON DHHL PROPERTY.

PULEHUNUI REGIONAL PROJECT
PRELIMINARY OPINION OF PROBABLE COST
WASTE WATER SYSTEM ALTERNATE 1A

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|---|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 1A-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 1A-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 1A-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 1A-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 1A-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 1A-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 1A-7 | Reclaimed waterline from Kihei WWRF system | 23,200 | LF | \$ 300 | \$ 6,960,000 |
| | SUBTOTAL | | | | \$ 9,761,000 |
| WASTEWATER PUMP SYSTEM (Shareholders) | | | | | |
| 1A-8 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 1A-9 | Pump Station No. 1 on DHHL Property North | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 1A-10 | Pump Station No. 2 on DHHL Property South | 1 | LS | \$ 3,800,000 | \$ 3,800,000 |
| 1A-11 | Force main from PS No. 1 to PS No. 2 | 6,200 | LF | \$ 300 | \$ 1,860,000 |
| 1A-12 | Force main from PS No. 2 to County sewer system | 7,200 | LF | \$ 300 | \$ 2,160,000 |
| 1A-13 | Modification to Kihei PS 2 | 1 | LS | \$ 330,000 | \$ 330,000 |
| | SUBTOTAL | | | | \$ 11,850,000 |
| TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 1A \$ 29,937,000 | | | | | |
| TOTAL FOR WASTERWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 1A \$ 34,428,000 | | | | | |

PULEHUNUI REGIONAL PROJECT
PRELIMINARY OPINION OF PROBABLE COST
WASTE WATER SYSTEM ALTERNATE 1B

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|---|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 1B-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 1B-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 1B-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 1B-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 1B-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 1B-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 1B-7 | Reclaimed waterline from Kihei WWRF system | 23,200 | LF | \$ 300 | \$ 6,960,000 |
| | SUBTOTAL | | | | \$ 9,761,000 |
| WASTEWATER PUMP SYSTEM (Shareholders) | | | | | |
| 1B-8 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 1B-9 | Pump Station No. 1 on DHHL Property North | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 1B-10 | Pump Station No. 2 on DHHL Property South | 1 | LS | \$ 4,100,000 | \$ 4,100,000 |
| 1B-11 | Force main from PS No. 1 to PS No. 2 | 6,200 | LF | \$ 300 | \$ 1,860,000 |
| 1B-12 | Force main from PS No. 2 to County sewer system | 11,035 | LF | \$ 300 | \$ 3,310,500 |
| | SUBTOTAL | | | | \$ 12,971,000 |
| INTERIM WASTEWATER STORAGE RESERVOIR (Shareholders) | | | | | |
| 1B-13 | 600,000 gallon storage reservoir | 1 | LS | \$ 1,900,000 | \$ 1,900,000 |
| 1B-14 | Aeration equipment | 1 | LS | \$ 280,000 | \$ 280,000 |
| | SUBTOTAL | | | | \$ 2,180,000 |
| TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 1B \$ 33,238,000 | | | | | |
| TOTAL FOR WASTERWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 1B \$ 38,224,000 | | | | | |

PULEHUNUI REGIONAL PROJECT
 PRELIMINARY OPINION OF PROBABLE COST
 WASTE WATER SYSTEM ALTERNATE 2A

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|-------------------------------------|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 2A-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 2A-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 2A-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 2A-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 2A-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 2A-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 2A-7 | Submersible Pump Station | 1 | EA | \$ 520,000 | \$ 520,000 |
| 2A-8 | Forcemain | 3,900 | LF | \$ 260 | \$ 1,014,000 |
| | SUBTOTAL | | | | \$ 4,335,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (Shareholders) | | | | | |
| 2A-9 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 2A-10 | Pump Station on DHHL Property North | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 2A-11 | Force main from PS to WWTF | 6,500 | LF | \$ 300 | \$ 1,950,000 |
| 2A-12 | AC Road to WWTF | 4,900 | SY | \$ 48 | \$ 235,200 |
| 2A-13 | Clearing and Grubbing | 10.0 | AC | \$ 20,000 | \$ 200,000 |
| 2A-14 | Earthwork | 18,500 | CY | \$ 15 | \$ 277,500 |
| 2A-15 | Fencing | 2,800 | LF | \$ 22 | \$ 61,600 |
| 2A-16 | On-Site A.C. Pavement | 3,650 | SY | \$ 48 | \$ 175,200 |
| 2A-17 | Gravel Roads | 2,400 | SY | \$ 12 | \$ 28,800 |
| 2A-18 | Headworks | 1 | LS | \$ 1,480,000 | \$ 1,480,000 |
| 2A-19 | Equalization Tank/Pumps | 1 | LS | \$ 854,000 | \$ 854,000 |
| 2A-20 | MBR Tank/Equipment | 1 | LS | \$ 6,500,000 | \$ 6,500,000 |
| 2A-21 | Aerobic Digester | 1 | LS | \$ 720,000 | \$ 720,000 |
| 2A-22 | Dewatering Equipment | 1 | LS | \$ 520,000 | \$ 520,000 |
| 2A-23 | Disinfection UV | 1 | LS | \$ 680,000 | \$ 680,000 |
| 2A-24 | Office/lab/maintenance/MCC Bldg | 1 | LS | \$ 1,100,000 | \$ 1,100,000 |
| 2A-25 | Plant pump station | 1 | LS | \$ 360,000 | \$ 360,000 |
| 2A-26 | Emergency Generator | 1 | LS | \$ 780,000 | \$ 780,000 |
| 2A-27 | Electrical/SCADA | 1 | LS | \$ 1,400,000 | \$ 1,400,000 |
| 2A-28 | Irrigation reservoir/pumps | 1 | LS | \$ 810,000 | \$ 810,000 |
| 2A-29 | Landscaping | 1 | LS | \$ 300,000 | \$ 300,000 |
| 2A-30 | Potable waterline | 2,200 | LF | \$ 300 | \$ 660,000 |
| 2A-31 | Electrical/Communication to site | 2,200 | LF | \$ 120 | \$ 264,000 |
| | SUBTOTAL | | | | \$ 22,133,000 |
| TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 2A \$ 34,794,000 | | | | | |
| TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2A \$ 40,014,000 | | | | | |

PULEHUNUI REGIONAL PROJECT
 PRELIMINARY OPINION OF PROBABLE COST
 WASTE WATER SYSTEM ALTERNATE 2B

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|-------------------------------------|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 2B-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 2B-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 2B-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 2B-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 2B-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 2B-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 2B-7 | Submersible Pump Station | 1 | EA | \$ 580,000 | \$ 580,000 |
| 2B-8 | Forcemain | 6,200 | LF | \$ 260 | \$ 1,612,000 |
| | SUBTOTAL | | | | \$ 4,993,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (Shareholders) | | | | | |
| 2B-9 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 2B-10 | Pump Station on DHHL Property North | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 2B-11 | Force main from PS to WWTF | 3,645 | LF | \$ 300 | \$ 1,093,500 |
| 2B-12 | AC Road to WWTF | 0 | SY | \$ 48 | \$ - |
| 2B-13 | Clearing and Grubbing | 10.0 | AC | \$ 20,000 | \$ 200,000 |
| 2B-14 | Earthwork | 18,500 | CY | \$ 15 | \$ 277,500 |
| 2B-15 | Fencing | 2,800 | LF | \$ 22 | \$ 61,600 |
| 2B-16 | On-Site A.C. Pavement | 3,650 | SY | \$ 48 | \$ 175,200 |
| 2B-17 | Gravel Roads | 2,400 | SY | \$ 12 | \$ 28,800 |
| 2B-18 | Headworks | 1 | LS | \$ 1,480,000 | \$ 1,480,000 |
| 2B-19 | Equalization Tank/Pumps | 1 | LS | \$ 854,000 | \$ 854,000 |
| 2B-20 | MBR Tank/Equipment | 1 | LS | \$ 6,500,000 | \$ 6,500,000 |
| 2B-21 | Aerobic Digester | 1 | LS | \$ 720,000 | \$ 720,000 |
| 2B-22 | Dewatering Equipment | 1 | LS | \$ 520,000 | \$ 520,000 |
| 2B-23 | Disinfection UV | 1 | LS | \$ 680,000 | \$ 680,000 |
| 2B-24 | Office/lab/maintenance/MCC Bldg | 1 | LS | \$ 1,100,000 | \$ 1,100,000 |
| 2B-25 | Plant pump station | 1 | LS | \$ 360,000 | \$ 360,000 |
| 2B-26 | Emergency Generator | 1 | LS | \$ 780,000 | \$ 780,000 |
| 2B-27 | Electrical/SCADA | 1 | LS | \$ 1,400,000 | \$ 1,400,000 |
| 2B-28 | Irrigation reservoir/pumps | 1 | LS | \$ 810,000 | \$ 810,000 |
| 2B-29 | Landscaping | 1 | LS | \$ 300,000 | \$ 300,000 |
| | SUBTOTAL | | | | \$ 21,041,000 |
| TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 2B \$ 34,360,000 | | | | | |
| TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2B \$ 39,514,000 | | | | | |

PULEHUNUI REGIONAL PROJECT
 PRELIMINARY OPINION OF PROBABLE COST
 WASTE WATER SYSTEM ALTERNATE 2C

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|-------------------------------------|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 2C-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 2C-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 2C-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 2C-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 2C-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 2C-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 2C-7 | Submersible Pump Station | 1 | EA | \$ 580,000 | \$ 580,000 |
| 2C-8 | Forcemain | 7,300 | LF | \$ 260 | \$ 1,898,000 |
| | SUBTOTAL | | | | \$ 5,279,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (Shareholders) | | | | | |
| 2C-9 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 2C-10 | Pump Station on DHHL Property North | 1 | LS | \$ 3,600,000 | \$ 3,600,000 |
| 2C-11 | Force main from PS to WWTF | 10,200 | LF | \$ 300 | \$ 3,060,000 |
| 2C-12 | AC Road to WWTF | 4,100 | SY | \$ 48 | \$ 196,800 |
| 2C-13 | Clearing and Grubbing | 10.0 | AC | \$ 20,000 | \$ 200,000 |
| 2C-14 | Earthwork | 18,500 | CY | \$ 15 | \$ 277,500 |
| 2C-15 | Fencing | 2,800 | LF | \$ 22 | \$ 61,600 |
| 2C-16 | On-Site A.C. Pavement | 3,650 | SY | \$ 48 | \$ 175,200 |
| 2C-17 | Gravel Roads | 2,400 | SY | \$ 12 | \$ 28,800 |
| 2C-18 | Headworks | 1 | LS | \$ 1,480,000 | \$ 1,480,000 |
| 2C-19 | Equalization Tank/Pumps | 1 | LS | \$ 854,000 | \$ 854,000 |
| 2C-20 | MBR Tank/Equipment | 1 | LS | \$ 6,500,000 | \$ 6,500,000 |
| 2C-21 | Aerobic Digester | 1 | LS | \$ 720,000 | \$ 720,000 |
| 2C-22 | Dewatering Equipment | 1 | LS | \$ 520,000 | \$ 520,000 |
| 2C-23 | Disinfection UV | 1 | LS | \$ 680,000 | \$ 680,000 |
| 2C-24 | Office/lab/maintenance/MCC Bldg | 1 | LS | \$ 1,100,000 | \$ 1,100,000 |
| 2C-25 | Plant pump station | 1 | LS | \$ 360,000 | \$ 360,000 |
| 2C-26 | Emergency Generator | 1 | LS | \$ 780,000 | \$ 780,000 |
| 2C-27 | Electrical/SCADA | 1 | LS | \$ 1,400,000 | \$ 1,400,000 |
| 2C-28 | Irrigation reservoir/pumps | 1 | LS | \$ 810,000 | \$ 810,000 |
| 2C-29 | Landscaping | 1 | LS | \$ 300,000 | \$ 300,000 |
| 2C-30 | Potable waterline | 1,800 | LF | \$ 300 | \$ 540,000 |
| 2C-31 | Electrical/Communications to site | 1,800 | LF | \$ 120 | \$ 216,000 |
| | SUBTOTAL | | | | \$ 23,504,000 |
| TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 2C \$ 37,109,000 | | | | | |
| TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 2C \$ 42,676,000 | | | | | |

PULEHUNUI REGIONAL PROJECT
 PRELIMINARY OPINION OF PROBABLE COST
 WASTE WATER SYSTEM ALTERNATE 3A

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|-------------------------------------|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 3A-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 3A-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 3A-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 3A-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 3A-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 3A-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 3A-7 | Submersible Pump Station | 1 | EA | \$ 580,000 | \$ 580,000 |
| 3A-8 | Forcemain | 5,300 | LF | \$ 260 | \$ 1,378,000 |
| | SUBTOTAL | | | | \$ 4,759,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (Shareholders) | | | | | |
| 3A-9 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 3A-10 | Pump Station on DHHL Property North | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 3A-11 | Force main from PS to WWTF | 6,700 | LF | \$ 300 | \$ 2,010,000 |
| 3A-12 | AC Road to WWTF | 6,600 | SY | \$ 48 | \$ 316,800 |
| 3A-13 | Clearing and Grubbing | 10.0 | AC | \$ 20,000 | \$ 200,000 |
| 3A-14 | Earthwork | 18,500 | CY | \$ 15 | \$ 277,500 |
| 3A-15 | Fencing | 2,800 | LF | \$ 22 | \$ 61,600 |
| 3A-16 | On-Site A.C. Pavement | 3,650 | SY | \$ 48 | \$ 175,200 |
| 3A-17 | Gravel Roads | 2,400 | SY | \$ 12 | \$ 28,800 |
| 3A-18 | Headworks | 1 | LS | \$ 1,480,000 | \$ 1,480,000 |
| 3A-19 | Equalization Tank/Pumps | 1 | LS | \$ 854,000 | \$ 854,000 |
| 3A-20 | MBR Tank/Equipment | 1 | LS | \$ 6,500,000 | \$ 6,500,000 |
| 3A-21 | Aerobic Digester | 1 | LS | \$ 720,000 | \$ 720,000 |
| 3A-22 | Dewatering Equipment | 1 | LS | \$ 520,000 | \$ 520,000 |
| 3A-23 | Disinfection UV | 1 | LS | \$ 680,000 | \$ 680,000 |
| 3A-24 | Office/lab/maintenance/MCC Bldg | 1 | LS | \$ 1,100,000 | \$ 1,100,000 |
| 3A-25 | Plant pump station | 1 | LS | \$ 360,000 | \$ 360,000 |
| 3A-26 | Emergency Generator | 1 | LS | \$ 780,000 | \$ 780,000 |
| 3A-27 | Electrical/SCADA | 1 | LS | \$ 1,400,000 | \$ 1,400,000 |
| 3A-28 | Irrigation reservoir/pumps | 1 | LS | \$ 810,000 | \$ 810,000 |
| 3A-29 | Landscaping | 1 | LS | \$ 300,000 | \$ 300,000 |
| 3A-30 | Potable waterline | 3,900 | LF | \$ 300 | \$ 1,170,000 |
| 3A-31 | Electrical/Communications to site | 3,900 | LF | \$ 120 | \$ 468,000 |
| | SUBTOTAL | | | | \$ 22,274,000 |
| TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 3A \$ 35,359,000 | | | | | |
| TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 3A \$ 40,663,000 | | | | | |

PULEHUNUI REGIONAL PROJECT
PRELIMINARY OPINION OF PROBABLE COST
WASTE WATER SYSTEM ALTERNATE 4

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|---|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 4-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 4-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 4-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 4-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 4-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 4-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 4-7 | Submersible Pump Station | 1 | EA | \$ 520,000 | \$ 520,000 |
| 4-8 | Force main | 6,200 | LF | \$ 280 | \$ 1,612,000 |
| | SUBTOTAL | | | | \$ 4,933,000 |
| WASTEWATER PUMP SYSTEM (Shareholders) | | | | | |
| 4-9 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 4-10 | Shareholder PS DHHL North | 1 | LS | \$ 3,800,000 | \$ 3,800,000 |
| 4-11 | Shareholder PS Midway | 1 | LS | \$ 3,800,000 | \$ 3,800,000 |
| 4-12 | Force main from PS DHHL North to PS Midway | 14,800 | LF | \$ 300 | \$ 4,440,000 |
| 4-13 | Force main from PS Midway to County WWRF | 10,900 | LF | \$ 300 | \$ 3,270,000 |
| | SUBTOTAL | | | | \$ 15,710,000 |
| TEMPORARY WASTEWATER TREATMENT FACILITY | | | | | |
| 4-14 | Temporary WWTF at DHHL North | 1 | LS | \$ 4,800,000 | \$ 4,800,000 |
| PRO-RATA SHAREHOLDER SHARE OF COUNTY WWRF | | | | | |
| 4-15 | Pro-Rate Shareholder's Share of County Facility (Not including land costs) | 1 | LS | \$ 8,300,000 | \$ 8,300,000 |
| | TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 1B | | | | \$ 42,069,000 |
| | TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 1B | | | | \$ 48,380,000 |

PULEHUNUI REGIONAL PROJECT
PRELIMINARY OPINION OF PROBABLE COST
WASTE WATER SYSTEM ALTERNATE 3B

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|--|-----------|------|--------------|----------------------|
| DLNR BUSINESS PARK (On-Site) | | | | | |
| 3B-1 | PVC sewer line | 20,300 | LF | \$ 160 | \$ 3,248,000 |
| 3B-2 | Manholes | 82 | EA | \$ 13,000 | \$ 1,066,000 |
| | SUBTOTAL | | | | \$ 4,314,000 |
| PULEHUNUI NORTH (On-Site) | | | | | |
| 3B-3 | PVC sewer line | 18,900 | LF | \$ 160 | \$ 3,024,000 |
| 3B-4 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| | SUBTOTAL | | | | \$ 4,012,000 |
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 3B-5 | PVC sewer line | 13,200 | LF | \$ 160 | \$ 2,112,000 |
| 3B-6 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 3B-7 | Submersible Pump Station | 1 | EA | \$ 580,000 | \$ 580,000 |
| 3B-8 | Force main | 6,200 | LF | \$ 260 | \$ 1,612,000 |
| | SUBTOTAL | | | | \$ 4,993,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (Shareholders) | | | | | |
| 3B-9 | Mobilization | 1 | LS | \$ 400,000 | \$ 400,000 |
| 3B-10 | Pump Station on DHHL Property North | 1 | LS | \$ 3,800,000 | \$ 3,800,000 |
| 3B-11 | Force main from PS to WWTF | 12,500 | LF | \$ 300 | \$ 3,750,000 |
| 3B-12 | AC Road to WWTF | 4,100 | SY | \$ 48 | \$ 196,800 |
| 3B-13 | Clearing and Grubbing | 10.0 | AC | \$ 20,000 | \$ 200,000 |
| 3B-14 | Earthwork | 18,500 | CY | \$ 15 | \$ 277,500 |
| 3B-15 | Fencing | 2,800 | LF | \$ 22 | \$ 61,600 |
| 3B-16 | On-Site A.C. Pavement | 3,650 | SY | \$ 48 | \$ 175,200 |
| 3B-17 | Gravel Roads | 2,400 | SY | \$ 12 | \$ 28,800 |
| 3B-18 | Headworks | 1 | LS | \$ 1,480,000 | \$ 1,480,000 |
| 3B-19 | Equalization Tank/Pumps | 1 | LS | \$ 854,000 | \$ 854,000 |
| 3B-20 | MBR Tank/Equipment | 1 | LS | \$ 6,500,000 | \$ 6,500,000 |
| 3B-21 | Aerobic Digester | 1 | LS | \$ 720,000 | \$ 720,000 |
| 3B-22 | Dewatering Equipment | 1 | LS | \$ 520,000 | \$ 520,000 |
| 3B-23 | Disinfection UV | 1 | LS | \$ 680,000 | \$ 680,000 |
| 3B-24 | Office/lab/maintenance/MCC Bldg | 1 | LS | \$ 1,100,000 | \$ 1,100,000 |
| 3B-25 | Plant pump station | 1 | LS | \$ 360,000 | \$ 360,000 |
| 3B-26 | Emergency Generator | 1 | LS | \$ 780,000 | \$ 780,000 |
| 3B-27 | Electrical/SCADA | 1 | LS | \$ 1,400,000 | \$ 1,400,000 |
| 3B-28 | Irrigation reservoir/pumps | 1 | LS | \$ 810,000 | \$ 810,000 |
| 3B-29 | Landscaping | 1 | LS | \$ 300,000 | \$ 300,000 |
| 3B-30 | Potable waterline | 5,100 | LF | \$ 300 | \$ 1,530,000 |
| 3B-31 | Electrical/Communications to site | 5,100 | LF | \$ 120 | \$ 612,000 |
| | SUBTOTAL | | | | \$ 24,394,000 |
| | TOTAL FOR WASTEWATER SYSTEM - ALTERNATIVE 3B | | | | \$ 37,713,000 |
| | TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) - ALTERNATIVE 3B | | | | \$ 43,370,000 |

APPENDIX A

**RUNOFF CALCULATIONS
EXISTING CONDITIONS**

| Drainage Area Label | Area (acres) | C Runoff Coeff. | Tc (min) | 50-Yr Design Intensity (in/hr) | 50-Yr, 1-Hr Runoff | | Flows To |
|---------------------|----------------|----------------------|----------|--------------------------------|--------------------|----------------|-----------------------------|
| | | | | | Q Flow (cfs) | V Volume (cf) | |
| E1 | 84.669 | 0.20 | 27.7 | 3.80 | 64.35 | 115,830 | Camp 6 Ditch/ Mokulele Hwy |
| E2 | 74.498 | 0.20 | 32.0 | 3.50 | 52.15 | 93,870 | Nat'l Guard/ Mokulele Hwy |
| E3 | 115.698 | 0.20 | 40.0 | 3.20 | 74.05 | 133,290 | Mokulele Hwy |
| E4 | 5.277 | 0.31 | 20.2 | 4.60 | 7.53 | 13,554 | Exist. Basin E4 (Retained) |
| TOTAL | 280.142 | | | | 190.55 | 342,990 | |
| O-1 | 806.600 | (See HydroCAD Calcs) | | | - | - | Onsite/ Nat'l Guard/ M. Hwy |
| O-2 | 78.097 | 0.20 | 33.4 | 3.40 | 53.11 | 95,598 | Onsite/Camp 6 Ditch/ M. Hwy |
| O-3 | 86.954 | 0.20 | 33.5 | 3.40 | 59.13 | 106,434 | Mokulele Hwy. |

- Notes:
1. The Rational Method ($Q = CIA$) is used to determine 50-year, 1-hour runoff.
 2. Refer to Runoff Coefficient Calculations for determination of "C" value.
 3. Refer to Time of Concentration Calculations for determination of "Tc" value.
 4. Rainfall Intensity obtained from the NOAA Precipitation Frequency Data Server, accessed online at: <http://hdsc.nws.noaa.gov/hdsc/pfds>
 5. Runoff volume determined using triangular Rational Method hydrograph ending at 1-hour. Hydrograph Volume = $(Q \text{ ft}^3/\text{sec}) \times (60 \text{ sec}/\text{min}) \times (60 \text{ min}/\text{hr}) \times (1/2)$
 6. Refer to Detention Basin Summary for Basin E4.

**APPENDIX A
DRAINAGE CALCULATIONS**

APPENDIX A

RUNOFF CALCULATIONS
PROPOSED CONDITIONS

| Drainage Area Label | C Runoff Coeff. | Tc (min) | 50-Yr Design Intensity (in/hr) | 50-Yr, 1-Hr Runoff | | Flows To |
|---------------------|--------------------------------------|----------|--------------------------------|--------------------|------------------|-----------------------------|
| | | | | Q Flow (cfs) | V Volume (cf) | |
| P1 | 0.74 | 10.8 | 5.90 | 357.57 | 643,626 | Basin P1 (Retained) |
| P2 | 0.74 | 13.4 | 5.40 | 135.25 | 243,450 | Basin P2 (Qout = 24.14 cfs) |
| P3 | 0.74 | 11.1 | 5.80 | 129.61 | 233,298 | Basin P3 (Qout = 18.50 cfs) |
| P4 | 0.74 | 12.9 | 5.50 | 289.11 | 520,398 | Basin P4 (Retained) |
| P5 | 0.74 | 11.2 | 5.80 | 248.45 | 447,210 | Basin P5 (Qout = 81.78 cfs) |
| P6 | 0.74 | 8.4 | 6.70 | 26.16 | 47,088 | Basin P6 (Retained) |
| TOTAL | | | | 1,186.15 | 2,135,070 | Before Detention |
| | | | | 124.42 | 223,956 | After Detention |
| O-1 | (No Change, See Existing Conditions) | | | - | - | Onsite/ Nat'l Guard/ M. Hwy |
| O-2 | (No Change, See Existing Conditions) | | | 53.11 | 95,598 | Onsite/Camp 6 Ditch/ M. Hwy |
| O-3 | (No Change, See Existing Conditions) | | | 59.13 | 106,434 | Mokulele Hwy. |

- Notes:
1. The Rational Method (Q= CIA) is used to determine 50-year, 1-hour runoff.
 2. Refer to Runoff Coefficient Calculations for determination of "C" value.
 3. Refer to Time of Concentration Calculations for determination of "Tc" value.
 4. Rainfall Intensity obtained from the NOAA Precipitation Frequency Data Server, accessed online at: <http://hdsc.nws.noaa.gov/hdsc/pfds>
 5. Runoff volume determined using triangular Rational Method hydrograph ending at 1-hour. Hydrograph Volume = (Q ft³/sec) x (60 sec/min) x (60 min/hr) x (1/2)
 6. Refer to Detention Basin Summary for basin outflows.

APPENDIX A

RUNOFF COEFFICIENT CALCULATIONS

| Drainage Area Label | C ₅₀ = 0.10 | | C ₅₀ = 0.15 | | C ₅₀ = 0.20 | | C ₅₀ = 0.80 | | C ₅₀ = 0.85 | | Weighted Avg. Coeff. | |
|----------------------------|--|------|----------------------------|------|---------------------------------|-------|--------------------------------------|------|-------------------------------|------|----------------------|---------------|
| | Ex. Grass/ Weed Mix Area (ac) | (%) | Prop. Open Space Area (ac) | (%) | Ex. Fallow Sugar Cane Area (ac) | (%) | Prop. Comm. & Lt. Industr. Area (ac) | (%) | Ex. Dirt/ Bare Soil Area (ac) | (%) | Area (ac) | Runoff Coeff. |
| Existing Conditions | | | | | | | | | | | | |
| E1 | 0 | 0.0 | 0 | 0.0 | 84,669 | 100.0 | 0 | 0.0 | 0 | 0.0 | 84,669 | 0.20 |
| E2 | 0 | 0.0 | 0 | 0.0 | 74,498 | 100.0 | 0 | 0.0 | 0 | 0.0 | 74,498 | 0.20 |
| E3 | 0 | 0.0 | 0 | 0.0 | 115,698 | 100.0 | 0 | 0.0 | 0 | 0.0 | 115,698 | 0.20 |
| E4 | 3,777 | 71.6 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1,500 | 28.4 | 5,277 | 0.31 |
| O-1 | (See HydroCAD Calculations) 806,600 | | | | | | | | | | | |
| O-2 | 0 | 0.0 | 0 | 0.0 | 78,097 | 100.0 | 0 | 0.0 | 0 | 0.0 | 78,097 | 0.20 |
| O-3 | 0 | 0.0 | 0 | 0.0 | 86,954 | 100.0 | 0 | 0.0 | 0 | 0.0 | 86,954 | 0.20 |
| Proposed Conditions | | | | | | | | | | | | |
| P1 | 0 | 0.0 | 8,190 | 10.0 | 0 | 0.0 | 73,709 | 90.0 | 0 | 0.0 | 81,899 | 0.74 |
| P2 | 0 | 0.0 | 3,385 | 10.0 | 0 | 0.0 | 30,461 | 90.0 | 0 | 0.0 | 33,846 | 0.74 |
| P3 | 0 | 0.0 | 3,020 | 10.0 | 0 | 0.0 | 27,179 | 90.0 | 0 | 0.0 | 30,199 | 0.74 |
| P4 | 0 | 0.0 | 7,103 | 10.0 | 0 | 0.0 | 63,931 | 90.0 | 0 | 0.0 | 71,034 | 0.74 |
| P5 | 0 | 0.0 | 5,789 | 10.0 | 0 | 0.0 | 52,098 | 90.0 | 0 | 0.0 | 57,887 | 0.74 |
| P6 | 0 | 0.0 | 0.528 | 10.0 | 0 | 0.0 | 4,749 | 90.0 | 0 | 0.0 | 5,277 | 0.74 |
| O-1 | (No Change, See Existing Conditions) 806,600 | | | | | | | | | | | |
| O-2 | (No Change, See Existing Conditions) 78,097 | | | | | | | | | | | |
| O-3 | (No Change, See Existing Conditions) 86,954 | | | | | | | | | | | |
| | | | | | | | | | | | TOTAL | 0.20 |

Surface Type Detailed Descriptions:

- Ex. Grass/ Weed Mix, Good Cover, Mild Slopes, HSG B C = 0.10
- Prop. Open Space Area, Good Cover, Mild Slopes, HSG B C = 0.15
- Ex. Fallow Sugar Cane, Fair Cover, Mild Slopes, HSG B C = 0.20
- Prop. Commercial and Light Industrial, Mild Slopes, HSG B C = 0.80
- Ex. Dirt Roadways or Bare Soil, HSG B C = 0.85

Note: 1. Proposed open space area estimated to be 10% of total site area.

APPENDIX A

TIME OF CONCENTRATION CALCULATIONS

| Drain Area Label | Flow Segment 1 Overland Flow | | | Flow Segment 2 Concentrated Flow | | | Flow Segment 3 Open Channel Flow | | | TOTAL Time (min) | | | |
|----------------------------|--------------------------------------|-------------|-----------|-------------------------------------|------------|-------------|-------------------------------------|------------|------------|---------------------|-------------|-----------|------------|
| | Surf. Type | Length (ft) | Slope (%) | Time (min) | Surf. Type | Length (ft) | Slope (%) | Time (min) | Surf. Type | | Length (ft) | Slope (%) | Time (min) |
| Existing Conditions | | | | | | | | | | | | | |
| E1 | Cane | 1,250 | 1.6 | 27.7 | - | - | - | 0.0 | - | - | - | 0.0 | 27.7 |
| E2 | Cane | 1,850 | 1.6 | 32.0 | - | - | - | 0.0 | - | - | - | 0.0 | 32.0 |
| E3 | Cane | 3,190 | 1.2 | 40.0 | - | - | - | 0.0 | - | - | - | 0.0 | 40.0 |
| E4 | Grass,Pool | 510 | 1.3 | 20.2 | - | - | - | 0.0 | - | - | - | 0.0 | 20.2 |
| O-1 | (See HydroCAD Calculations) | | | | | | | | | | | | |
| O-2 | Cane | 1,810 | 1.2 | 33.4 | - | - | - | 0.0 | - | - | - | 0.0 | 33.4 |
| O-3 | Cane | 1,820 | 1.2 | 33.5 | - | - | - | 0.0 | - | - | - | 0.0 | 33.5 |
| Proposed Conditions | | | | | | | | | | | | | |
| P1 | Grass,Avg | 20 | 2.0 | 6.6 | Pave | 100 | 1.5 | 0.3 | Pipe | 1,820 | 1.0 | 3.9 | 10.8 |
| P2 | Grass,Avg | 20 | 2.0 | 6.6 | Pave | 100 | 1.5 | 0.3 | Pipe | 2,710 | 0.8 | 6.5 | 13.4 |
| P3 | Grass,Avg | 20 | 2.0 | 6.6 | Pave | 100 | 1.5 | 0.3 | Pipe | 1,730 | 0.8 | 4.1 | 11.1 |
| P4 | Grass,Avg | 20 | 2.0 | 6.6 | Pave | 100 | 1.5 | 0.3 | Pipe | 2,340 | 0.7 | 6.0 | 12.9 |
| P5 | Grass,Avg | 20 | 2.0 | 6.6 | Pave | 100 | 1.5 | 0.3 | Pipe | 1,890 | 0.9 | 4.3 | 11.2 |
| P6 | Grass,Avg | 20 | 2.0 | 6.6 | Pave | 100 | 1.5 | 0.3 | Pipe | 670 | 0.9 | 1.5 | 8.4 |
| O-1 | (No Change, See Existing Conditions) | | | | | | | | | | | | |
| O-2 | (No Change, See Existing Conditions) | | | | | | | | | | | | |
| O-3 | (No Change, See Existing Conditions) | | | | | | | | | | | | |

- Notes:
- County of Maui Storm Drain Manual Plate 1 used for the determination of overland flow time.
Fallow Sugar Cane and Sugar Cane assumed equivalent to "Poor Grass Surface" in Plate 1.
 - County of Maui Storm Drain Manual Table 4 used for the determination of concentrated flow time.
 - Open Channel Flow velocity estimated using the Manning's equation for the channel cross-section at full-flow.

APPENDIX A

DETENTION BASIN SUMMARY

| Basin Label | Contrib. Drainage Area | Contrib. Area to Basin (acres) | Basin Storage Volume (cf) | Inflow To Basin | | Outflow From Basin | | Basin Ponding Depth (ft) | Basin Footprint Area (ac) |
|----------------------------|------------------------|--------------------------------|---------------------------|-----------------------|-------------------------|-----------------------|-------------------------|--------------------------|---------------------------|
| | | | | Q ₅₀ (cfs) | Vol ₅₀ (cfs) | Q ₅₀ (cfs) | Vol ₅₀ (cfs) | | |
| Existing Conditions | | | | | | | | | |
| Basin E4 | E4 | 5,277 | 84,000 | 7.53 | 13,554 | 0.00 | 0 | 5.0 | 0.4 |
| Proposed Conditions | | | | | | | | | |
| Basin(s) P1 | P1 | 81,899 | 650,000 | 357.57 | 643,626 | 0.00 | 0 | 4.0 | 6.3 |
| Basin P2 | P2 | 33,846 | 200,000 | 135.25 | 243,450 | 24.14 | 43,450 | 4.0 | 2.0 |
| Basin P3 | P3 | 30,199 | 200,000 | 129.61 | 233,298 | 18.50 | 33,298 | 4.0 | 2.0 |
| Basin(s) P4 | P4 | 71,034 | 550,000 | 289.11 | 520,398 | 0.00 | 0 | 4.0 | 5.4 |
| Basin(s) P5 | P5 | | 300,000 | 248.45 | 447,210 | 81.78 | 147,210 | 4.0 | 2.9 |
| Basin P6 | P6 | 5,277 | 50,000 | 26.16 | 47,088 | 0.00 | 0 | 4.0 | 0.5 |

- Notes:
- Multiple basins may be used to arrive at the total proposed storage volume.
 - Basin outflow is estimated based on the provided storage volume. Basin modeling will be used to verify the final design.
 - Basin depth does not include embankment height (freeboard) above the water surface.
 - Basin footprint is approximate and is provided for the purpose of estimating the land area needed to be reserved for basins.
 - The HC&S Reservoir No. 6 is not assumed to have significant retention volume above its normal operating water level. Therefore the irrigation reservoir is ignored in runoff calculations.

APPENDIX A

WATER QUALITY CALCULATIONS

| Drainage Area | Water Quality BMP | Treatment Type | Contributing Drainage Area (ac) | Detention Based Design | | | |
|----------------------------|--------------------|-----------------|---------------------------------|------------------------|--------------|----------------------|--------------------|
| | | | | Imperv. Area (%) | Runoff Coeff | Rainfall Amount (in) | Required WQDV (cf) |
| Proposed Conditions | | | | | | | |
| P-1 | Extended Detention | Detention Based | 81.899 | 70.0 | 0.68 | 1.0 | 202,159 |
| P-2 | Extended Detention | Detention Based | 33.846 | 70.0 | 0.68 | 1.0 | 83,545 |
| P-3 | Extended Detention | Detention Based | 30.199 | 70.0 | 0.68 | 1.0 | 74,543 |
| P-4 | Extended Detention | Detention Based | 71.034 | 70.0 | 0.68 | 1.0 | 175,340 |
| P-5 | Extended Detention | Detention Based | 57.887 | 70.0 | 0.68 | 1.0 | 142,888 |
| P-6 | Extended Detention | Detention Based | 5.277 | 70.0 | 0.68 | 1.0 | 13,026 |
| O-1 | N/A- Bypassed | - | - | - | - | - | - |
| O-2 | N/A- Bypassed | - | - | - | - | - | - |
| O-3 | N/A- Bypassed | - | - | - | - | - | - |

- Notes: 1. Detention based designs are required to treat WQDV = $C \times 1.0'' \times A \times 3630$, where $C = 0.05 + (0.009 \times \text{IMP}\%)$.
2. Water Quality Treatment is not required for offsite flow that is bypassed through or around the site.
3. Impervious area is estimated based on typical commercial and light industrial use, plus 10% site open space area.
4. Water Quality Treatment will be provided within the proposed detention/retention basins. The water quality volume will be retained.

APPENDIX A

**RUNOFF CALCULATIONS
EXISTING CONDITIONS**

| Drainage Area Label | Area (acres) | C Runoff Coeff. | Tc (min) | 50-Yr. Design Intensity (in/hr) | 50-Yr. 1-Hr Runoff | |
|---------------------|--------------|-----------------|----------|---------------------------------|--------------------|----------------------|
| | | | | | Q Flow (cfs) | V Volume (cf) |
| E-1 | 88.47 | 0.20 | 70.0 | 2.35 | 41.58 | 74,844 |
| E-2 | 90.04 | 0.20 | 68.0 | 2.40 | 43.20 | 77,760 |
| E-3 | 6.52 | 0.20 | 30.0 | 3.50 | 4.55 | 8,190 |
| TOTAL | 185.0 | | | | 89.33 | 160,794 |
| | | | | | | Flows To |
| | | | | | | DITCH TO KEALEA POND |
| | | | | | | DITCH TO KEALEA POND |
| | | | | | | DITCH TO KEALEA POND |

- Notes: 1. The Rational Method ($Q = CIA$) is used to determine 50-year, 1-hour runoff.
2. Refer to Runoff Coefficient Calculations for determination of "C" value.
3. Refer to Time of Concentration Calculations for determination of "Tc" value.
4. Rainfall Intensity obtained from the NOAA Precipitation Frequency Data Server, accessed online at: <https://hdsc.nws.noaa.gov/hdsc/pfds>
5. Runoff volume determined using triangular Rational Method hydrograph ending at 1-hour. Hydrograph Volume = $(Q \text{ ft}^3/\text{sec}) \times (60 \text{ sec}/\text{min}) \times (60 \text{ min}/\text{hr}) \times (1/2)$

APPENDIX A

RUNOFF CALCULATIONS
PROPOSED CONDITIONS

| Drainage Area Label | Area (acres) | C Runoff Coeff. | Tc (min) | 50-Yr Design Intensity (in/hr) | Q Flow (cfs) | V Volume (cf) | Flows To |
|---------------------|--------------|-----------------|----------|--------------------------------|---------------|----------------|---------------------|
| | | | | | | | |
| P-1 | 16.2 | 0.15 | 114.0 | 1.80 | 4.39 | 7,902 | RETENTION BASIN P-1 |
| P-2 | 6.0 | 0.15 | 68.0 | 2.40 | 2.15 | 3,870 | RETENTION BASIN P-2 |
| P-3 | 11.2 | 0.15 | 180.0 | 1.00 | 1.67 | 3,006 | RETENTION BASIN P-3 |
| P-4 | 20.5 | 0.80 | 20.8 | 4.00 | 65.56 | 118,008 | RETENTION BASIN P-1 |
| P-5 | 4.8 | 0.80 | 17.6 | 4.40 | 16.76 | 30,168 | RETENTION BASIN P-2 |
| P-6 | 18.6 | 0.80 | 19.7 | 4.10 | 61.10 | 109,980 | RETENTION BASIN P-3 |
| P-7 | 14.8 | 0.80 | 17.8 | 4.40 | 52.12 | 93,816 | RETENTION BASIN P-7 |
| P-8 | 8.8 | 0.80 | 27.0 | 3.70 | 26.04 | 46,872 | RETENTION BASIN P-8 |
| P-9 | 84.1 | 0.80 | 17.2 | 4.50 | 302.76 | 544,968 | RETENTION BASIN P-9 |
| TOTAL | 185.0 | | | | 532.55 | 958,590 | |

- Notes:
1. The Rational Method (Q= CIA) is used to determine 50-year, 1-hour runoff.
 2. Refer to Runoff Coefficient Calculations for determination of "C" value.
 3. Refer to Time of Concentration Calculations for determination of "Tc" value.
 4. Rainfall Intensity obtained from the NOAA Precipitation Frequency Data Server, accessed online at: <https://hdsc.nws.noaa.gov/hdsc/pfds>
 5. Runoff volume determined using triangular Rational Method hydrograph ending at 1-hour. Hydrograph Volume = (Q ft³/sec) x (60 sec/min) x (60 min/hr) x (1/2)

APPENDIX A

RUNOFF COEFFICIENT CALCULATIONS

| Drainage Area Label | C ₅₀ = 0.10 | | C ₅₀ = 0.15 | | C ₅₀ = 0.20 | | C ₅₀ = 0.80 | | C ₅₀ = 0.85 | | Weighted Avg. Coeff. | |
|----------------------------|------------------------------|----------|----------------------------|----------|---------------------------------|----------|--------------------------------------|----------|------------------------------|----------|----------------------|---------------|
| | Ex. Grass/Weed Mix Area (ac) | Area (%) | Prop. Open Space Area (ac) | Area (%) | Ex. Fallow Sugar Cane Area (ac) | Area (%) | Prop. Comm. & Lt. Industr. Area (ac) | Area (%) | Ex. Dirt/Bare Soil Area (ac) | Area (%) | Area (ac) | Runoff Coeff. |
| <i>Existing Conditions</i> | | | | | | | | | | | | |
| E-1 | 0 | 0.0 | 0.0 | 0.0 | 88.5 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 88.47 | 0.20 |
| E-2 | 0 | 0.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 90.04 | 0.20 |
| E-3 | 0 | 0.0 | 0.0 | 0.0 | 6.5 | 99.8 | 0.0 | 0.0 | 0.0 | 0.0 | 6.52 | 0.20 |
| <i>Proposed Conditions</i> | | | | | | | | | | | | |
| P-1 | 0 | 0.0 | 16.2 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.2 | 0.15 |
| P-2 | 0 | 0.0 | 6.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 0.15 |
| P-3 | 0 | 0.0 | 11.2 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.2 | 0.15 |
| P-4 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.5 | 100.0 | 0.0 | 0.0 | 20.5 | 0.80 |
| P-5 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 100.0 | 0.0 | 0.0 | 4.8 | 0.80 |
| P-6 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.6 | 100.0 | 0.0 | 0.0 | 18.6 | 0.80 |
| P-7 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.8 | 100.0 | 0.0 | 0.0 | 14.8 | 0.80 |
| P-8 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.8 | 100.0 | 0.0 | 0.0 | 8.8 | 0.80 |
| P-9 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 84.1 | 100.0 | 0.0 | 0.0 | 84.1 | 0.80 |

Surface Type Detailed Descriptions:

- Ex. Grass/Weed Mix, Good Cover, Mild Slopes, HSG B C = 0.10
- Prop. Open Space Area, Good Cover, Mild Slopes, HSG B C = 0.15
- Ex. Fallow Sugar Cane, Fair Cover, Mild Slopes, HSG B C = 0.20
- Prop. Commercial and Light Industrial, Mild Slopes, HSG B C = 0.80
- Ex. Dirt Roadways or Bare Soil, HSG B C = 0.85

APPENDIX A

TIME OF CONCENTRATION CALCULATIONS

| Drain Area Label | Flow Segment 1 Overland Flow | | | Flow Segment 2 Concentrated Flow | | | Flow Segment 3 Open Channel Flow | | | TOTAL Time (min) | | | |
|----------------------------|---------------------------------|-------------|-----------|-------------------------------------|------------|-------------|-------------------------------------|------------|------------|---------------------|-------------|-----------|------------|
| | Surf. Type | Length (ft) | Slope (%) | Time (min) | Surf. Type | Length (ft) | Slope (%) | Time (min) | Surf. Type | | Length (ft) | Slope (%) | Time (min) |
| Existing Conditions | | | | | | | | | | | | | |
| E-1 | Grass,poor | 4,175 | 0.7 | 70.0 | | | | | | | | 70.0 | |
| E-2 | Grass,poor | 3,670 | 1.2 | 59.0 | | | | | | | | 59.0 | |
| E-3 | Grass,poor | 1,350 | 0.8 | 33.0 | | | | | | | | 33.0 | |
| Proposed Conditions | | | | | | | | | | | | | |
| P-1 | Grass,Avg | 2,600 | 2.0 | 114.0 | Pave | - | - | 0.0 | Pipe | - | - | 0.0 | 114.0 |
| P-2 | Grass,Avg | 560 | 2.0 | 68.0 | Pave | - | - | 0.0 | Pipe | - | - | 0.0 | 68.0 |
| P-3 | Grass,Avg | 1,480 | 2.0 | 180.0 | Pave | - | - | 0.0 | Pipe | - | - | 0.0 | 180.0 |
| P-4 | Grass,Avg | 50 | 2.0 | 9.5 | Pave | 100 | 1.5 | 6.0 | Pipe | 2,530 | 1.0 | 5.3 | 20.8 |
| P-5 | Grass,Avg | 50 | 2.0 | 9.5 | Pave | 100 | 1.5 | 6.0 | Pipe | 1,000 | 1.0 | 2.1 | 17.6 |
| P-6 | Grass,Avg | 50 | 2.0 | 9.5 | Pave | 100 | 1.5 | 6.0 | Pipe | 2,000 | 1.0 | 4.2 | 19.7 |
| P-7 | Grass,Avg | 50 | 2.0 | 9.5 | Pave | 100 | 1.5 | 6.0 | Pipe | 1,100 | 1.0 | 2.3 | 17.8 |
| P-8 | Grass,Avg | 50 | 2.0 | 9.5 | Pave | 100 | 1.5 | 6.0 | Pipe | 5,500 | 1.0 | 11.5 | 27.0 |
| P-9 | Grass,Avg | 50 | 2.0 | 9.5 | Pave | 100 | 1.5 | 6.0 | Pipe | 815 | 1.0 | 1.7 | 17.2 |

- Notes:
- County of Maui Storm Drain Manual Plate 1 used for the determination of overland flow time. Follow Sugar Cane and Sugar Cane assumed equivalent to "Poor Grass Surface" in Plate 1.
 - County of Maui Storm Drain Manual Table 4 used for the determination of concentrated flow time.
 - Open Channel Flow velocity estimated using the Manning's equation for the channel cross-section at full-flow.

APPENDIX A

DETENTION BASIN SUMMARY

| Basin Label | Contrib. Drainage Area (acres) | Contrib. Area to Basin (acres) | Basin Storage Volume (cf) | Inflow To Basin | | Outflow From Basin | | Basin Ponding Depth (ft) | Basin Footprint Area (ac) |
|----------------------------|--------------------------------|--------------------------------|---------------------------|-----------------------|-------------------------|-----------------------|-------------------------|--------------------------|---------------------------|
| | | | | Q ₅₀ (cfs) | Vol ₅₀ (cfs) | Q ₅₀ (cfs) | Vol ₅₀ (cfs) | | |
| Proposed Conditions | | | | | | | | | |
| Basin P-1 | P-1, P-4 | 36.73 | 128,000 | 69.95 | 125,910 | 0.00 | 0 | 4.0 | 1.1 |
| Basin P-2 | P-2, P-5 | 10.73 | 35,000 | 18.91 | 34,038 | 0.00 | 0 | 4.0 | 0.3 |
| Basin P-3 | P-3, P-6 | 29.79 | 113,000 | 62.77 | 112,986 | 0.00 | 0 | 4.0 | 1.0 |
| Basin P-7 | P7 | 14.81 | 95,000 | 52.12 | 93,816 | 0.00 | 0 | 4.0 | 0.8 |
| Basin P-8 | P8 | 8.80 | 50,000 | 26.04 | 46,872 | 0.00 | 0 | 4.0 | 0.4 |
| Basin P-9 | P9 | 84.10 | 550,000 | 302.76 | 544,968 | 0.00 | 0 | 5.0 | 3.8 |

- Notes:
- Multiple basins may be used to arrive at the total proposed storage volume.
 - Basin outflow is estimated based on the provided storage volume. Basin modeling will be used to verify the final design.
 - Basin depth does not include embankment height (freeboard) above the water surface.
 - Basin footprint is approximate and is provided for the purpose of estimating the land area needed to be reserved for basins.

APPENDIX A

**RUNOFF CALCULATIONS
EXISTING CONDITIONS**

| Drainage Area Label | Area (acres) | C Runoff Coeff. | Tc (min) | 50-Yr Design Intensity (in/hr) | Q Flow (cfs) | 50-Yr, 1-Hr Runoff Volume (cf) | Flows To |
|---------------------|--------------|---------------------------|----------|--------------------------------|---------------|--------------------------------|--------------------------|
| E-1 | 1.2 | 0.35 | 19.8 | 4.10 | 1.77 | 3,186 | EX. 8 - 12" X 8' CULVERT |
| E-2 | 580.5 | (See HydroCAD Calcs) | | | 270.37 | 486,666 | EX. 24" CULVERT |
| E-3 | 64.3 | 0.35 | 52.3 | 2.75 | 61.92 | 111,456 | EX. 24" CULVERT |
| TOTAL | 646.0 | | | | 334.06 | 601,308 | |
| O-1 | 5846.8 | (See Mokulele Hwy Report) | | | 5540.00 | - | EX. 8 - 12" X 8' CULVERT |
| O-2a | 1983.7 | (See HydroCAD Calcs) | | | 1188.70 | - | EX. 3 - 12" X 6' Culvert |

- Notes:
1. The Rational Method (Q= CIA) is used to determine 50-year, 1-hour runoff.
 2. Refer to Runoff Coefficient Calculations for determination of "C" value.
 3. Refer to Time of Concentration Calculations for determination of "Tc" value.
 4. Rainfall Intensity obtained from the NOAA Precipitation Frequency Data Server, accessed online at: <http://hdsc.nws.noaa.gov/hdsc/pfds>
 5. Runoff volume determined using triangular Rational Method hydrograph ending at 1-hour. Hydrograph Volume = (Q ft³/sec) x (60 sec/min) x (60 min/hr) x (1/2)

APPENDIX A

**RUNOFF CALCULATIONS
PROPOSED CONDITIONS**

| Drainage Area Label | Area (acres) | C Runoff Coeff. | Tc (min) | 50-Yr Design Intensity (in/hr) | Q Flow (cfs) | 50-Yr, 1-Hr Runoff | | Flows To |
|---------------------|--------------|---------------------------|----------|--------------------------------|-----------------|--------------------|---------------|--------------------------|
| | | | | | | Q Flow (cfs) | V Volume (cf) | |
| P-1 | 1.23 | 0.30 | 25.0 | 3.90 | 1.44 | 2,592 | | Ex. 8 - 12"x8' Culvert |
| P-2a | 38.60 | 0.30 | 78.0 | 2.30 | 26.64 | 47,952 | | Retention Basin 2a |
| P-2b | 29.00 | 0.35 | 21.2 | 4.00 | 40.60 | 73,080 | | Retention Basin 2b |
| P-2c | 13.19 | 0.35 | 20.6 | 4.10 | 18.93 | 34,074 | | Retention Basin 2c |
| P-2d | 58.37 | 0.30 | 104.0 | 1.80 | 31.52 | 56,736 | | Retention Basin 2d |
| P-2e | 61.02 | 0.35 | 24.5 | 3.90 | 83.29 | 149,922 | | Retention Basin 2e |
| P-2f | 93.82 | 0.35 | 25.2 | 3.80 | 124.78 | 224,604 | | Retention Basin 2f |
| P-2g | 48.97 | 0.35 | 22.5 | 4.00 | 65.76 | 118,368 | | Retention Basin 2g |
| P-2h | 61.64 | 0.30 | 130.0 | 1.70 | 31.44 | 56,592 | | Retention Basin 2h |
| P-2i | 25.67 | 0.70 | 21.6 | 4.00 | 71.86 | 129,348 | | Retention Basin 2i |
| P-2j | 11.42 | 0.70 | 20.4 | 4.10 | 32.77 | 58,986 | | Retention Basin 2j |
| P-2k | 28.57 | 0.80 | 20.6 | 4.10 | 93.71 | 168,678 | | Retention Basin 2k |
| P-2l | 29.71 | 0.30 | 21.8 | 4.10 | 36.54 | 65,772 | | Retention Basin 2l |
| P-2m | 33.37 | 0.60 | 18.7 | 4.30 | 86.11 | 154,988 | | Retention Basin 2m |
| P-2n | 12.11 | 0.60 | 20.2 | 4.10 | 29.79 | 53,622 | | Retention Basin 2n |
| P-2o | 14.43 | 0.80 | 20.2 | 4.10 | 47.33 | 85,194 | | Retention Basin 2o |
| P-2p | 24.77 | 0.35 | 120.0 | 1.70 | 14.74 | 26,532 | | Ex. 3 - 12" x 6' Culvert |
| P-3a | 26.57 | 0.80 | 22.3 | 4.00 | 85.04 | 153,072 | | Retention Basin 3a |
| P-3b | 35.33 | 0.80 | 20.2 | 4.10 | 115.88 | 208,584 | | Retention Basin 3b |
| TOTAL | 646 | | | | 1,038.17 | 1,868,706 | | |
| O-1 | 5846.8 | (See Mokulele Hwy Report) | | | 5540.00 | - | | Ex. 8 - 12"x8' Culvert |
| O-2a | 1983.7 | (See HydroCAD Calcs) | | | 1188.70 | - | | Ex. 3 - 12" x 6' Culvert |

- Notes:
1. The Rational Method (Q= CIA) is used to determine 50-year, 1-hour runoff.
 2. Refer to Runoff Coefficient Calculations for determination of "C" value.
 3. Refer to Time of Concentration Calculations for determination of "Tc" value.
 4. Rainfall Intensity obtained from the NOAA Precipitation Frequency Data Server, accessed online at: <http://hdsc.nws.noaa.gov/hdsc/pfds>
 5. Runoff volume determined using triangular Rational Method hydrograph ending at 1-hour. Hydrograph Volume = (Q ft³/sec) x (60 sec/min) x (60 min/hr) x (1/2)

Surface Type Detailed Descriptions:

Farms, Good Cover, Some Roads/ Bare Ground, Possible Shelter
 Ag. Homesteads, Similar to Residential, 2 acre lot
 Education, Similar to School Use
 Culture and Arts, Open Space + Buildings (Assume 50% Impervious)
 Ag. Support, Similar to Industrial Use
 Beneficiary Gardens, Good Cover, Some Roads and Small Parking Area
 Farmers Market, Open Space + Buildings (Assume 50% Impervious)
 Comm. Enterprise, Similar to Commercial Use
 Roads, Paved Raods (Or unpaved roads?)
 Open Space/ Gulch, Grass, Weeds, or Brush Good Cover, Some Rock, Mild Slopes
 WWTP, Similar to Industrial Use

C = 0.30
 C = 0.35
 C = 0.70
 C = 0.60
 C = 0.80
 C = 0.30
 C = 0.60
 C = 0.80
 C = 0.95
 C = 0.20
 C = 0.80

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APPENDIX A

RUNOFF COEFFICIENT CALCULATIONS

| Drainage Area Label | C ₅₀ = 0.20 | | C ₅₀ = 0.30 | | C ₅₀ = 0.35 | | C ₅₀ = 0.60 | | C ₅₀ = 0.70 | | C ₅₀ = 0.80 | | C ₅₀ = 0.95 | | Weighted Avg. Coeff. | | |
|----------------------------|--------------------------------------|----------|------------------------|----------|----------------------------------|----------|--------------------------------|----------|------------------------|----------|-------------------------------------|----------|------------------------|----------|----------------------|---------------|------|
| | Open Space | | Farms/ Gardens | | Ag. Homesteads Ex. Grass Surface | | Culture & Arts/ Farmers Market | | Education | | WWTP/ Ag. Support/ Comm. Enterprise | | Paved Roads | | TOTAL | | |
| | Area (ac) | Area (%) | Area (ac) | Area (%) | Area (ac) | Area (%) | Area (ac) | Area (%) | Area (ac) | Area (%) | Area (ac) | Area (%) | Area (ac) | Area (%) | Area (ac) | Runoff Coeff. | |
| Existing Conditions | | | | | | | | | | | | | | | | | |
| E-1 | 0 | 0.0 | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | | 0.0 | | 0.0 | 1.23 | 0.35 | |
| E-2 | (See HydroCAD Calculations) | | | | | | | | | | | | | | | 580.55 | 0.00 |
| E-3 | 0 | 0.0 | 0 | 0.0 | 64 | 100.0 | 0 | 0.0 | 0 | 0.0 | | 0.0 | | 0.0 | 64.33 | 0.35 | |
| O-1 | (See HydroCAD Calculations) | | | | | | | | | | | | | | | 64.33 | 0.00 |
| O-2a | (See HydroCAD Calculations) | | | | | | | | | | | | | | | 1,983.68 | 0.00 |
| O-2b | 0 | 0.0 | 0 | 0.0 | 87 | 100.0 | 0 | 0.0 | 0 | 0.0 | | 0.0 | | 0.0 | 87.00 | 0.35 | |
| Proposed Conditions | | | | | | | | | | | | | | | | | |
| P-1 | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1,233 | 0.30 | |
| P-2a | 0 | 0.0 | 39 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 38.603 | 0.30 | |
| P-2b | 0 | 0.0 | 0 | 0.0 | 29 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 29.000 | 0.35 | |
| P-2c | 0 | 0.0 | 0 | 0.0 | 13 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 13.193 | 0.35 | |
| P-2d | 0 | 0.0 | 58 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 58.375 | 0.30 | |
| P-2e | 0 | 0.0 | 0 | 0.0 | 61 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 61.016 | 0.35 | |
| P-2f | 0 | 0.0 | 0 | 0.0 | 94 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 93.819 | 0.35 | |
| P-2g | 0 | 0.0 | 0 | 0.0 | 47 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 46.974 | 0.35 | |
| P-2h | 0 | 0.0 | 62 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 61.644 | 0.30 | |
| P-2i | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 26 | 100.0 | 0 | 0.0 | 0 | 0.0 | 25.666 | 0.70 | |
| P-2j | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 11 | 100.0 | 0 | 0.0 | 0 | 0.0 | 11.418 | 0.70 | |
| P-2k | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 29 | 100.0 | 0 | 0.0 | 28.569 | 0.80 | |
| P-2l | 0 | 0.0 | 30 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 29.710 | 0.30 | |
| P-2m | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 33 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 33.375 | 0.60 | |
| P-2n | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 12 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 12.110 | 0.60 | |
| P-2o | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 14 | 100.0 | 0 | 0.0 | 14.430 | 0.80 | |
| P-2p | 0 | 0.0 | 0 | 0.0 | 27 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 26.575 | 0.35 | |
| P-3a | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 35 | 100.0 | 0 | 0.0 | 35.330 | 0.80 | |
| P-3b | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 35 | 100.0 | 0 | 0.0 | 35.330 | 0.80 | |
| O-1 | (No Change, See Existing Conditions) | | | | | | | | | | | | | | | 5,846.80 | 0.00 |
| O-2a | (No Change, See Existing Conditions) | | | | | | | | | | | | | | | 1,983.68 | 0.00 |

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- Notes: 1. County of Maui Storm Drain Manual Plate 1 used for the determination of overland flow time.
 Fallow Sugar Cane and Sugar Cane assumed equivalent to "Poor Grass Surface" in Plate 1.
 2. County of Maui Storm Drain Manual Table 4 used for the determination of concentrated flow time.
 3. Open Channel Flow velocity estimated using the Manning's equation for the channel cross-section at full-flow.

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APPENDIX A

TIME OF CONCENTRATION CALCULATIONS

| Drain Area Label | Flow Segment 1 Overland Flow | | | | Flow Segment 2 Concentrated Flow | | | | Flow Segment 3 Open Channel Flow | | | | TOTAL Time (min) | |
|----------------------------|--------------------------------------|-------------|-----------|------------|-------------------------------------|-------------|-----------|------------|-------------------------------------|-------------|-----------|------------|---------------------|-------|
| | Surf. Type | Length (ft) | Slope (%) | Time (min) | Surf. Type | Length (ft) | Slope (%) | Time (min) | Surf. Type | Length (ft) | Slope (%) | Time (min) | | |
| Existing Conditions | | | | | | | | | | | | | | |
| E-1 | Grass.poor | 409 | 1.0 | 19.8 | | | | | | | | | | 19.8 |
| E-2 | (See HydroCAD Calculations) | | | | | | | | | | | | | - |
| E-3 | Grass.poor | 2,000 | - | 31.0 | Grass.poor | 1,915 | - | 21.3 | | | | | | 52.3 |
| O-1 | (N/A See Mokulele Hwy Report) | | | | | | | | | | | | | - |
| O-2a | (See HydroCAD Calculations) | | | | | | | | | | | | | - |
| O-2b | Grass.poor | 2,468 | 1.9 | 57.0 | Grass.poor | 2,700 | - | 30.0 | | | | | | 87.0 |
| Proposed Conditions | | | | | | | | | | | | | | |
| P-1 | Grass.Ave. | 433 | 1.0 | 25.0 | - | - | - | 0.0 | - | - | - | 0.0 | 0.0 | 25.0 |
| P-2a | Grass.Ave. | 1,500 | 2.0 | 78.0 | - | - | - | 0.0 | - | - | - | 0.0 | 0.0 | 78.0 |
| P-2b | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,300 | 1.0 | 2.7 | 2.7 | 21.2 |
| P-2c | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,000 | 1.0 | 2.1 | 2.1 | 20.6 |
| P-2d | Grass.Ave. | 2,000 | 2.0 | 104.0 | - | - | - | 0.0 | - | - | - | 0.0 | 0.0 | 104.0 |
| P-2e | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 2,900 | 1.0 | 6.0 | 6.0 | 24.5 |
| P-2f | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 3,200 | 1.0 | 6.7 | 6.7 | 25.2 |
| P-2g | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,900 | 1.0 | 4.0 | 4.0 | 22.5 |
| P-2h | Grass.Ave. | 2,500 | 2.0 | 130.0 | - | - | - | 0.0 | - | - | - | 0.0 | 0.0 | 130.0 |
| P-2i | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,500 | 1.0 | 3.1 | 3.1 | 21.6 |
| P-2j | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 900 | 1.0 | 1.9 | 1.9 | 20.4 |
| P-2k | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,000 | 1.0 | 2.1 | 2.1 | 20.6 |
| P-2l | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,600 | 1.0 | 3.3 | 3.3 | 21.8 |
| P-2m | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 100 | 1.0 | 0.2 | 0.2 | 18.7 |
| P-2n | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 800 | 1.0 | 1.7 | 1.7 | 20.2 |
| P-2o | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 800 | 1.0 | 1.7 | 1.7 | 20.2 |
| P-2p | Bottom Gulch | 5,300 | 1.7 | 120.0 | - | - | - | 0.0 | - | - | - | 0.0 | 0.0 | 120.0 |
| P-3a | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 1,800 | 1.0 | 3.8 | 3.8 | 22.3 |
| P-3b | Grass.Ave. | 200 | 2.0 | 17.0 | Pave | 100 | 2.0 | 1.5 | Pipe | 800 | 1.0 | 1.7 | 1.7 | 20.2 |
| O-1 | (No Change, See Existing Conditions) | | | | | | | | | | | | | |
| O-2a | (No Change, See Existing Conditions) | | | | | | | | | | | | | |

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APPENDIX A
 DETENTION BASIN SUMMARY

| Basin Label | Contrib. Drainage Area | Contrib. Area to Basin (acres) | Basin Storage Volume (cf) | Inflow To Basin | | Outflow From Basin | | Basin Ponding Depth (ft) | Basin Footprint Area (ac) |
|----------------------------|------------------------|--------------------------------|---------------------------|-----------------------|-------------------------|-----------------------|-------------------------|--------------------------|---------------------------|
| | | | | Q ₅₀ (cfs) | Vol ₅₀ (cfs) | Q ₅₀ (cfs) | Vol ₅₀ (cfs) | | |
| Proposed Conditions | | | | | | | | | |
| Basin P-2a | P-2a | 38.60 | 50,000 | 26.64 | 47,952 | 0.00 | 0 | 4.0 | 0.5 |
| Basin P-2b | P-2b | 29.00 | 74,000 | 40.60 | 73,080 | 0.00 | 0 | 4.0 | 0.7 |
| Basin P-2c | P-2c | 13.19 | 35,000 | 18.93 | 34,074 | 0.00 | 0 | 4.0 | 0.3 |
| Basin P-2d | P-2d | 58.37 | 57,000 | 31.52 | 56,736 | 0.00 | 0 | 4.0 | 0.6 |
| Basin P-2e | P-2e | 61.02 | 150,000 | 83.29 | 149,922 | 0.00 | 0 | 4.0 | 1.5 |
| Basin P-2f | P-2f | 93.82 | 225,000 | 124.78 | 224,604 | 0.00 | 0 | 4.0 | 2.2 |
| Basin P-2g | P-2g | 46.97 | 120,000 | 65.76 | 118,368 | 0.00 | 0 | 4.0 | 1.2 |
| Basin P-2h | P-2h | 61.64 | 57,000 | 31.44 | 56,592 | 0.00 | 0 | 4.0 | 0.6 |
| Basin P-2i | P-2i | 25.67 | 130,000 | 71.86 | 129,348 | 0.00 | 0 | 4.0 | 1.3 |
| Basin P-2j | P-2j | 11.42 | 60,000 | 32.77 | 58,986 | 0.00 | 0 | 4.0 | 0.6 |
| Basin P-2k | P-2k | 28.57 | 170,000 | 93.71 | 168,678 | 0.00 | 0 | 4.0 | 1.7 |
| Basin P-2l | P-2l | 29.71 | 66,000 | 36.54 | 65,772 | 0.00 | 0 | 4.0 | 0.6 |
| Basin P-2m | P-2m | 33.37 | 155,000 | 86.11 | 154,998 | 0.00 | 0 | 4.0 | 1.5 |
| Basin P-2n | P-2n | 12.11 | 54,000 | 29.79 | 53,622 | 0.00 | 0 | 4.0 | 0.5 |
| Basin P-2o | P-2o | 14.43 | 86,000 | 47.33 | 85,194 | 0.00 | 0 | 4.0 | 0.8 |
| Basin P-3a | P-3a | 26.57 | 154,000 | 85.04 | 153,072 | 0.00 | 0 | 4.0 | 1.5 |
| Basin P-3b | P-3b | 35.33 | 209,000 | 115.88 | 208,584 | 0.00 | 0 | 4.0 | 2.0 |

- Notes:
- Multiple basins may be used to arrive at the total proposed storage volume.
 - Basin outflow is estimated based on the provided storage volume. Basin modeling will be used to verify the final design.
 - Basin depth does not include embankment height (freeboard) above the water surface.
 - Basin footprint is approximate and is provided for the purpose of estimating the land area needed to be reserved for basins.

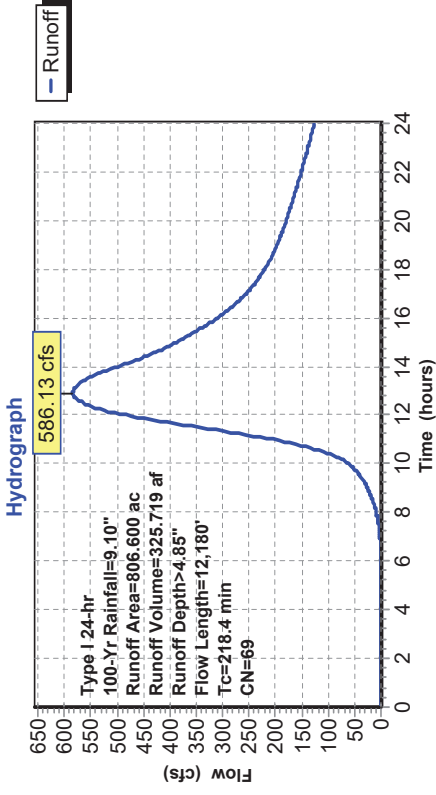
Summary for Subcatchment O-1: Offsite Area O-1

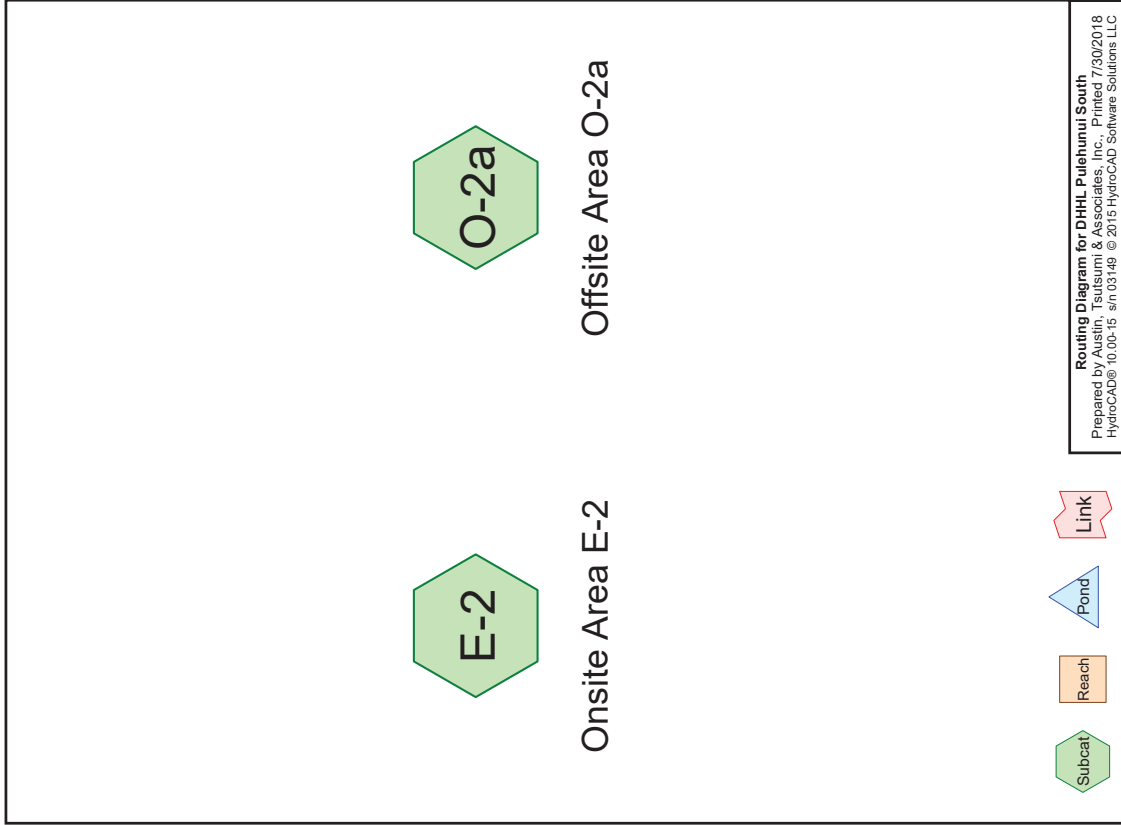
Runoff = 586.13 cfs @ 12.87 hrs, Volume= 325.719 af, Depth> 4.85"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type I 24-hr 100-Yr Rainfall=9.10"

| Area (ac) | CN | Description |
|-----------|----|------------------------------|
| 11,700 | 98 | Water Surface, 0% imp, HSG C |
| 2,800 | 30 | Meadow, non-grazed, HSG A |
| 271,000 | 58 | Meadow, non-grazed, HSG B |
| 432,500 | 71 | Meadow, non-grazed, HSG C |
| 88,600 | 91 | Fallow, bare soil, HSG C |
| 806,600 | 69 | Weighted Average |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 9.7 | 100 | 0.0220 | 0.17 | | Sheet Flow, Grass: Short n= 0.150 P2= 3.00" |
| 208.7 | 12,080 | 0.0190 | 0.96 | | Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps |
| 218.4 | 12,180 | Total | | | |

Subcatchment O-1: Offsite Area O-1 Hydrograph





Summary for Subcatchment E-2: Onsite Area E-2

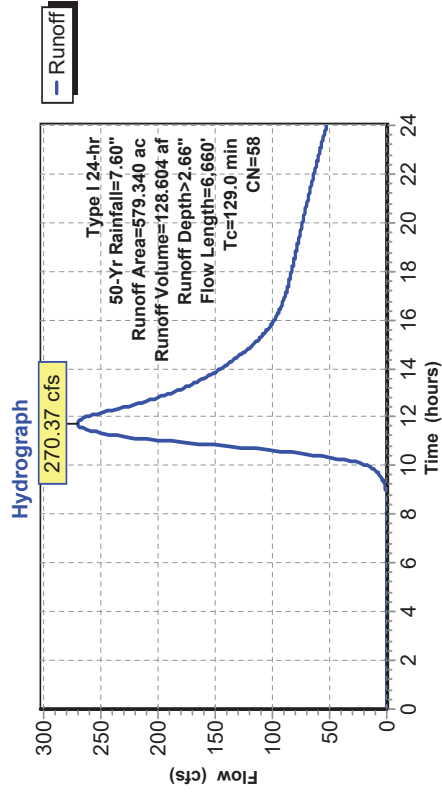
Runoff = 270.37 cfs @ 11.73 hrs, Volume= 128.604 af, Depth> 2.66"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type 1 24-hr 50-Yr Rainfall=7.60"

| Area (ac) | CN | Description |
|-----------|----|-------------------------------|
| * 143.170 | 39 | Herbaceous range, Good, HSG A |
| 333.870 | 62 | Herbaceous range, Good, HSG B |
| 102.300 | 74 | Herbaceous range, Good, HSG C |
| 579.340 | 58 | Weighted Average |

| Tc (min) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|-------------------|----------------|-------------|
| 9.2 | 100 | 0.0200 | 0.18 | |
| 119.8 | 6.560 | 0.0170 | 0.91 | |
| 129.0 | 6.660 | Total | | |

Sheet Flow, Range n= 0.130 P2= 2.90"
Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps

Subcatchment E-2: Onsite Area E-2



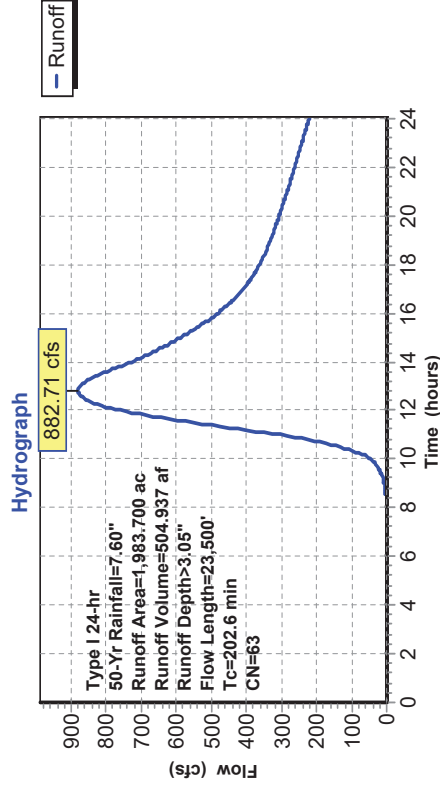
Summary for Subcatchment O-2a: Offsite Area O-2a

Runoff = 882.71 cfs @ 12.83 hrs, Volume= 504.937 af, Depth> 3.05"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type I 24-hr 50-Yr Rainfall=7.60"

| Area (ac) | CN | Description |
|-----------|----|-------------------------------|
| * 158.700 | 39 | Herbaceous range, Good, HSG A |
| 1,329.080 | 62 | Herbaceous range, Good, HSG B |
| 495.920 | 74 | Herbaceous range, Good, HSG C |
| 1,983.700 | 63 | Weighted Average |

| Tc (min) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|-------------------|----------------|--|
| 7.0 | 100 | 0.0400 | 0.24 | Sheet Flow , Range n= 0.130 P2= 2.90" Shallow Concentrated Flow , Short Grass Pasture Kv= 7.0 fps |
| 175.3 | 14,350 | 0.0380 | 1.36 | Trap/Vee/Rect Channel Flow, Assumed Trap Channel Bot.W=10.00' D=3.00' Z= 2.0 1' Top.W=22.00' n= 0.050 |
| 20.3 | 9,050 | 0.0240 | 7.43 | 356.62 |
| 202.6 | 23,500 | Total | | |

Subcatchment O-2a: Offsite Area O-2a



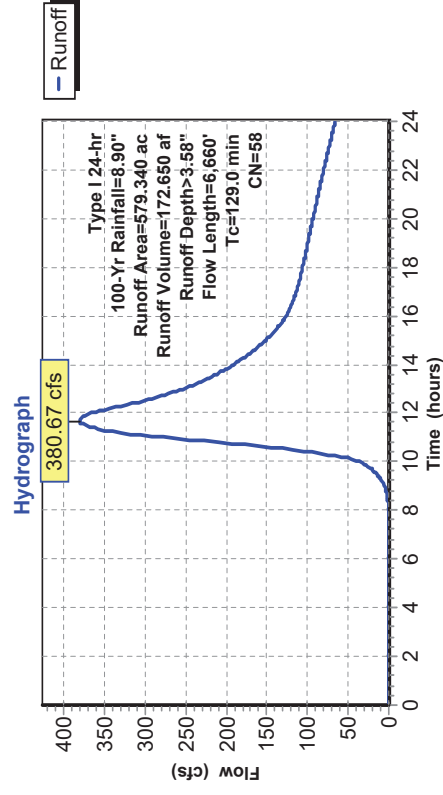
Summary for Subcatchment E-2: Onsite Area E-2

Runoff = 380.67 cfs @ 11.65 hrs, Volume= 172.650 af, Depth> 3.58"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type I 24-hr 100-Yr Rainfall=8.90"

| Area (ac) | CN | Description |
|-----------|----|-------------------------------|
| * 143.170 | 39 | Herbaceous range, Good, HSG A |
| 333.870 | 62 | Herbaceous range, Good, HSG B |
| 102.300 | 74 | Herbaceous range, Good, HSG C |
| 579.340 | 58 | Weighted Average |

| Tc (min) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|-------------------|----------------|--|
| 9.2 | 100 | 0.0200 | 0.18 | Sheet Flow , Range n= 0.130 P2= 2.90" Shallow Concentrated Flow , Short Grass Pasture Kv= 7.0 fps |
| 119.8 | 6,560 | 0.0170 | 0.91 | |
| 129.0 | 6,660 | Total | | |

Subcatchment E-2: Onsite Area E-2



Summary for Subcatchment O-2a: Offsite Area O-2a

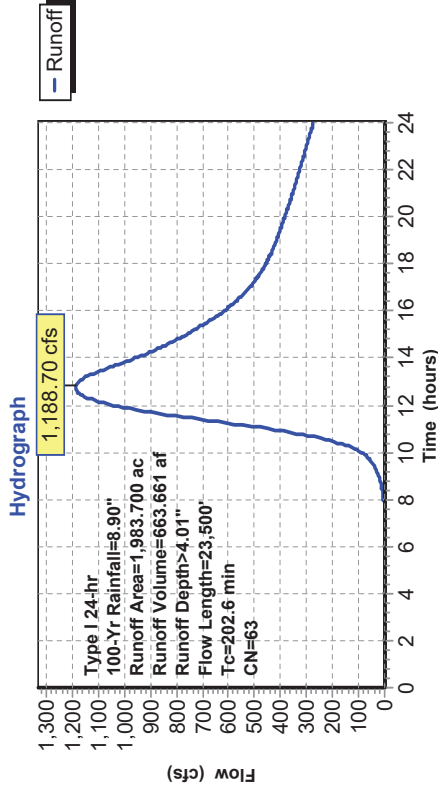
Runoff = 1,188.70 cfs @ 12.81 hrs, Volume= 663,661 af, Depth> 4.01"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type I 24-hr 100-Yr Rainfall=8.90"

| Area (ac) | CN | Description |
|-----------|----|-------------------------------|
| 158.700 | 39 | Herbaceous range, Good, HSG A |
| 1,329.080 | 62 | Herbaceous range, Good, HSG B |
| 495.920 | 74 | Herbaceous range, Good, HSG C |
| 1,983.700 | 63 | Weighted Average |

| Tc (min) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|-------------------|----------------|---|
| 7.0 | 100 | 0.0400 | 0.24 | Sheet Flow, Range n= 0.130 P2= 2.90" |
| 175.3 | 14,350 | 0.0380 | 1.36 | Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps |
| 20.3 | 9,050 | 0.0240 | 7.43 | 356.62 Trap/Vee/Rect Channel Flow, Assumed Trap Channel Bot.W=10.00' D=3.00' Z= 2.0 1' Top.W=22.00 n= 0.050 |
| 202.6 | 23,500 | Total | | |

APPENDIX B
 PULEHUNUI INDEPENDENT STUDY
 MEMO

Subcatchment O-2a: Offsite Area O-2a Hydrograph





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Wailuku, HI 96793

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MEMORANDUM

Project: Pulehuhui Regional Infrastructure Project
Department of Hawaiian Home Lands
Job No: 16-576

Date: September 14, 2018

Subject: Supplemental Independent Alternatives for the Pulehuhui North and South Projects

DIGEST:

The purpose of this memo is to supplement the Pulehuhui Regional Infrastructure Master Plan Report in providing independent infrastructure options for the Pulehuhui North and Pulehuhui South Projects. The options listed below were found to be the most cost efficient options and require no reliance to other stakeholders mentioned in the Pulehuhui Regional Infrastructure Project.

Pulehuhui North

Water System – Connection to DWS System
Estimated Cost: \$9,723,000

DWS would provide water for the project, but a new storage reservoir would be required to provide adequate storage for the project. The new reservoir would not be located at the project site, since there would not be enough elevation to provide adequate pressure to the project area. The location of the reservoir would be determined by DWS; however, the reservoir is expected to be located adjacent to the Waihee Tank Site.

The water domestic demand for the project was calculated based on DWS's Water System Standards (WSS), dated 2002. The projected average daily potable water demand is 449,000 gpd. In accordance with the WSS, the maximum daily water demand is calculated as being 1.5 times the average daily demand, or 673,000 gpd

In accordance with the WSS, the expected tank size is calculated to be 1 MG based on the expected water demand described above.

Sewer System – Private Wastewater Treatment Facility
Estimated Cost: R2 Treatment Plant - \$9,212,000
R1 Treatment Plant - \$13,987,000

A new onsite private wastewater facility will need to be constructed in order to treat the wastewater produced on the project site. The treatment facility can have the option to either provide treatment to an R2 level, which will be disposed of through detention ponds, or provide treatment to a R1 level, which can be reused for onsite irrigation.

The wastewater flow for the project was based on Wastewater Reclamation Division's Wastewater Standards (WWS). The projected average day flow is 172,000 gpd.

Pulehuhui South

Water System – Connection to DWS System
Estimated Cost: \$12,111,000

DWS would provide water for the project, but a new storage reservoir would be required to provide adequate storage for the project. The new reservoir would not be located at the project site, since there would not be enough elevation to provide adequate pressure to the project area. The location of the reservoir would be determined by DWS; however, the reservoir is expected to be located adjacent to the Waihee Tank Site.

The domestic water demand for the project was calculated based on DWS's Water System Standards (WSS), dated 2002. The projected average daily potable water demand is 144,000 gpd. In accordance with the WSS, the maximum daily water demand is calculated as being 1.5 times the average daily demand, or 215,000 gpd

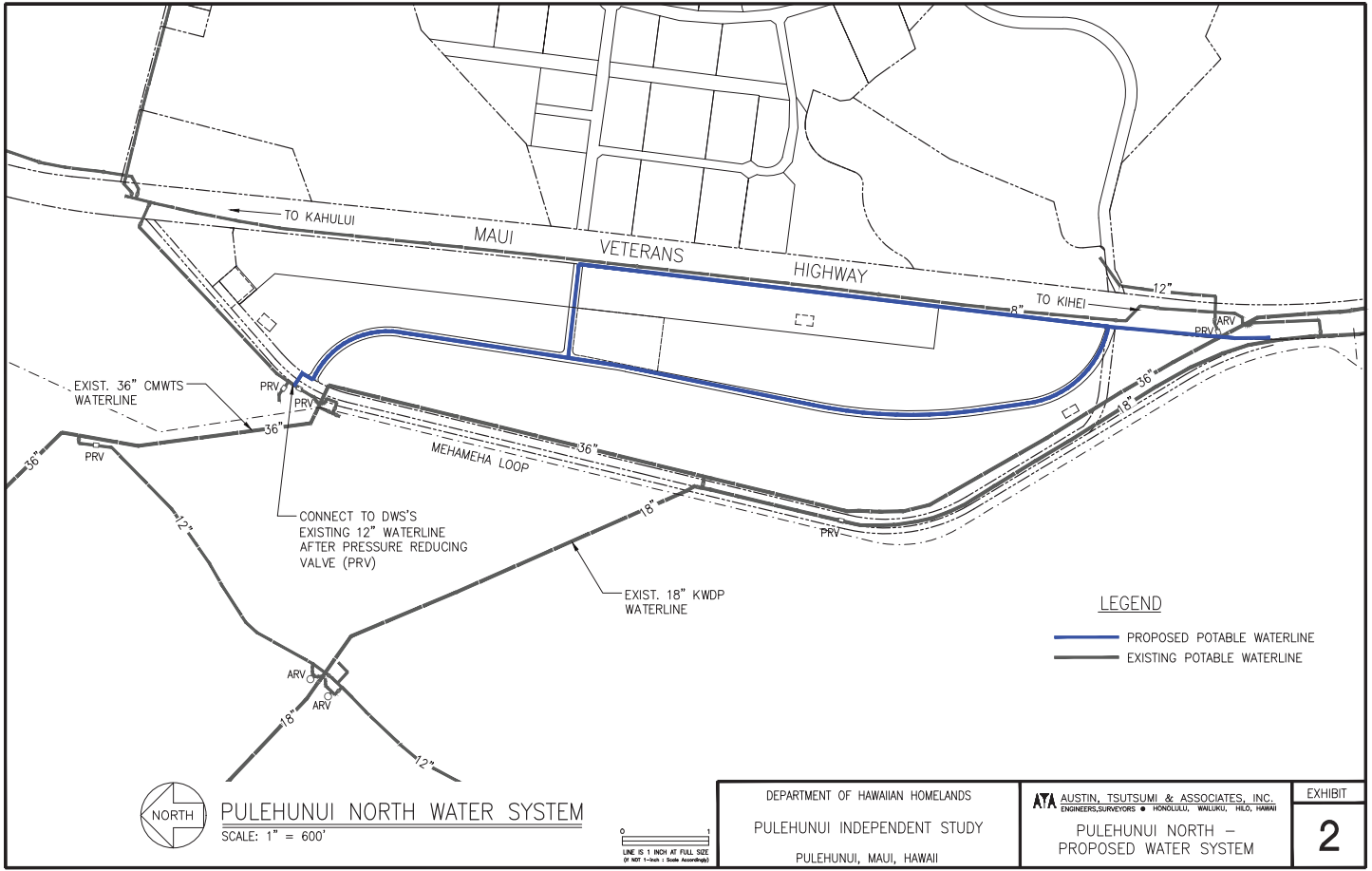
In accordance with the WSS, the expected tank size is calculated to be 0.25 MG based on the expected water demand described above.

Irrigation throughout the site will be served by a non-potable water source described in section 2.5 in the Pulehuhui Regional Infrastructure Master Plan Report.

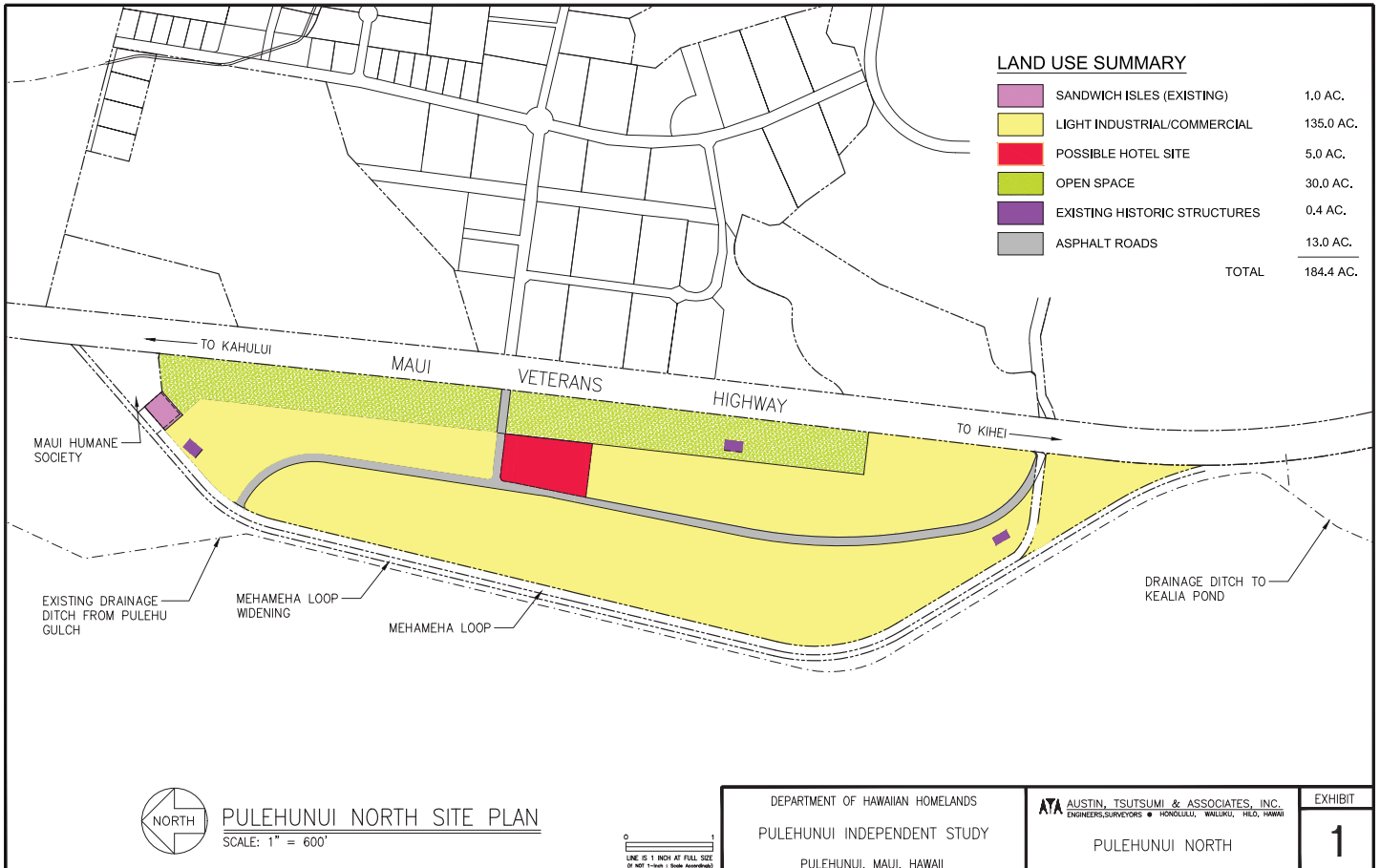
Sewer System – Private Wastewater Treatment Facility
Estimated Cost: R2 Treatment Plant - \$12,659,000
R1 Treatment Plant - \$14,246,000

A new onsite private wastewater facility will need to be constructed in order to treat the waste water produced on the project site. The treatment facility can have the option to either provide treatment to an R2 level, which will be disposed of through detention ponds, or provide treatment to a R1 level, which can be reused for onsite irrigation.

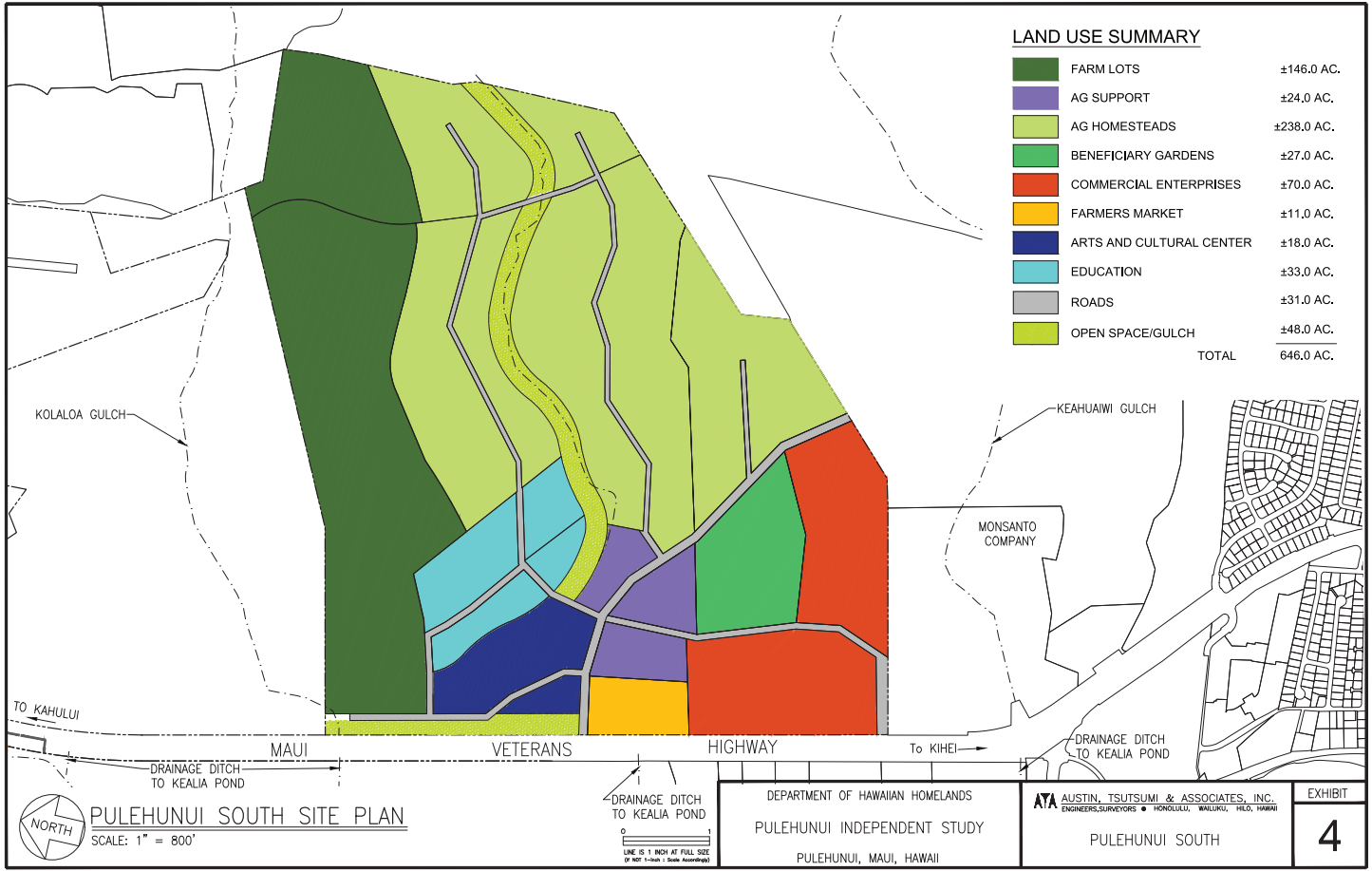
The wastewater flow for the project was based on Wastewater Reclamation Division's Wastewater Standards (WWS). The projected average day flow is 72,000 gpd.



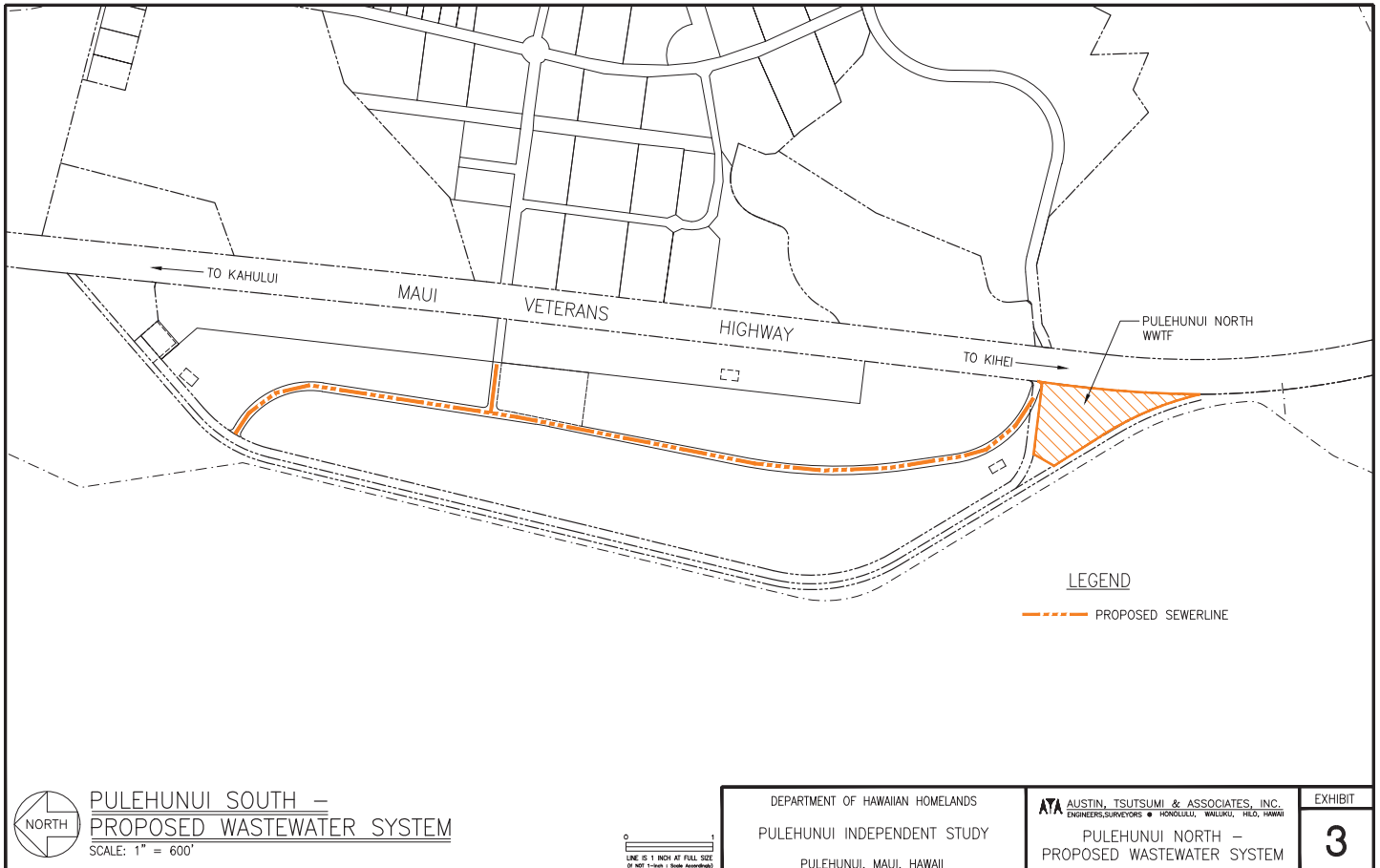
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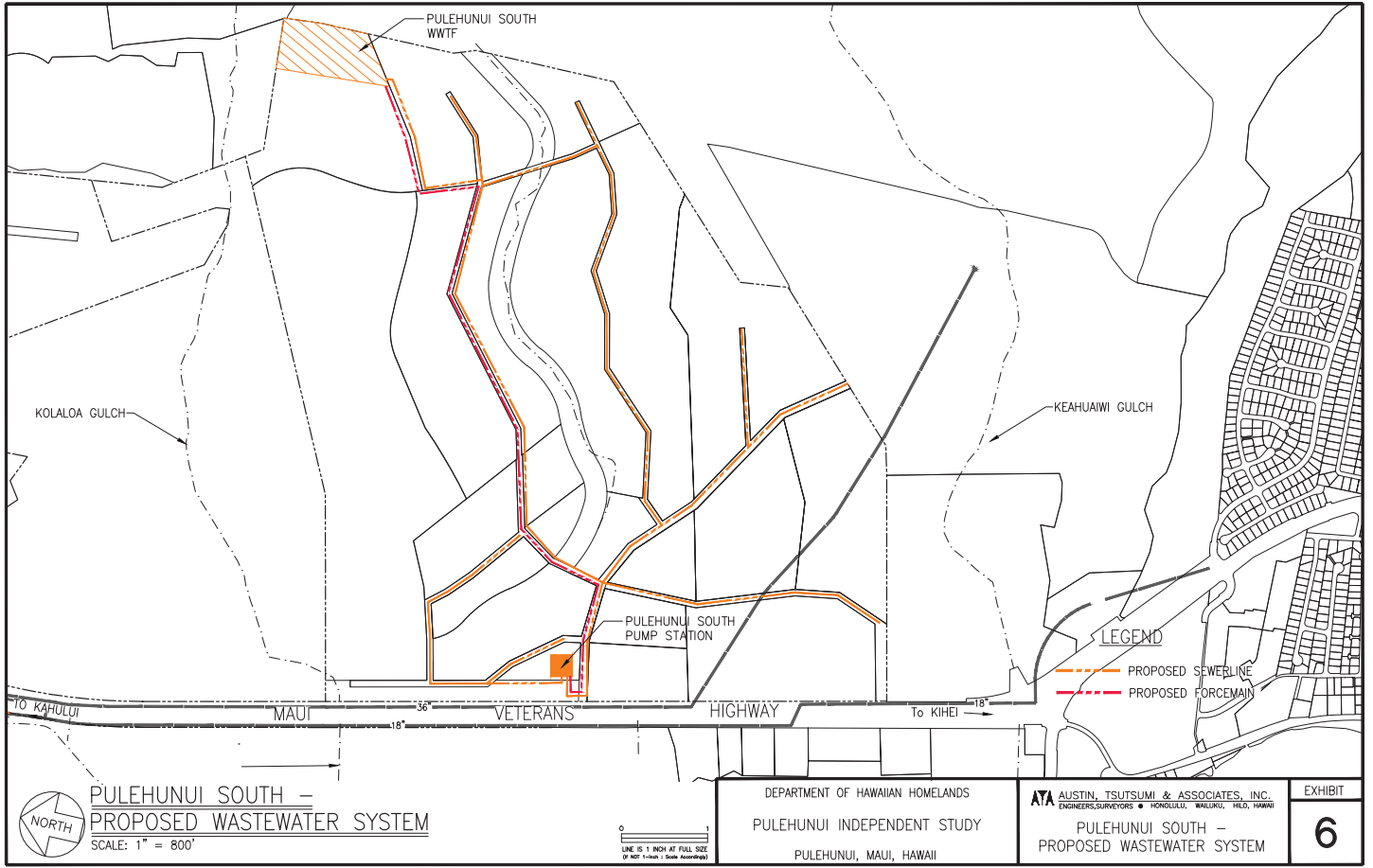
JOB NO. M-16-076
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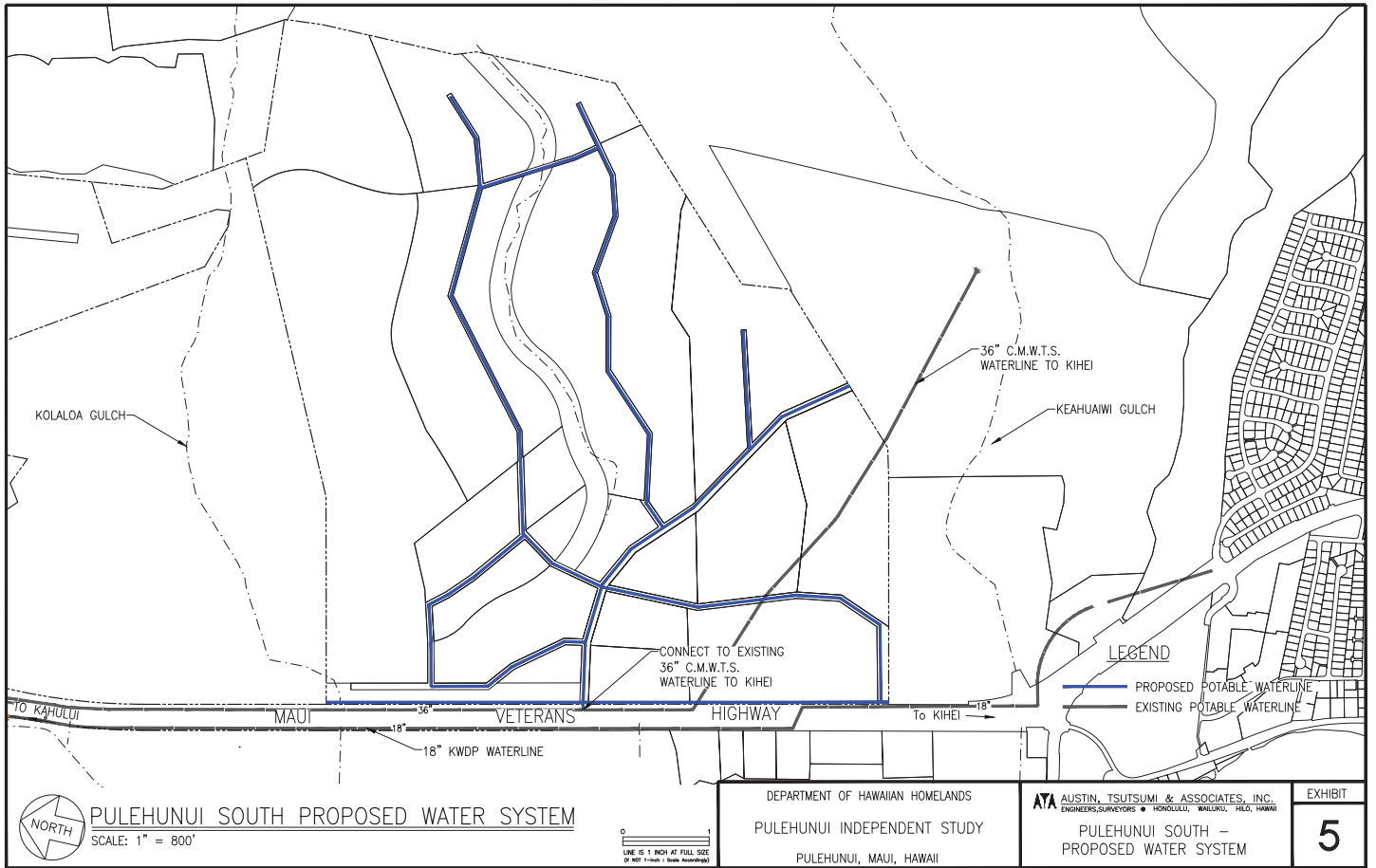
JOB NO. M-16-576
FILENAME: Z:\2016\16-576\ENGINEERING\REPORTS\PER\DRHL INDEPENDENT\EXHIBITS\A. GENERAL SITE PLAN - PULEHUNUI SOUTH.DWG Sep 14, 2016-12:25 PM



JOB NO. M-16-576
FILENAME: Z:\2016\16-576\ENGINEERING\REPORTS\PER\DRHL INDEPENDENT\EXHIBITS\A. WASTEWATER SYSTEM - PULEHUNUI NORTH.DWG Sep 14, 2016-12:24 PM



JOB NO. M-16-076
FILENAME: Z:\2016\16-076\ENGINEERING\REPORTS\PER\04\H. INDEPENDENT EXHIBITS\6. WASTEWATER SYSTEM - PULEHUNUI SOUTH.DWG Sep 14, 2016 - 1:48 PM



JOB NO. M-16-076
FILENAME: Z:\2016\16-076\ENGINEERING\REPORTS\PER\04\H. INDEPENDENT EXHIBITS\5. WATER SYSTEM - PULEHUNUI SOUTH.DWG Sep 14, 2016 - 1:47 PM

PULUHUNUI NORTH PROJECT
PRELIMINARY COST ESTIMATE
CONNECTION TO DWS SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|------------------------------|--|-----------|------|--------------|---------------------|
| PULUHUNUI NORTH | | | | | |
| 1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 6,300 | LF | \$ 300 | \$ 1,890,000 |
| 2 | Fire Hydrant Assembly w/ Conc. Slab | 18 | EA | \$ 7,000 | \$ 126,000 |
| | SUBTOTAL | | | | \$ 2,016,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 3 | 12" Transmission Potable Waterline | 3,700 | LF | \$ 375 | \$ 1,387,500 |
| 4 | Connection to 36" CMWTS | 1 | LS | \$ 50,000 | \$ 50,000 |
| 5 | Off-Site Water Tank | 1 | LS | \$ 5,000,000 | \$ 5,000,000 |
| | SUBTOTAL | | | | \$ 6,438,000 |
| | TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) | | | | \$ 9,723,000 |

Notes:

- 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
- 2 ASSUMES TANK LOCATED AT CMWTS SITE.
- 3 DOES NOT INCLUDE LAND ACQUISITION FOR TANK SITE.

PULUHUNUI NORTH PROJECT
PRELIMINARY COST ESTIMATE
ONSITE R2 TREATMENT FACILITY

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|----------------------------------|--|-----------|------|--------------|---------------------|
| PULUHUNUI NORTH (On-Site) | | | | | |
| 1 | PVC sewer line | 6,000 | LF | \$ 160 | \$ 960,000 |
| 2 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| 3 | R2 Wastewater Treatment Facility | 1 | LS | \$ 6,062,000 | \$ 6,062,000 |
| | SUBTOTAL | | | | \$ 8,010,000 |
| | TOTAL FOR WASTERWATER SYSTEM (WITH 15% CONTINGENCY) | | | | \$ 9,212,000 |

PULEHUNUI NORTH PROJECT
PRELIMINARY COST ESTIMATE

ONSITE R1 TREATMENT FACILITY

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|---|----------------------------------|-----------|------|---------------|----------------------|
| PULEHUNUI NORTH (On-Site) | | | | | |
| 1 | PVC sewer line | 6,000 | LF | \$ 160 | \$ 960,000 |
| 2 | Manholes | 76 | EA | \$ 13,000 | \$ 988,000 |
| 3 | R1 Wastewater Treatment Facility | 1 | LS | \$ 10,214,000 | \$ 10,214,000 |
| SUBTOTAL | | | | | \$ 12,162,000 |
| TOTAL FOR WASTEWATER SYSTEM (WITH 15% CONTINGENCY) | | | | | \$ 13,987,000 |

PULEHUNUI SOUTH PROJECT
PRELIMINARY COST ESTIMATE

CONNECTION TO DWS SYSTEM

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|--|-----------|------|--------------|----------------------|
| PULEHUNUI SOUTH | | | | | |
| 1 | 12" D.I. Waterline, Class 52 w/ Polywrap | 21,800 | LF | \$ 300 | \$ 6,540,000 |
| 2 | Fire Hydrant Assembly w/ Conc. Slab | 63 | EA | \$ 7,000 | \$ 441,000 |
| SUBTOTAL | | | | | \$ 6,981,000 |
| OFF-SITE WATER SYSTEM | | | | | |
| 3 | 12" Transmission Potable Waterline | 5,000 | LF | \$ 300 | \$ 1,500,000 |
| 4 | Connection to 36" CMWTS | 1 | LS | \$ 50,000 | \$ 50,000 |
| 5 | Off-Site Water Tank | 1 | LS | \$ 2,000,000 | \$ 2,000,000 |
| SUBTOTAL | | | | | \$ 3,550,000 |
| TOTAL FOR WATER SYSTEM | | | | | \$ 10,531,000 |
| TOTAL FOR WATER SYSTEM (WITH 15% CONTINGENCY) | | | | | \$ 12,111,000 |

Notes:

- 1 DOES NOT INCLUDE COST FOR WATER DISTRIBUTION SYSTEM FOR INTERIOR ROADS NOT SHOWN ON CONCEPTUAL COMMUNITY MASTER PLAN, OR WATER LATERALS AND METERS FOR INDIVIDUAL LOTS.
- 2 ASSUMES TANK LOCATED AT CMMTS SITE.
- 3 DOES NOT INCLUDE LAND ACQUISITION FOR TANK SITE.

PULEHUNUI SOUTH PROJECT
PRELIMINARY COST ESTIMATE

ONSITE R2 TREATMENT FACILITY

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|----------------------------------|-----------|------|--------------|----------------------|
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 1 | PVC Sewer Line | 21,000 | LF | \$ 160 | \$ 3,360,000 |
| 2 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 3 | Sewer Force Main | 7,100 | LF | \$ 300 | \$ 2,130,000 |
| 4 | Sewer Pump Station | 1 | LS | \$ 580,000 | \$ 580,000 |
| 5 | R2 Wastewater Treatment Facility | 1 | LS | \$ 4,248,000 | \$ 4,248,000 |
| TOTAL FOR WASTERWATER SYSTEM (WITH 15% CONTINGENCY) | | | | | \$ 11,007,000 |

independent wastewater.xlsx
M-16-576

1. WASTERWATER-ALT 1A
9/14/2018

PULEHUNUI SOUTH PROJECT
PRELIMINARY COST ESTIMATE

ONSITE R1 TREATMENT FACILITY

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|----------------------------------|-----------|------|--------------|----------------------|
| PULEHUNUI SOUTH (On-Site) | | | | | |
| 1 | PVC Sewer Line | 21,000 | LF | \$ 160 | \$ 3,360,000 |
| 2 | Manholes | 53 | EA | \$ 13,000 | \$ 689,000 |
| 3 | Sewer Force Main | 7,100 | LF | \$ 300 | \$ 2,130,000 |
| 4 | Sewer Pump Station | 1 | LS | \$ 580,000 | \$ 580,000 |
| 5 | R1 Wastewater Treatment Facility | 1 | LS | \$ 5,628,000 | \$ 5,628,000 |
| TOTAL FOR WASTERWATER SYSTEM (WITH 15% CONTINGENCY) | | | | | \$ 12,387,000 |

independent wastewater.xlsx
M-16-576

1. WASTERWATER-ALT 1A (4)
9/14/2018



No. of pages: 3
Email: lappelgate@atahawaii.com
nakatsuka@atahawaii.com
awong@atahawaii.com
greg@tnwre.com
todd@tnwre.com

Original will be mailed to you. will not be mailed to you.

October 4, 2018
18-193 | 16-01

MEMORANDUM

To: Lisa Appeigate – Austin, Tsutsumi & Associates, Inc.
From: Tom Nance
Subject: Possible Drinking Water Well Sites on TMK 3-1-01:001 in the Waihee Aquifer

APPENDIX C

TOM NANCE WATER RESOURCE ENGINEERING MEMO

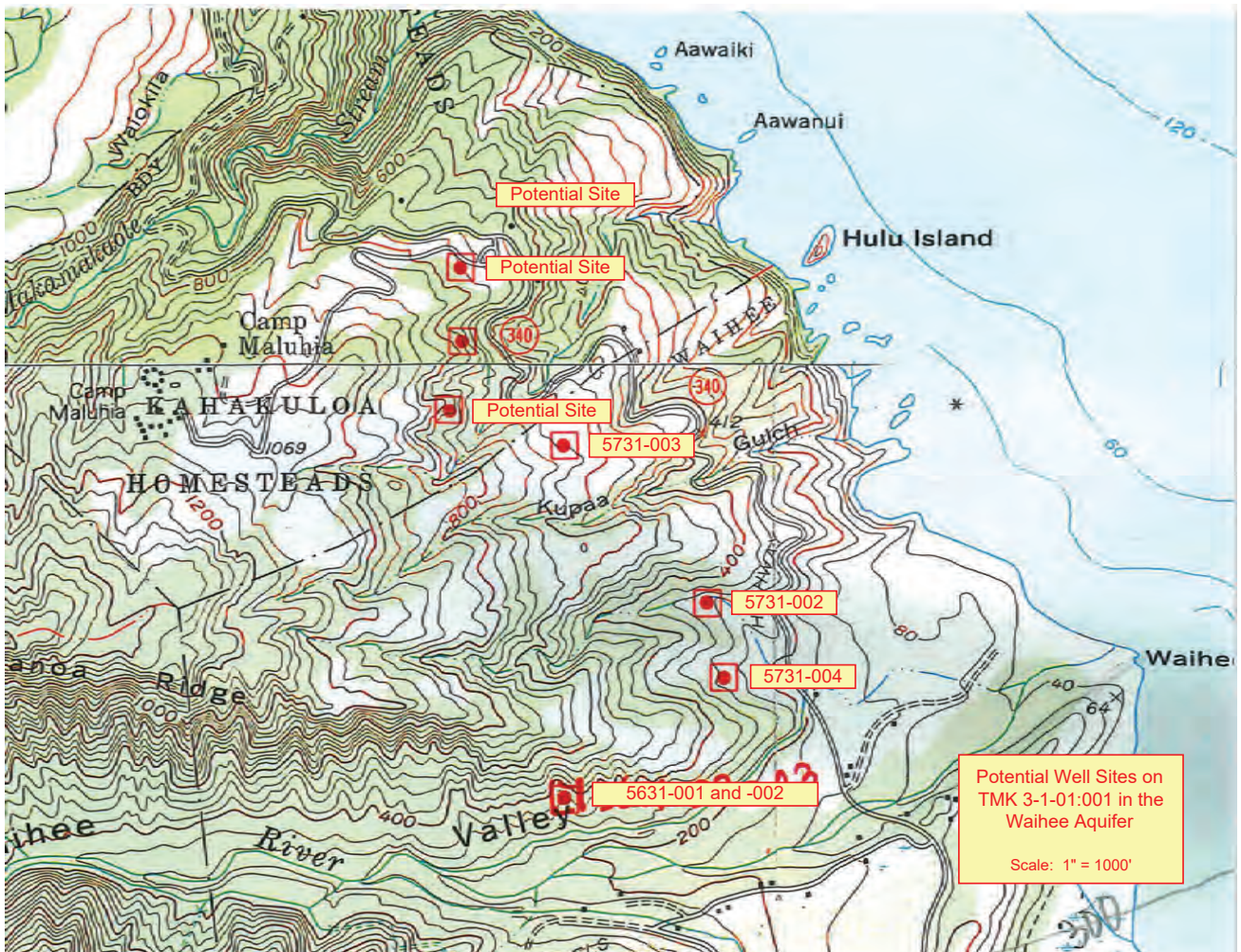
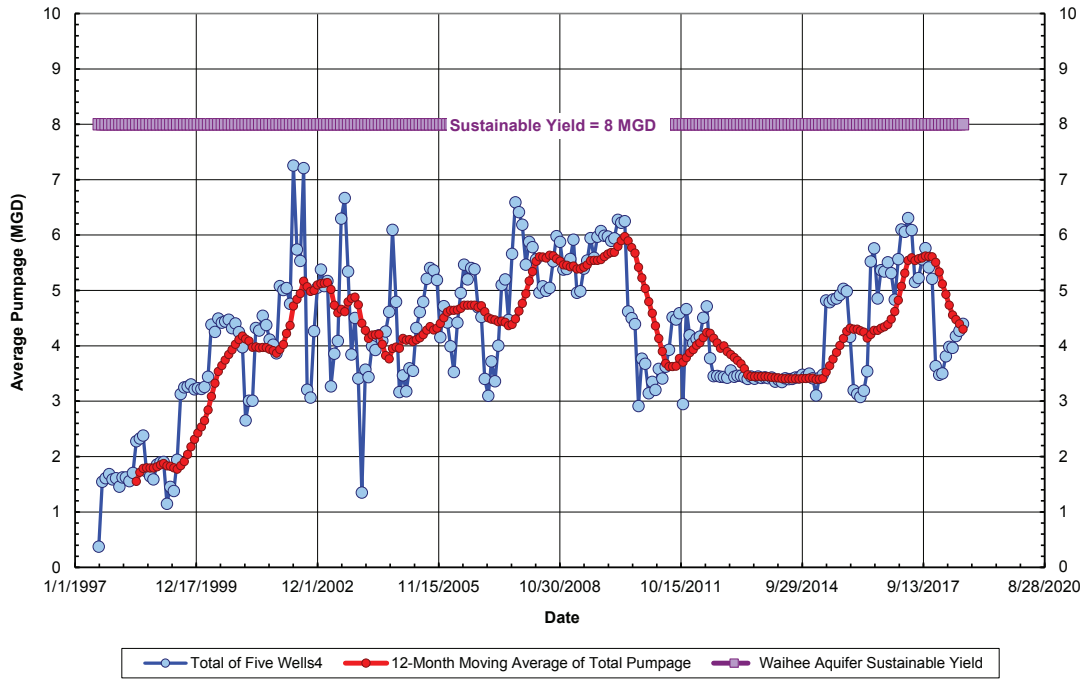
The attached map identifies three potential well sites on the State property identified as TMK 3-1-01:001 in the Waihee Aquifer. They will need to be field adjusted at the appropriate time. Also shown are the locations of five Maui Department of Water Supply (MDWS) wells which draw from the Waihee Aquifer. From north to south, they are: Kupaa (State No. 5731-003); Kanao 1 (State No. 5731-002); Kanao 2 (State No. 5731-004); and North Waihee 1 and 2 (State Nos. 5631-001 and -002).

The potential sites on the State property are at approximately 760-foot elevation, about 120 feet higher than the Kupaa Well and 0.5 MG tank. The nearest two MDWS wells, Kupaa and Kanao 1, have 1200 GPM pumps. Similar capacity pumps could be assumed for the three new wells on the State property. Depending on negotiations with MDWS, their combined supply may or may not be sufficient for DHHL's needs at Pulehunui. Also attached is a graph of pumpage by the five MDWS wells in the Waihee Aquifer. Use of the new wells on the State property could bring the total draft close to the Waihee Aquifer's eight (8) MGD sustainable yield.

Attachments

ec: Ivan Nakatsuka and Adrienne Wong – Austin, Tsutsumi & Associates, Inc.
Greg Fukumitsu and Todd Yonamine – TNWRE Inc.

Total Pumpage by the Five Maui Department of Water Supply Wells in the Waihee Aquifer



**Addendum 1. Refinement of Wastewater
Alternative 2A for the Pūlehunui Regional
Infrastructure Master Plan**



Austin, Tsutsumi & Associates, Inc.

1871 Wili Pa Loop, Suite A
Wailuku, HI 96793

Civil Engineers • Surveyors

Phone: (808) 244-8044 • Fax: (808) 242-9163
E-mail: atamani@atahawaii.com

ADDENDUM TO PRELIMINARY ENGINEERING REPORT PŪLEHUUI REGIONAL INFRASTRUCTURE MASTER PLAN

Project: Pūlehuui Regional Infrastructure Master Plan

Date: April 16, 2019

Subject: Refinement of Wastewater Alternative 2A for the Pūlehuui Regional
Infrastructure Master Plan

DIGEST:

The purpose of this Addendum is to supplement the Pūlehuui Regional Infrastructure Master Plan Report in providing a refinement of Wastewater Alternative 2A for regional wastewater disposal. This refinement, Wastewater Alternative 2A-1, consists of a private Waste Water Reclamation Facility (WWRF) located on the Pūlehuui South Project site that will process the wastewater generated by the surrounding regional shareholder developments. To meet immediate regional wastewater needs while maximizing the use of available funding, the proposed WWRF will be temporary. It will be upgraded to a larger capacity when funds become available and as the surrounding developments grow towards full buildout capacity. The capacity of the temporary WWRF will be 90,000 gpd which is roughly 15% of the full buildout design wastewater flow (618,000 gpd) described in option 2A in the Pūlehuui Regional Infrastructure Master Plan Report.

Wastewater generated from the Pūlehuui North Project, DLNR I&BP, MRP, and MRPSC will be collected by trunk sewerlines and sent to a shareholder owned pump station located on the Pūlehuui North Project site. The collected wastewater will then be pumped to the temporary treatment facility located on the Pūlehuui South Project site. Wastewater generated on the Pūlehuui South Project site will be collected by gravity lines and sent to a DHHL owned pump station near the western end of the site and then also pumped to the temporary WWRF. The temporary WWRF is proposed roughly 2,000 feet inland from Maui Veterans Highway along the Pūlehuui South northern border. Wastewater will be treated to the State of Hawaii R-1 Water

Standards and disposed of via one of two soil aquifer treatment (SAT) ponds and/or utilized to irrigate portions of Pūlehuui South.

As shown in Alternative 2C of the PER, a second location for the temporary WWRF will be considered in which the WWRF will be sited in the north eastern corner of the Pūlehuui South Project site, approximately 6,000 feet from Maui Veterans Highway. The advantage to this location would be that the produced R1 effluent could be used as irrigation for Pūlehuui South via gravity lines, given that the WWRF would be at the highest onsite elevation. Another advantage to this location is that it will minimize the efforts needed to upgrade the temporary facility to the future permanent WWRF, since this will ideally be the proposed location for the permanent facility. Being that the alternative location is located much further inland; the cost of this alternative will be higher due added force main, utility, and roadway lengths. Therefore unless additional funding is obtained prior to the bidding process, it is unlikely that this option will be feasible. The cost for the temporary WWRF (Alternative 2A-1) is roughly \$17.26 million, whereas the cost for the temporary WWRF at the Alternative 2C site is \$22.45 million.

Ultimately, either of these locations would be ideal to meet long-term regional needs for a private WWRF – either through expansion of the temporary facility at one site, moderately-sized facilities at both sites, or relocation of all treatment facilities from one site to the other. Regardless, Alternative 2A-1 is anticipated to adequately meet immediate regional wastewater needs and will be designed to fully utilize available funding.

Due to ongoing investigations into environmental hazards, anticipated surrounding land uses, and drainage conditions, it is anticipated that the previously shown alignment for the DHHL North Trunk Sewer, DLNR Trunk Sewer and certain force main alignments may not be feasible. Potential environmental hazards on fallow DLNR lands (TMK (2) 3-8-008-038) and storm water inundation at the lower portions of the land potentially constrain portions of the force main and gravity sewer, therefore a significant portion of the new force main and the gravity collector sewer from the DLNR land (TMK (2)3-8-008:001) may be located within the highway right-of-way, and not parallel to the highway within TMK (2) 3-8-008-038 as shown in the PER. In light of recent drainage analyses it is anticipated that the DHHL North Trunk Sewer may be located in the center of Pūlehuui North, rather than follow Mehamaha Loop as shown in the PER. Refer to the attached revised exhibits, which are numbered as they were in the PER.

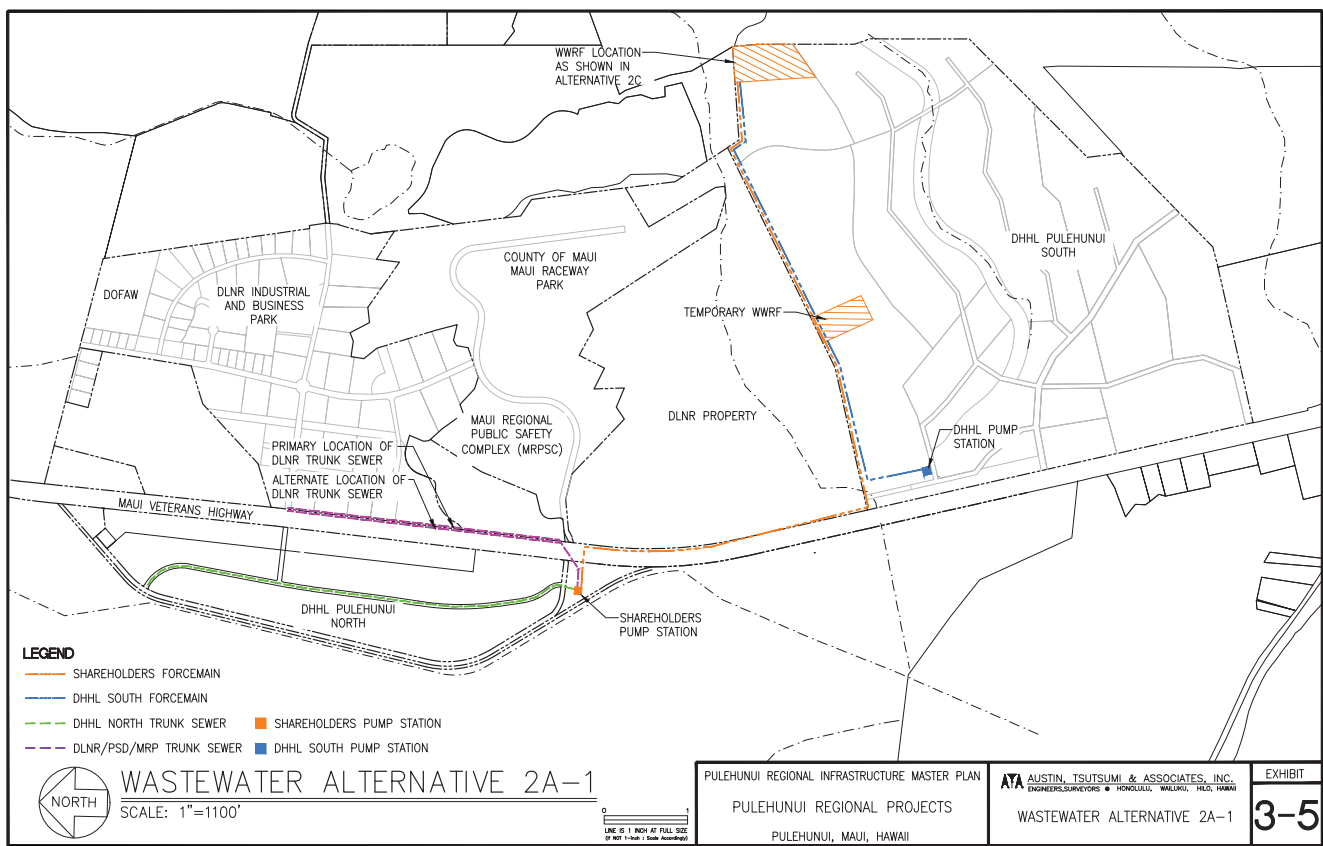
PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PRELIMINARY OPINION OF PROBABLE COST

WASTE WATER SYSTEM ALTERNATIVE 2A-1

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|-------------------------------------|-----------|------|-----------------|----------------------|
| PULEHUNUI NORTH | | | | | |
| 1 | PVC Sewer Line (Trunk) | 6,875 | LF | \$ 160 | \$ 1,100,000 |
| 2 | Manholes | 30 | EA | \$ 13,000 | \$ 390,000 |
| | | | | SUBTOTAL | \$ 1,490,000 |
| PULEHUNUI SOUTH | | | | | |
| 1 | Forcemain | 3,000 | LF | \$ 260 | \$ 780,000 |
| 2 | Submersible Pump Station | 1 | EA | \$ 480,000 | \$ 480,000 |
| | | | | SUBTOTAL | \$ 1,260,000 |
| DLNR BUSINESS PARK | | | | | |
| 1 | PVC Sewer Line (Trunk) | 4,485 | LF | \$ 160 | \$ 717,600 |
| 2 | Manholes | 18 | EA | \$ 13,000 | \$ 234,000 |
| | | | | SUBTOTAL | \$ 952,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (SHAREHOLDERS) | | | | | |
| 1 | Temporary WWTF | 1 | LS | \$ 3,700,000 | \$ 3,700,000 |
| 2 | Pump Station on DHHL North Property | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 3 | Forcemain from PN to WWTF | 6,450 | LF | \$ 300 | \$ 1,935,000 |
| 4 | AC Road to WWTF | 3,000 | LF | \$ 500 | \$ 1,500,000 |
| 5 | Potable Waterline To WWTF | 3,000 | LF | \$ 300 | \$ 900,000 |
| 6 | Electrical/Communication to site | 1 | LS | \$ 500,000 | \$ 500,000 |
| | | | | SUBTOTAL | \$ 11,835,000 |
| MISC | | | | | |
| 1 | Survey | 1 | LS | \$ 81,000 | \$ 81,000 |
| 2 | Engineering Report/Permits | 1 | LS | \$ 1,640,000 | \$ 1,640,000 |
| | | | | SUBTOTAL | \$ 1,721,000 |
| TOTAL FOR WASTEWATER ALTERNATIVE 2A-1 | | | | | \$ 17,260,000 |

Cost (02-07-19) DK.xlsx
M-16-576

1. WASTEWATER-ALT 2A-1
2/13/2019



FOR NO. M-16-576
FILED IN PROJECT FOLDER M-16-576 DHHL PROJECT/ENGINEERING/REPORTS/PER REGIONAL FACILITY/ENR/2019/ALTERNATIVES EXHIBIT 3-5 ALTERNATIVE 2A-1.DWG Apr 14, 2019-8:29 AM

**PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PRELIMINARY OPINION OF PROBABLE COST**

**WASTE WATER SYSTEM ALTERNATE 2A-1
ADDITIVE ALTERNATIVE WWRF LOCATION**

| Item No. | Item Description | Est. Qty. | Unit | Unit Price | Total Price |
|--|--------------------------------------|-----------|------|-----------------|----------------------|
| PULEHUNUI NORTH | | | | | |
| 1 | PVC Sewer Line (Trunk) | 6,875 | LF | \$ 160 | \$ 1,100,000 |
| 2 | Manholes | 30 | EA | \$ 13,000 | \$ 390,000 |
| | | | | SUBTOTAL | \$ 1,490,000 |
| PULEHUNUI SOUTH | | | | | |
| 1 | Forcemain | 6,800 | LF | \$ 260 | \$ 1,768,000 |
| 2 | Submersible Pump Station | 1 | EA | \$ 480,000 | \$ 480,000 |
| | | | | SUBTOTAL | \$ 2,248,000 |
| DLNR BUSINESS PARK | | | | | |
| 1 | PVC Sewer Line (Trunk) | 4,485 | LF | \$ 160 | \$ 717,600 |
| 2 | Manholes | 18 | EA | \$ 13,000 | \$ 234,000 |
| | | | | SUBTOTAL | \$ 952,000 |
| WASTEWATER COLLECTION AND TREATMENT SYSTEM (SHAREHOLDERS) | | | | | |
| 1 | Temporary WWTF | 1 | LS | \$ 3,700,000 | \$ 3,700,000 |
| 2 | Pump Station on DHHI, North Property | 1 | LS | \$ 3,300,000 | \$ 3,300,000 |
| 3 | Forcemain from PN to WWTF | 10,300 | LF | \$ 300 | \$ 3,090,000 |
| 4 | AC Road to WWTF | 6,800 | LF | \$ 500 | \$ 3,400,000 |
| 5 | Potable Waterline To WWTF | 6,800 | LF | \$ 300 | \$ 2,040,000 |
| 6 | Electrical/Communication to site | 1 | LS | \$ 500,000 | \$ 500,000 |
| | | | | SUBTOTAL | \$ 16,030,000 |
| MISC | | | | | |
| 1 | Survey | 1 | LS | \$ 90,000 | \$ 90,000 |
| 2 | Engineering Report/Permits | 1 | LS | \$ 1,640,000 | \$ 1,640,000 |
| | | | | SUBTOTAL | \$ 1,730,000 |
| TOTAL FOR WASTEWATER ALTERNATIVE 2A-1 | | | | | \$ 22,450,000 |

**Addendum 2. Refinement of Wastewater
Alternatives 1A, 1B, 2A, 2B, 2C, 3A, 3B, 4, and
4 Interim for the Pūlehunui Regional
Infrastructure Master Plan**



Austin, Tsutsumi & Associates, Inc.

1871 Wili Pa Loop, Suite A
Wailuku, HI 96793

Civil Engineers • Surveyors

Phone: (808) 244-8044 • Fax: (808) 242-9163
E-mail: atamaui@atahawaii.com

ADDENDUM TO PRELIMINARY ENGINEERING REPORT PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

Project: Pūlehunui Regional Infrastructure Master Plan

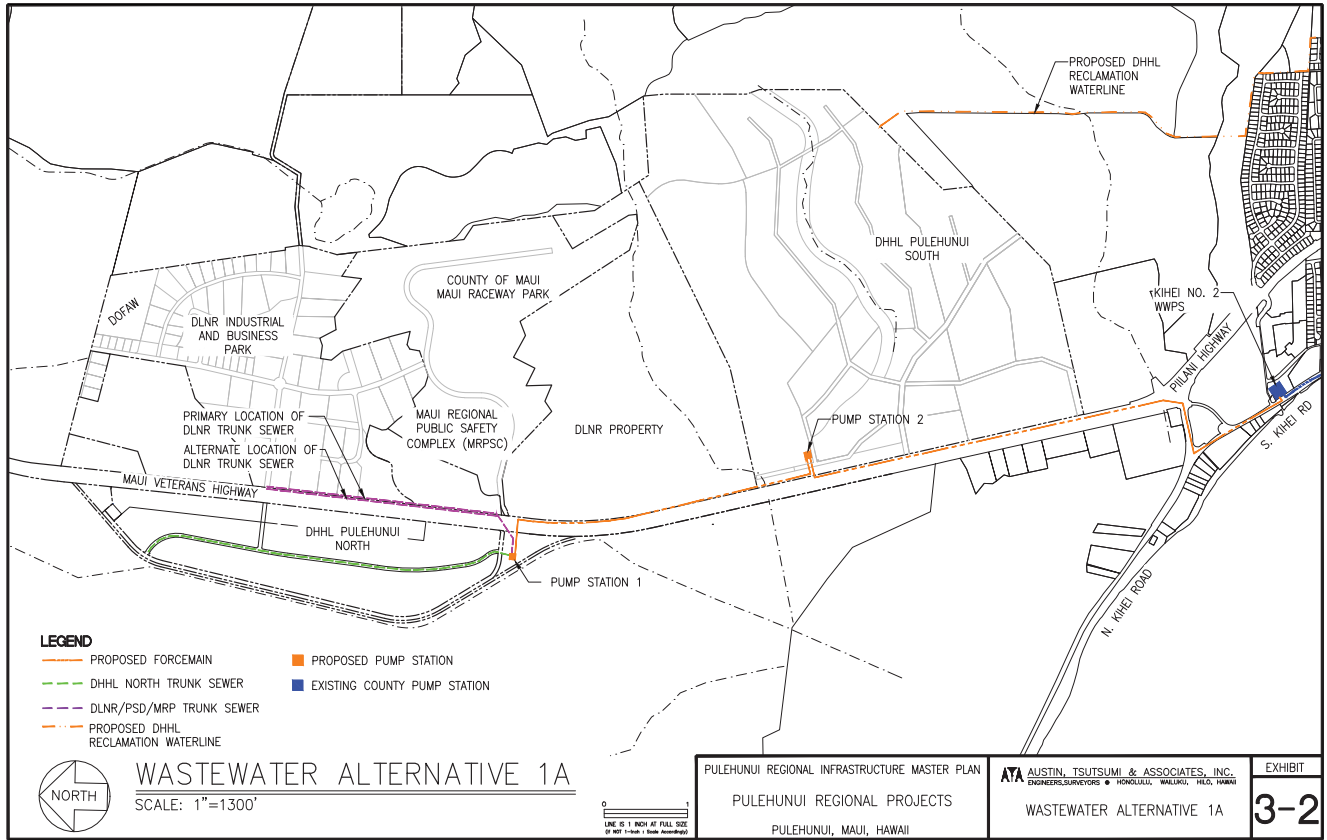
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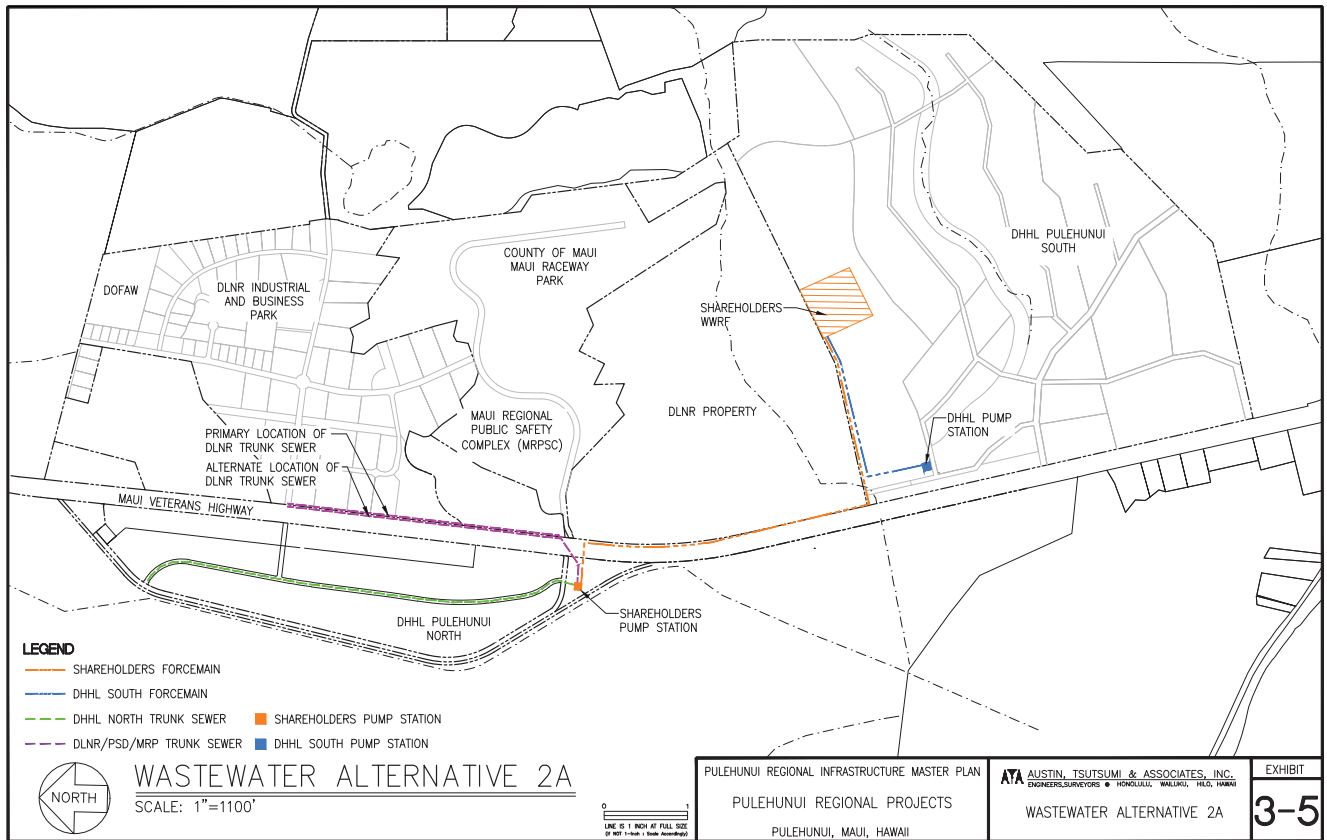
Subject: Refinement of Wastewater Alternatives 1A, 1B, 2A, 2B, 2C, 3A, 3B, 4, and 4 Interim for the Pūlehunui Regional Infrastructure Master Plan

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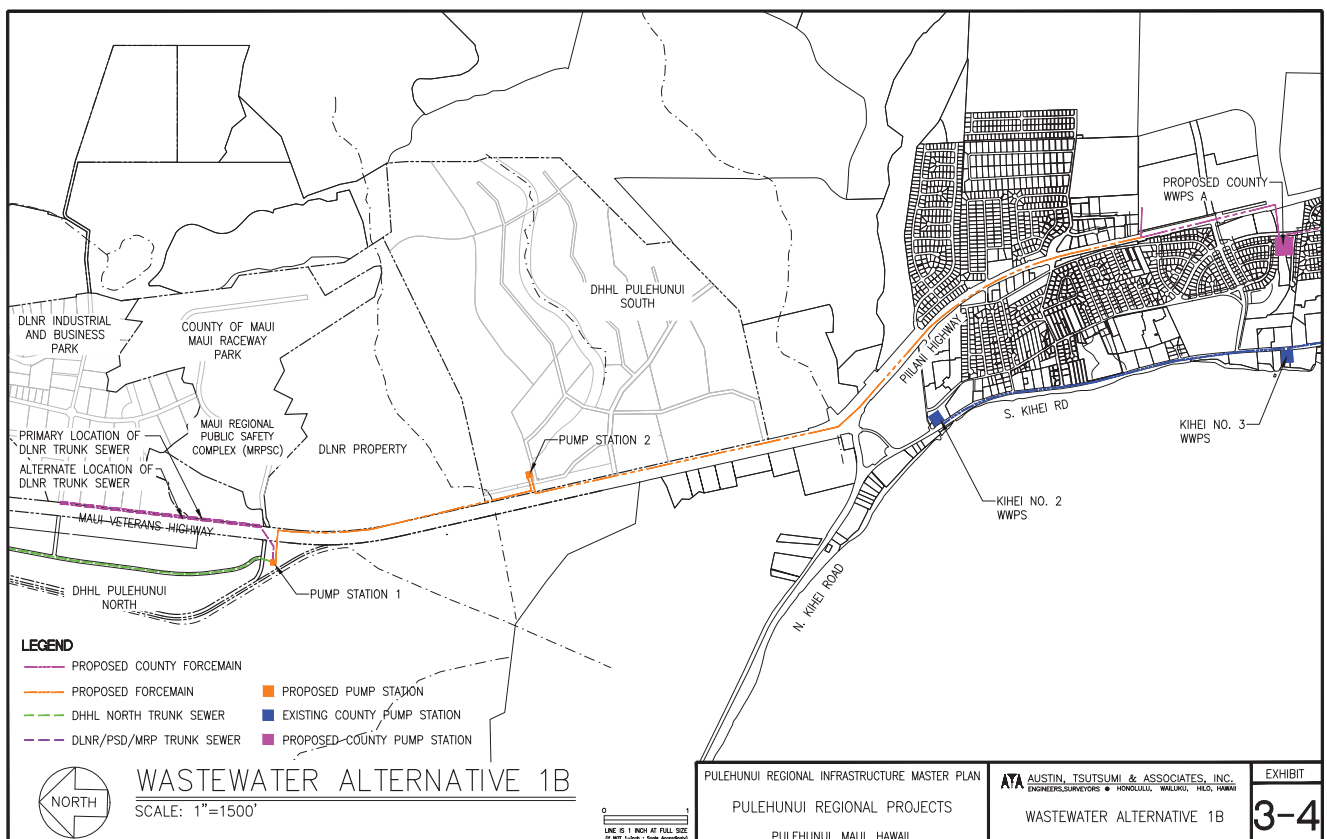
The purpose of this Addendum is to supplement the Pūlehunui Regional Infrastructure Master Plan Report in providing a refinement of alternatives for regional wastewater disposal.

Due to ongoing investigations into environmental hazards, anticipated surrounding land uses, and drainage conditions, it is anticipated that the previously shown alignment for the DHHL North Trunk Sewer, DLNR Trunk Sewer and certain force main alignments may not be feasible. Potential environmental hazards on fallow DLNR lands (TMK (2) 3-8-008-038) and storm water inundation at the lower portions of the land potentially constrain portions of the force main and gravity sewer, therefore a significant portion of the new force main and the gravity collector sewer from the DLNR land (TMK (2)3-8-008:001) may be located within the highway right-of-way, and not parallel to the highway within TMK (2) 3-8-008-038 as shown in the PER. In light of recent drainage analyses it is anticipated that the DHHL North Trunk Sewer may be located in the center of Pūlehunui North, rather than follow Mehamaha Loop as shown in the PER. Refer to the attached revised exhibits, which are numbered as they were in the PER.

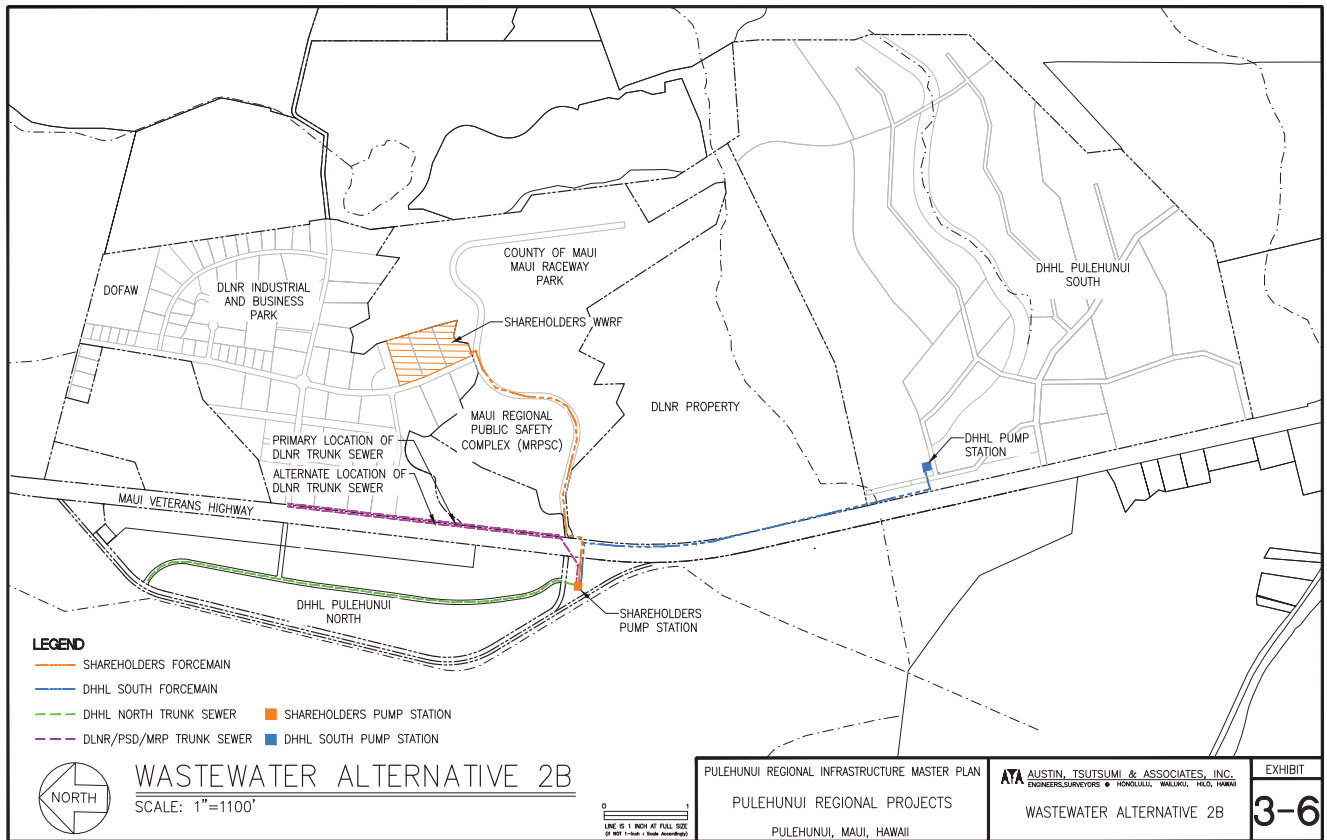




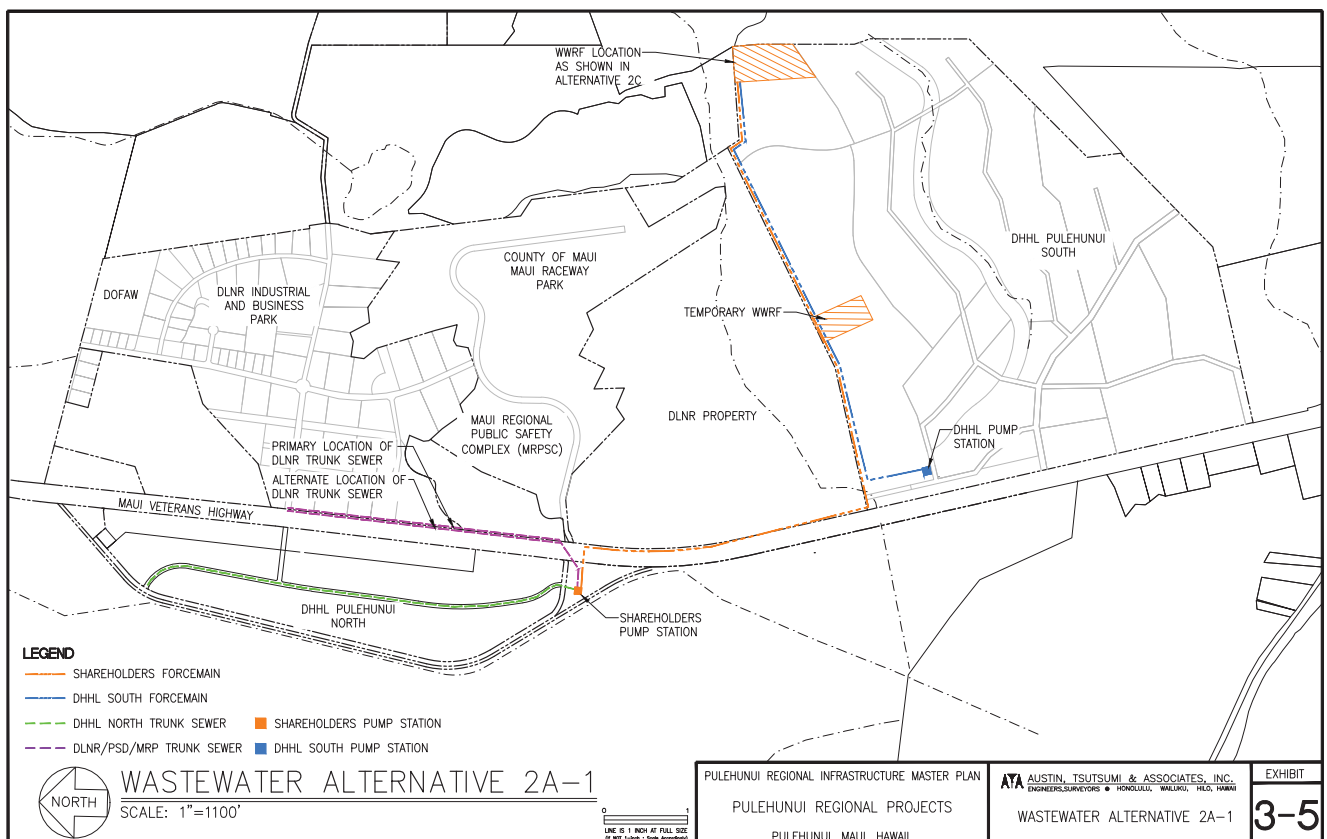
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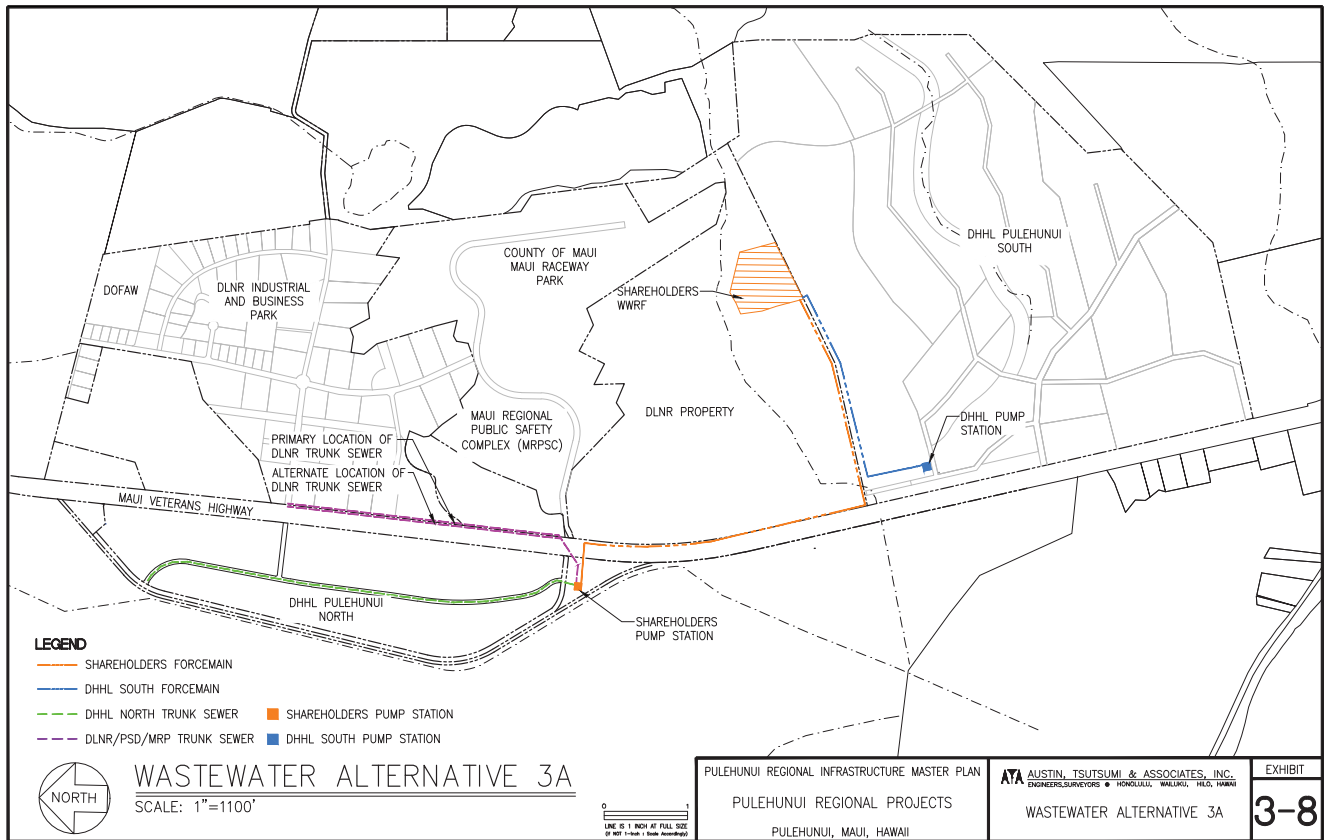
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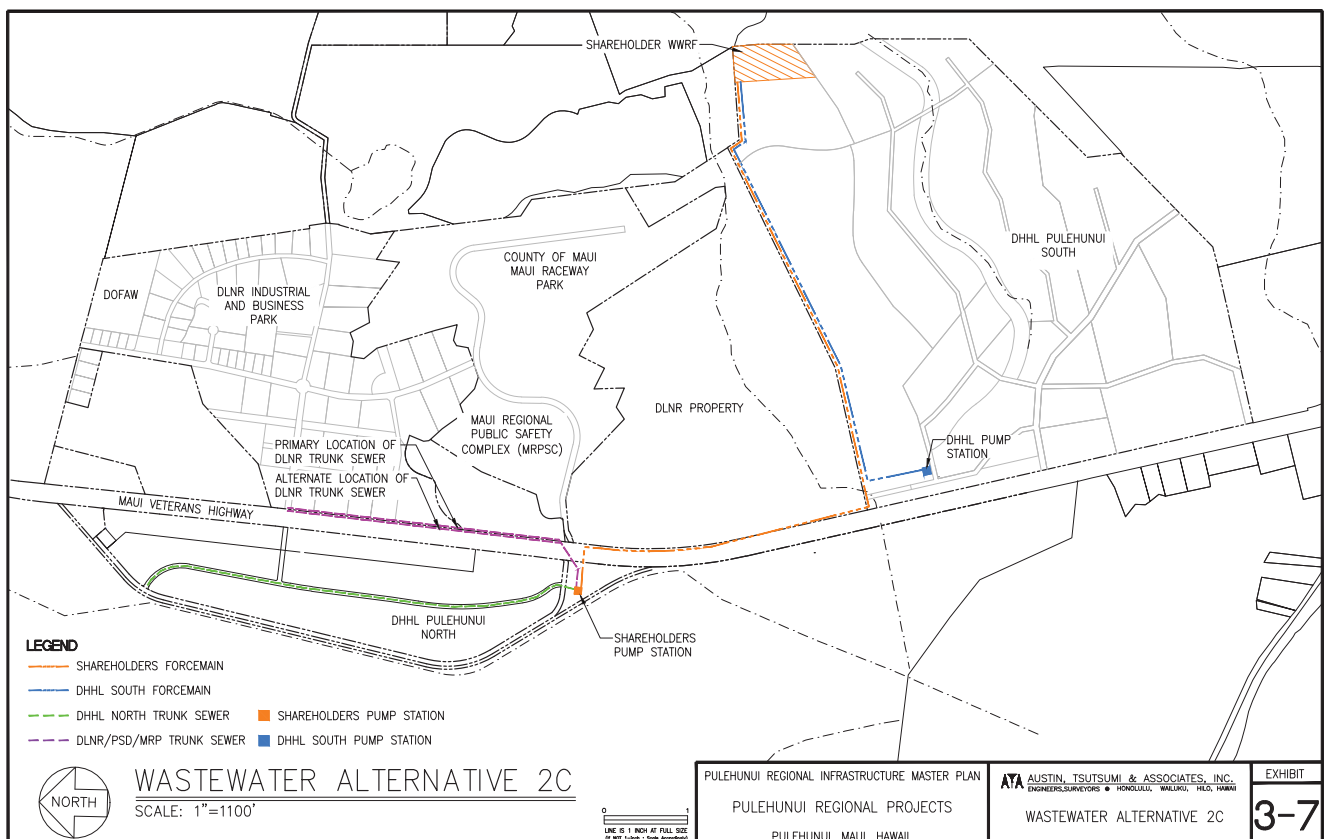
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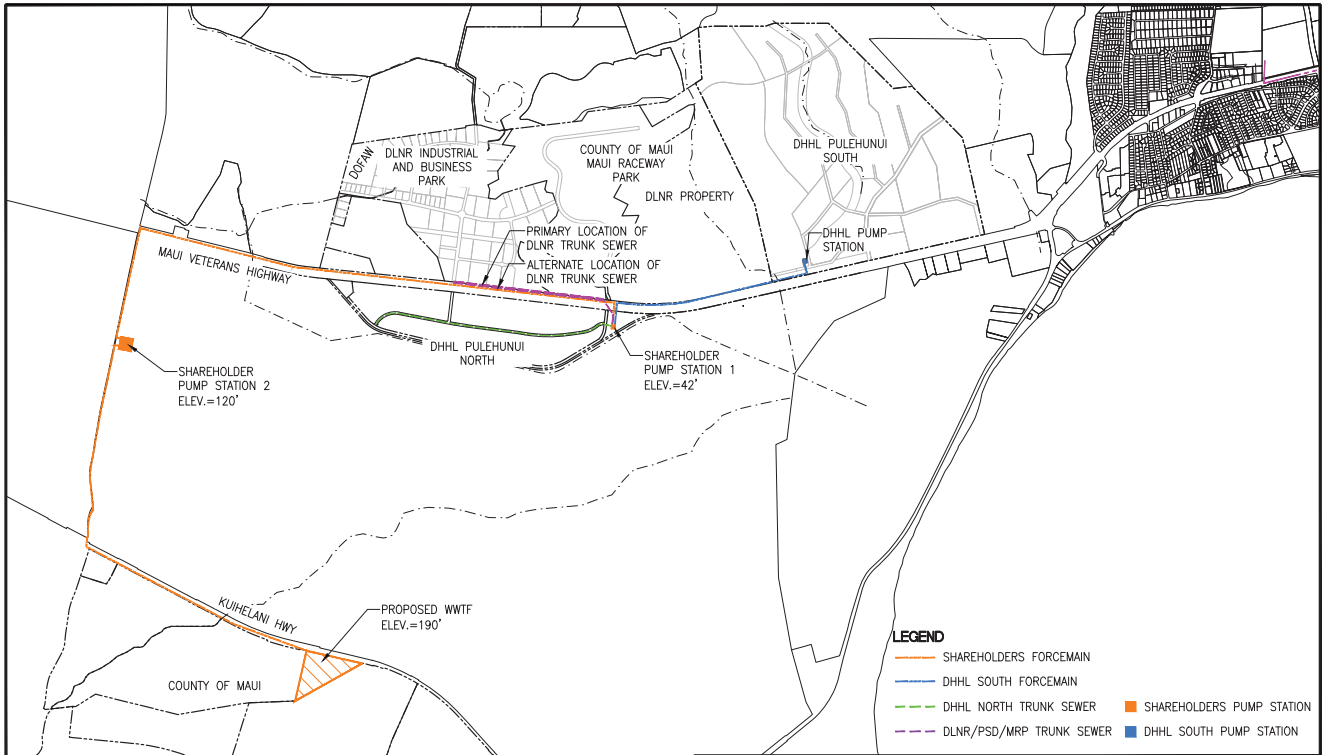
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WASTEWATER ALTERNATIVE 4
SCALE: 1" = 2,000'

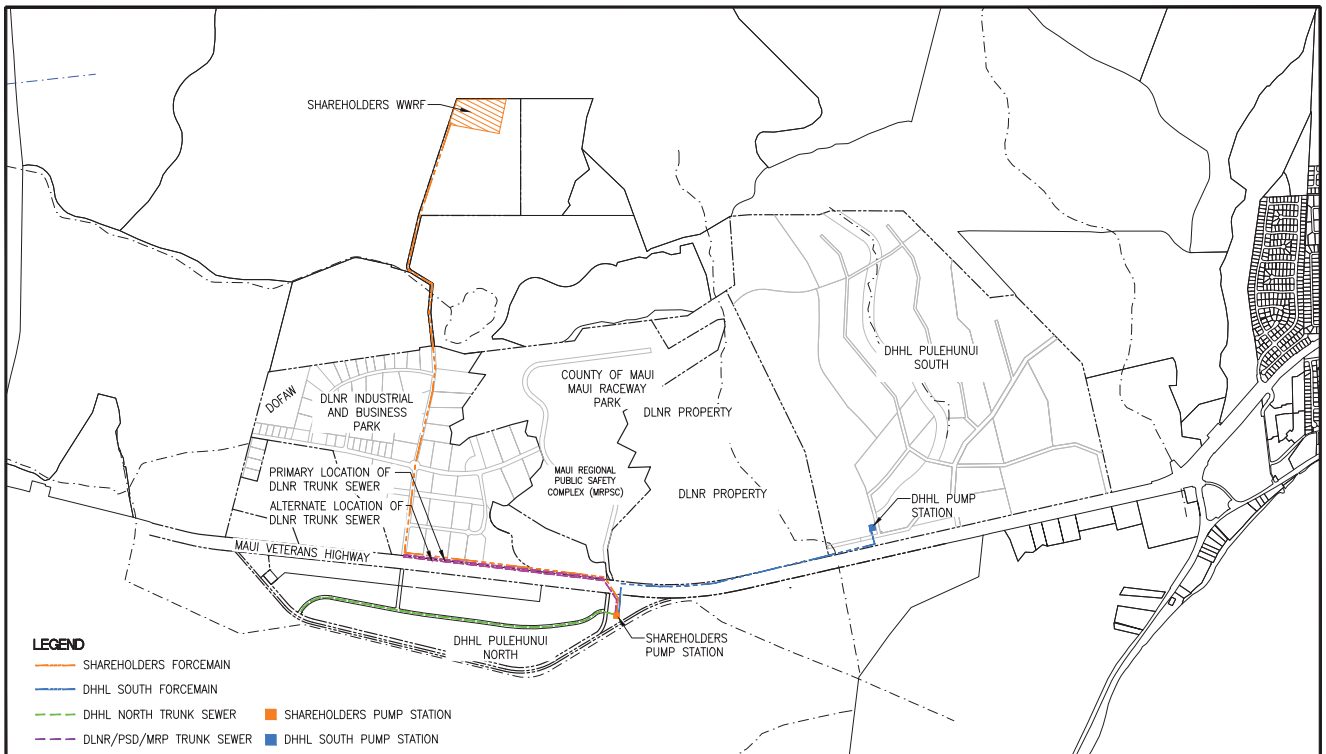


PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, MAUI, HILO, HAWAII
WASTEWATER ALTERNATIVE 4

EXHIBIT
3-10
AUGUST 2018

JOB NO. M-16-276
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WASTEWATER ALTERNATIVE 3B
SCALE: 1" = 1500'

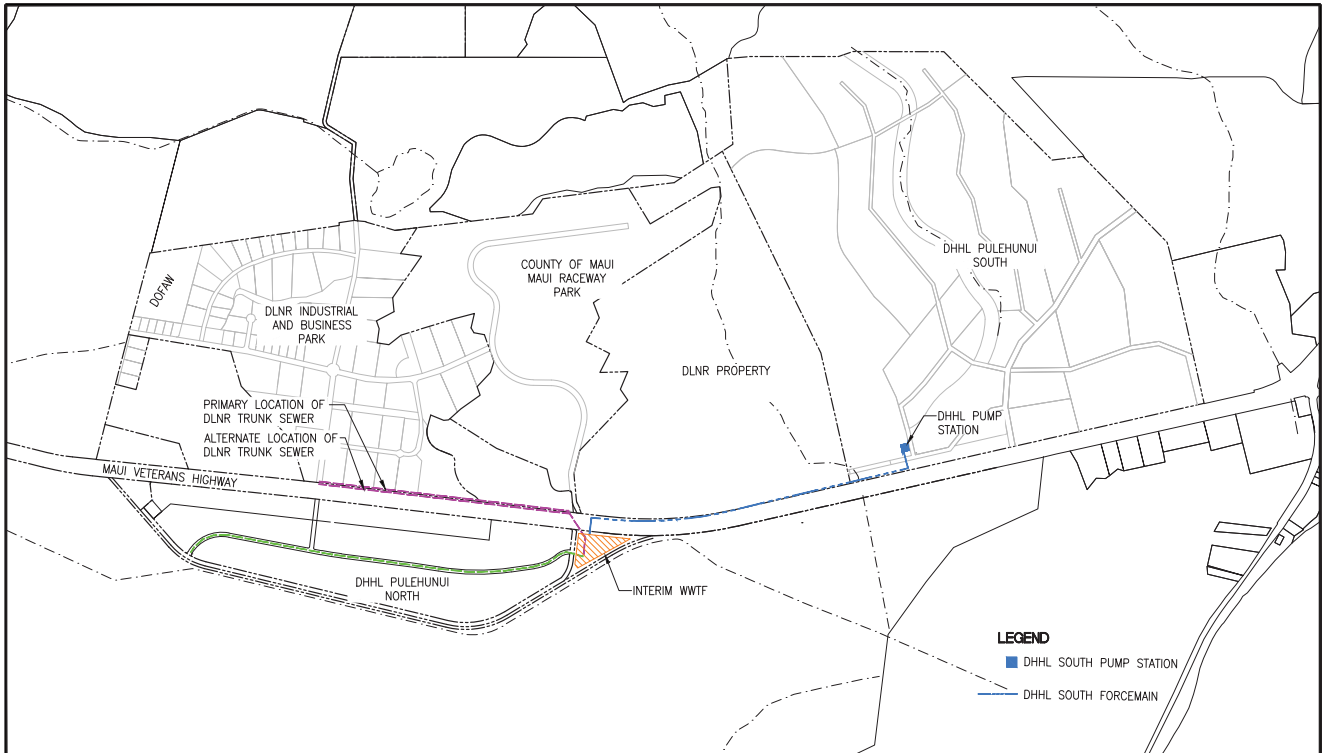


PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, MAUI, HILO, HAWAII
WASTEWATER ALTERNATIVE 3B

EXHIBIT
3-9
AUGUST 2018

JOB NO. M-16-276
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WASTEWATER ALTERNATIVE 4 INTERIM
SCALE: 1" = 2,000'

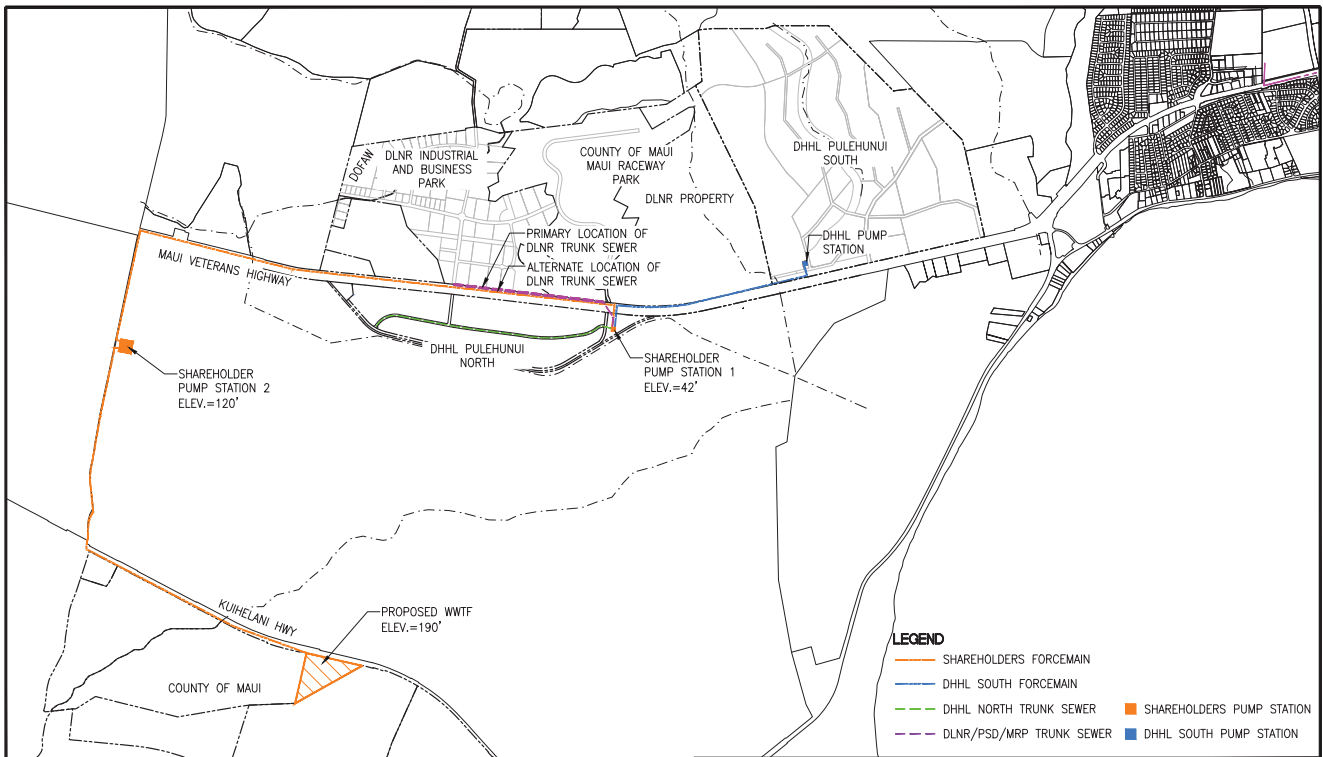


PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS/SURVEYORS • HONOLULU, MAUI, HILO, HAWAII
WASTEWATER ALTERNATIVE 4
INTERIM

EXHIBIT
3-11
AUGUST 2018

JOB NO. M-16-276
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WASTEWATER ALTERNATIVE 4
SCALE: 1" = 2,000'



PULEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN
PULEHUNUI REGIONAL PROJECTS
PULEHUNUI, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS/SURVEYORS • HONOLULU, MAUI, HILO, HAWAII
WASTEWATER ALTERNATIVE 4

EXHIBIT
3-10
AUGUST 2018

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APPENDIX D

AGRICULTURAL FEASIBILITY STUDY

Agricultural Feasibility Study for Pulehunui
Puunene, Maui, Hawaii
August 2018

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Agricultural Feasibility Study for Pulehunui

Puunene, Maui, Hawaii

August, 2018

Agricon Hawaii Inc.
P.O. Box 95
Kamuela, HI 96743

**Agricultural Feasibility Study for Pulehunu
Puunene, Maui, Hawaii
August 2018**

Summary

The land at Pulehunu South is well suited for growing crops but will require water for irrigation and windbreaks to buffer the strong tradewinds.

Following the demise of Hawaiian Commercial & Sugar Company (HC&S) there is strong community support for the continuation of agriculture on this land. This is also an opportunity to grow food crops that support the people who live on Maui and to provide economic opportunities to local people as well.

Most of this property is classified Prime Agricultural Lands of Importance to the State of Hawaii and are therefore considered to be the best lands for agriculture.

This report outlines the farming requirements, the various crops that can be grown, and the processing and marketing issues that need to be addressed.

Description of the Property

The land at Pulehunu South, TMK 2-3-8-008:034, is located south of the old Puunene Airport and borders Mokulele Highway. This property is owned by the Department of Hawaiian Home Lands (DHHL). The total land area is 646 acres. The land was formerly in sugar cane and was referred to by Hawaiian Commercial & Sugar Company as fields 916 and 917. The land is in the saddle between Haleakala and the West Maui Mountains, and is therefore subject to the strong tradewinds that flow through the saddle.

Agricultural Feasibility at This Location

The feasibility of developing agriculture at Pulehunu is excellent for many reasons. One of the main reasons is the existence of good natural resources on this property. The climate is tropical and suitable for many crops. The soils within this parcel are optimally suited for growing crops. Water is available for irrigation. Although Pulehunu is exposed to the northeast tradewinds during the year, substantial windbreaks will mitigate this problem.

There is strong community and Maui government support for developing a diversified and intensive agricultural industry. In addition local Maui and state economic conditions show considerable opportunity for agricultural production. Maui has an increasing population that is more sophisticated about its food choices, demanding locally produced food that is grown using sustainable farming methods. The visitor industry also prefers gourmet meals featuring locally grown food. Food grown on Maui for Maui has the added advantage of providing a reduction in transportation costs and energy utilization. In the event of a natural or man-made disaster having a reliable food supply on Maui for its

**Agricultural Feasibility Study for Pulehunu
Puunene, Maui, Hawaii
August 2018**

island population mitigates a food crisis and provides a level of food security. Food grown near the market decreases the chance of food born illness by shortening the transportation and handling.

There are numerous advanced technologies being used today in agricultural production that are available for Pulehunu farmers. The ability to apply technical efficiencies to improve production costs also is an opportunity to work with the high schools and community college to train a skilled agricultural workforce on Maui. Some examples of the technology in use are Global Positioning Systems (GPS); optical sorters; artificial intelligence (AI); data driven processes; and computer programs for planting, cultivation, tracking, etc. Utilization of appropriate technology can provide the farmers at Pulehunu the opportunity to develop smarter labor practices, be more cost efficient, have fewer detrimental environmental impacts and safer food handling processes.

Other opportunities at Pulehunu are greenhouse farming, solar and wind farm energy generation, and natural farming using indigenous microorganisms or Effective Microorganisms (EM). Aquaponics in a closed system with fish and a crop is a small farm enterprise that is both sustainable and efficient for limited space.

Natural Resources

Climate Information

The climate in the Pulehunu area is dry, hot and windy. These climate conditions require certain mitigation measures for a successful agricultural enterprise, including irrigation and windbreaks.

The average temperature is 75+ degrees Fahrenheit (F) but varies depending on the time of year and amount of cloud cover and wind. The temperature during the day can be in the mid to high 80's F during the summer and low 70's F to high 60's during the winter. Night temperatures are usually slightly lower.

Average annual rainfall for this property in central Maui is 16 to 17 inches. The rainfall does not occur evenly throughout the year and is often associated with low pressure systems that bring heavy rains in short time spans.

The prevailing winds are the northeast tradewinds. These tradewind speeds vary from 5 to 10 miles per hour (mph) to 25 to 30 mph or higher. Recently global climate change has affected the weather and light variable winds or southwesterly wind or no wind are more prevalent now than in the past. See Appendix A – Topography and Rainfall Data.

Soils and Topographic Information

The elevation within the property ranges from 20 feet above sea level on the southwestern boundary at Mokulele Highway gradually rising to 120 feet elevation on the northeastern boundary. The terrain is well suited for cultivation by hand and by machinery.

Agricultural Feasibility Study for Pulehunui
Puunene, Maui, Hawaii
August 2018

The soils consist of sandy loams and silty clay loams some of which are very stony. A large section of the property (104.2 acres) is Alae sandy loam with 3 to 7 percent slopes, and is located along the lower western part of the property and the northeastern corner. The largest soil type (310.7 acres) in Pulehunui is Pulehu cobbly silt loam with 0 to 3 percent slopes. This soil is located in the middle of the property and in the far northeastern corner. There are 110.3 acres of Waiakoa extremely stony silty clay loam with 3 to 25 percent slopes, eroded, situated in areas throughout the parcel.

The sandy loam soils are deep soils with more than 80 inches before there are restrictive features such as the water table. Their water holding capacity is limited which means the soils dry out quickly after a rain and irrigation is a requirement for satisfactory crop growth. Flooding does occur occasionally but water ponding is not an issue. These sandy loam soils are excellent for farming.

The silty clay loam soils are deep, well drained soils with minimal rain runoff. The depth to the water table is 80 inches. Flooding and ponding are not a problem and rarely occur. These soils are excellent for farming. The Waiakoa silty clay loam soils in some areas are steeper (3 to 25 percent slopes) and rockier. These soils may provide some difficulties for machine cultivation. Mulching and ground cover establishment would mitigate some of the problem using equipment in these rocky soils. However, these soils are good soils for farming. See Appendix B: Soils Information.

State of Hawaii Land Classification

Most of this property is classified Prime Agricultural Lands of Importance to the State of Hawaii (Prime ALISH), considered to be the best lands for agriculture. Small scattered areas are designated Other ALISH and are the Waiakoa stony silty clay soils which are not as easy to farm since they are rocky.

The NRCS Land Evaluation and Site Assessment (LESA) follows the ALISH map showing important Agricultural Lands as delineated by the LESEA Commission. Small areas of Waiakoa stony silty clay soils are not included as important Agricultural Lands. See Appendix C: State of Hawaii Land Classification Maps.

Farming Considerations

Water Availability

Water to these parcels was provided by HC&S until the parcels were returned to DHHL following the termination of the lease between the two parties. As a condition of the lease, HC&S removed most of the irrigation infrastructure.

Water to irrigate crops is essential. DHHL will need to negotiate an agreement with HC&S or a successor company to purchase water. DHHL will also need to create the infrastructure to provide water to the farmers who lease the land.

DHHL will need to determine the location of the water source provided by HC&S or a successor company. DHHL will then need to map the farm lots and create a distribution system that provides an irrigation water source for each farm lot.

Agricultural Feasibility Study for Pulehunui
Puunene, Maui, Hawaii
August 2018

The general requirement for most crops is 60 acre inches of rainfall per year, equally distributed throughout the year. An acre inch is equal to one inch of water distributed across one acre. There are 27,154 gallons per acre inch. Therefore, if one acre receives 60 inches of rainfall in a year this amounts to slightly over 1.6 million gallons of water.

By using recorded rainfall history for this area, one can determine how much water can be expected to come from rainfall. If drip irrigation is used to irrigate the various crops, then the irrigation requirement, without rainfall, will be directly related to the number of square feet per acre that is actually irrigated. If one assumes that the drip irrigation system irrigates one quarter of an acre and that there is no rainfall in a given year, then the annual water used will be one quarter of the gallons mentioned above or approximately one-half a million gallons.

The actual water required for irrigation will be determined by the crop, the age of the crop and the annual rainfall.

Organic Farming

To qualify as an organic farm the land must not have been exposed to chemicals, such as herbicides, pesticides and fertilizers, for three years. A 25 foot buffer from a farm using chemicals must be maintained. Because the Monsanto Company seed corn farm is the neighbor on the Kihel side of the property and the land is directly adjacent to Pulehunui, a buffer is required for organic farms along this boundary with Monsanto. To facilitate isolation of the organic farms from any prohibited chemical drift it is recommended that the organic farms be clustered in one area of the property.

International Certification Services, Inc. (ICS) of Medina, North Dakota certifies organic farms on Maui and has two certifiers, Kelly Abbott and Sarah Townsend, on the island. For a farm to sell United States Department of Agriculture (USDA) certified organic crops as a part of the USDA National Organic Program the farm must be certified. Some farms prefer to practice sustainable, organic farming but not go through the lengthy process of being certified. There are several organic farms on Maui including one near Pulehunui.

University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) Maui Extension Service has an agent Kylie Wong whose expertise is assisting farmers with organic farming methods. UH CTAHR's Ted Radovich, the associate specialist for sustainable and organic farming systems in the Department of Tropical Plant and Soil Sciences at the University of Hawaii at Manoa is another resource for the farmers interested in organic farming methods.

Conventional Farming

Sustainable, productive farming can be done without complying with the strict requirements of organic farming. Good farming practices using minimal pesticides and insecticides and applying chemical fertilizers based on soil and tissue analysis are practices that will promote healthy crop production year after year. In addition planting ground covers and mulching around the crops add organic matter that will encourage beneficial fungus and bacteria that facilitate root absorption of the soil nutrients. UH-CTAHR has a diagnostic lab that analyses soil and plant tissue. The CTAHR Maui extension agent, Robin

Agricultural Feasibility Study for Pulehunui
Puunene, Maui, Hawaii
August 2018

Shimabuku, can assist the farmer in the recommended method of taking soil and tissue samples for analysis and send the samples to the diagnostic lab in Honolulu. The CTAHR extension agent can also work with the farmer to develop an integrated pest management system (IPM) to control crop pests utilizing natural as well as chemical controls. There are other helpful resources available to the farmers such as <https://gofarmhawaii.org>.

Windbreaks

Windbreaks will be required to protect the crops grown on the land. Trade winds coming from the northeast are the norm and will reduce both plant growth and crop production if windbreaks are not installed.

A primary windbreak should be planted along the windward boundary of the property. The recommended tree used for the primary windbreak is Norfolk Island Pine (*Araucaria heterophyllum*). Two rows with trees planted in an alternating sequence, that is the second row blocks the gap created by the first row are recommended. Norfolk Island Pine is considered a tall species that is designed to diffuse the wind rather than block it. Tree species that create a barrier to the wind are not recommended. This type of windbreak will force the wind to climb up and over the windbreak. The wind accelerates down the back side of the windbreak causing damage to crops.

Plants or non-growing material can be used for intermediate windbreaks. The distance between intermediate windbreaks will depend upon the crops that are planted and the effectiveness of the primary windbreak.

Erosion Control

The primary concern regarding soil erosion is the wind. Windbreaks are essential. Leaving land bare during crop rotation cycles is a concern. Crop rotation cycles should include some sort of a cover crop that does not leave fallow land open and subject to soil erosion due to wind.

Crops

Crops should grow very well on this property because of the high quality soils found throughout the entire parcel. Irrigation is a requisite for farming as the rainfall is limited. Windbreaks will be necessary to protect the crops from the damaging tradewinds that blow from the northeast steadily when high pressure climate systems are prevalent in the Islands. Because the crop on this property for a century or more was sugar cane the soils may be depleted in some nutrients and organic matter and require mineral and organic matter fertilization to ensure optimum crop growth and production.

Because of the excellent agricultural conditions these lands are well suited for many types of crops including commercial farm crops and for subsistence agriculture and family table food. To be successful good soil stewardship and consistent farming practices are required.

Agricultural Feasibility Study for Pulehunui
Puunene, Maui, Hawaii
August 2018

Crop selection depends on the goals of the farmer and the market for the crop. Some of the crops that would be suitable are listed, but there are many others that may be grown successfully. As the farmer develops a farm plan, assistance on crop types, varieties and suitability can be obtained from the UH-CTAHR Extension Service agents on Maui. These agents work closely with Maui farmers and are familiar with the farming conditions and plants. The United States Department of Agriculture Natural Resource and Conservation Service (USDA-NRCS) on Maui is another excellent resource for the Pulehunui farmer.

Some of the recommendations to improve crop production and quality are mulching and ground covers. A soil test that includes the acidity (pH) will assist with the initial fertilizer program. The UH-CTAHR Diagnostic Lab does soil testing for a reasonable fee and the UH-CTAHR Extension agent can assist with the method for taking a soil sample. Careful planning of the farm layout and infrastructure is recommended prior to actual initiation of the farm development. The USDA-NRCS has an online program called *NRCS 808 Planner for Conservation Practices* that is a good tool for the farm planning process.

A list of potential crops includes many types of crops including orchard crops, vegetable crops, medicinal, Hawaiian crops and small livestock and bees to name a few. Some of the categories and crops selected as representative of those crops are included.

Orchard Crops: Farms 126 acres/2

The orchard trees listed below are included because they are suitable for the agricultural conditions at Pulehunui and have good market appeal. However, many other orchard crops could be grown here. This is a sample of the potential for orchard crops on this property.

- Avocado: The Sharwil variety of avocado can be shipped without a post-harvest treatment to certain mainland US states during fall and winter months. This coincides with the usual avocado harvesting schedules from October to January of the following year. There is a United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) protocol to follow.

- Breadfruit: Breadfruit cultivation and marketing have been revived in recent years because of ease of cultivation and large volume of nutritious fruit produced per tree. Chefs are developing delicious new recipes for breadfruit and its demand is increasing. Since the breadfruit is a traditional tree of the Pacific Islands, it has a strong cultural appeal.

- Cacao: Cacao as a commercial crop in Hawaii is a recent addition. The Hawaiian chocolate product is a quality chocolate that commands a high price.

- Citrus: Locally grown citrus is a quality fruit that usually has superior flavor and juiciness compared to imported citrus. There is a large market for locally grown limes as import replacements. The market prefers local fruit as it has a longer shelf life.

Agricultural Feasibility Study for Pulehunu
Puunene, Maui, Hawaii
August 2018

- Coffee: Coffee cultivation techniques for Hawaii conditions have been well developed by UH-CTAHR researchers and extension agents. Hawaii grown coffees, including Maui coffee, have an excellent quality reputation and also benefit from the Hawaii marketing mystic.
- Longan, Rambutan, Lychee: The fruit from longan, rambutan, and lychee trees is very popular both among the local population and the tourists. There is a strong demand for these fruits by the resort industry chefs.
- Papaya: Papaya is a staple in the Hawaii market and popular with a wide section of the consumer market. It would grow well at Pulehunu with irrigation and have fewer fungal problems in the dry climate than growing papaya in wet zones.

Vegetable & Fruit Crops: Ag Homesteads 2+ acres

There are many vegetable and fruit crops that can be grown at Pulehunu because of the excellent soil conditions and consistently warm climate. Because of these conditions several rounds of crop harvest for some crops can often be obtained in a year. Quality Maui grown crops like those listed below could replace imported crops in the market and would provide a better product with a longer shelf life. There are many other vegetable and fruit crops that can be grown, and this list is a sample of the many crops that could be successfully grown at Pulehunu.

- Sweet Corn
- Sweet Potato
- Ginger
- Strawberry
- Pumpkins, Squash
- Pineapple
- Dragon Fruit
- Watermelon
- Beans
- Carrots
- Snow Peas
- Beets
- Tomatoes

Herbs: Ag Homesteads 2+ acres

Fresh herbs often command a premium price in Hawaii as the markets can rely on quality and freshness. The resort and restaurant trades are especially eager to purchase locally grown fresh herbs. There are many more herbs than suggested here. If the farmer did a market survey, the farmer could learn what herbs are in demand and the quantities required to make growing herbs profitable.

- Basil
- Chives
- Dill
- Marjoram

Agricultural Feasibility Study for Pulehunu
Puunene, Maui, Hawaii
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- Parsley
- Rosemary
- Sage
- Thyme
- Vanilla

Medicinal Crops: Ag Homesteads 2+ acres

Medicinal crops have regained popularity in this era. Before the advent of modern medicine medicinal crops were used by ancient communities to treat illnesses. The use of medicinal crops has increased recently as some of the side effects of the modern drugs have caused their own negative impacts to the human body. Culturally the Hawaiians had a very sophisticated knowledge of the medicinal properties of their plants and fortunately a great deal of this knowledge has been researched and recorded. In addition the use of medicinal crops from other cultures is being used. Growing medicinal crops at Pulehunu would be a very viable and beneficial farming enterprise. Those listed below are a small sample of what could be grown.

- Aloe Vera
- Nohi
- Kukui
- Laukahi
- Pohokula
- Popolo
- Tumeric
- Uhaloa

Biofuel Crops: Farms 126 acres+/-

Growing biofuel crops on the larger acreages if combined with other farms that are also growing biofuels has potential on Maui as large land owners are considering growing these crops. There is considerable research being done to investigate the economics of biofuels of which the Pulehunu farmers could take advantage.

- Corn
- Gamma Grass
- Pongamia Trees
- Sorghum
- Soybeans

Hawaiian Crops: Ag Homesteads 2+ acres

There has been a resurgence of interest in growing and marketing crops that are considered Hawaiian. Mamaki has become a popular tea crop and sells both in health food stores and supermarkets. Kava is grown mostly for its pleasant narcotic effect, and specialty kava bar establishments are found on some islands. Dryland taro is an important staple and a very nutritious food that is marketed in the normal market channels like the supermarkets as well as in the restaurant and hotel trade. Hawaiian sugar cane varieties are being grown for a specialty market to blend in alcoholic beverages.

Agricultural Feasibility Study for Pulehunu
Puunene, Maui, Hawaii
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- Mamaki.
- Kava (needs high rainfall – could be grown with banana)
- Dryland Taro
- Hawaiian Sugar Cane Varieties

Livestock: Ag Homesteads 2+ acres; Farms 126+/-

Livestock for small farms would be a productive use of Pulehunu lands. Small animals and bees would thrive in the climate on this property and be a profitable use if grown efficiently. All the livestock could be sold on Maui or exported depending on the size of the farm and the extent of the production. The honey could be sold on Maui if the amount was small. Larger volumes of honey would require exporting to Oahu or the mainland USA.

- Goats
- Sheep
- Fowl: Chickens, Turkeys, Ducks
- Pigs
- Honey Bees

Lei Flowers: Ag Homesteads 2+ acres

Maui has a shortage of lei flowers, especially for the tourists, necessitating the lei sellers and florists to import the flowers. There is market potential for growing lei flowers of good quality for Pulehunu farmers. The selection of lei flowers in this list is limited, but there are many other flowers that can be grown for the lei industry that would grow well at Pulehunu.

- Orchids
- Plikake
- Plumieria
- Tuberose

Aquaponics: Ag Homestead 2+ acres

Aquaponics is a suitable farming enterprise for a small farm or homestead. Growing fish in tanks or small artificial ponds and recycling the water from the fish ponds to irrigate and fertilize vegetables is a new type of farming for Maui. There is presently one company applying for the permits to do aquaponics. However, the UH-CTAHR extension service can assist a farmer with the technical requirements to do this type of intense farming. The market products are both fish and vegetables from a contained and sustainable system.

Maui Markets

Markets for farm products on Maui are varied and many markets are close to the Pulehunu property. The demand for local farm products is very strong with preference given to Maui grown products of good quality. The large food brokers, such as Kula Produce in Kahului, an Armstrong Produce Company, are buyers of Maui produce and have food safety procedures in place for the farmer to follow. Other

Agricultural Feasibility Study for Pulehunu
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Maui food brokers are HFM Foodservice, Haiku Produce and D. Otani Produce. Maui supermarkets, such as Whole Foods, Down to Earth, Costco in Kahului, and Times Supermarket will also purchase Maui grown farm products. There are specialty markets such as Wow Wow Lemonade in Kihei that buys local citrus and other tropical fruits for its products; Ocean Vodka that purchases sugar cane for its vodka; Kokolani Chocolates owned by Virginia Douglas, a small specialty business, that purchases Maui chocolate; Adoboloco that makes hot sauces with local ingredients if they are available; and Maui Preserved in Haiku. The Maui Food Bank purchases Maui produce as well. For the farmers with small amounts of production the many farmers' markets on Maui provide an excellent point of sale.

There are other Maui companies growing their own produce but also buying from local farmers as they expand their markets. Pacific Biodiesel is growing sunflowers for biofuels and cosmetic oils; needs sugar for a new line of cola and soft drinks; and corn for bourbon as well as hops. Chic Naturals makes snack products from chickpeas and is importing chickpeas; but has requested that Pacific Biodiesel plant 5 acres of chickpeas for its snacks and has indicated it needs more as its market expands.

The opportunity for the Pulehunu farmers to produce crops for the Maui markets, both basic foods such as fruits and vegetables as well as specialty crops, is in its infancy but growing rapidly. The farmers will require assistance of a marketing specialist to take advantage of Maui sales of their products. The markets like the freshness, longer shelf life, minimal transportation costs and the marketing mystic of "Grown on Maui", a Maui County Office of Economic Development and the Maui County Farm Bureau farm marketing campaign. However, it is critical that the products are of good quality and that production and marketing are consistent. Sufficient infrastructure is also needed to prepare the products for sale. See Appendix D: Maui Farmers' Markets.

Farm Infrastructure (Roads; Storage; Packing; Processing including refrigeration)

Infrastructure that is required for farming will be simple roads so that the farmer can get to his or her parcel. A gravel surface is recommended to reduce dust.

A warehouse type of shed to store equipment, tools, materials and supplies will be required. This can be a coop operated where each farmer has a place to store the needed items. The alternative is to allow each farmer to construct a working shed on the individual leases.

Electricity and potable water should also be a consideration.

Processing, packing and storage of finished goods should be accomplished at a central location on a portion of the parcel that is not suitable for farming. Refrigeration will be required to maintain the quality of the finished goods.

The land area required for processing, packing, storage, refrigeration along with a small administrative office and parking is estimated to be one to two acres.

The determination of the required operations, size of the building and other considerations will be based upon the farm size and the types of crops that will be grown.

Staff

DHHL should be prepared to commit one person full time to manage its leases and supervise the packing and shipping operations along with one administrative person. A consideration should be given to partially subsidizing a CTAHR extension agent who can assist the farmers with technical support. Also, the assistance of a business person and a marketing person would ensure the farmers had access to the support they need to be successful. This is particularly important for new farmers. The staffing required on the individual farms and homesteads will be dictated by the size of the farm, the crop or crops being grown and the involvement of the farmer's family and friends.

Financial Assistance

Those DHHL beneficiaries who want to develop commercial farms may need financial assistance with low interest loans and/or grants to install on farm irrigation systems and other infrastructure to ensure cost effective farming methods. Farm equipment, such as trucks and tractors, may need to be purchased or leased. There are high tech systems and equipment that can make the farms more efficient.

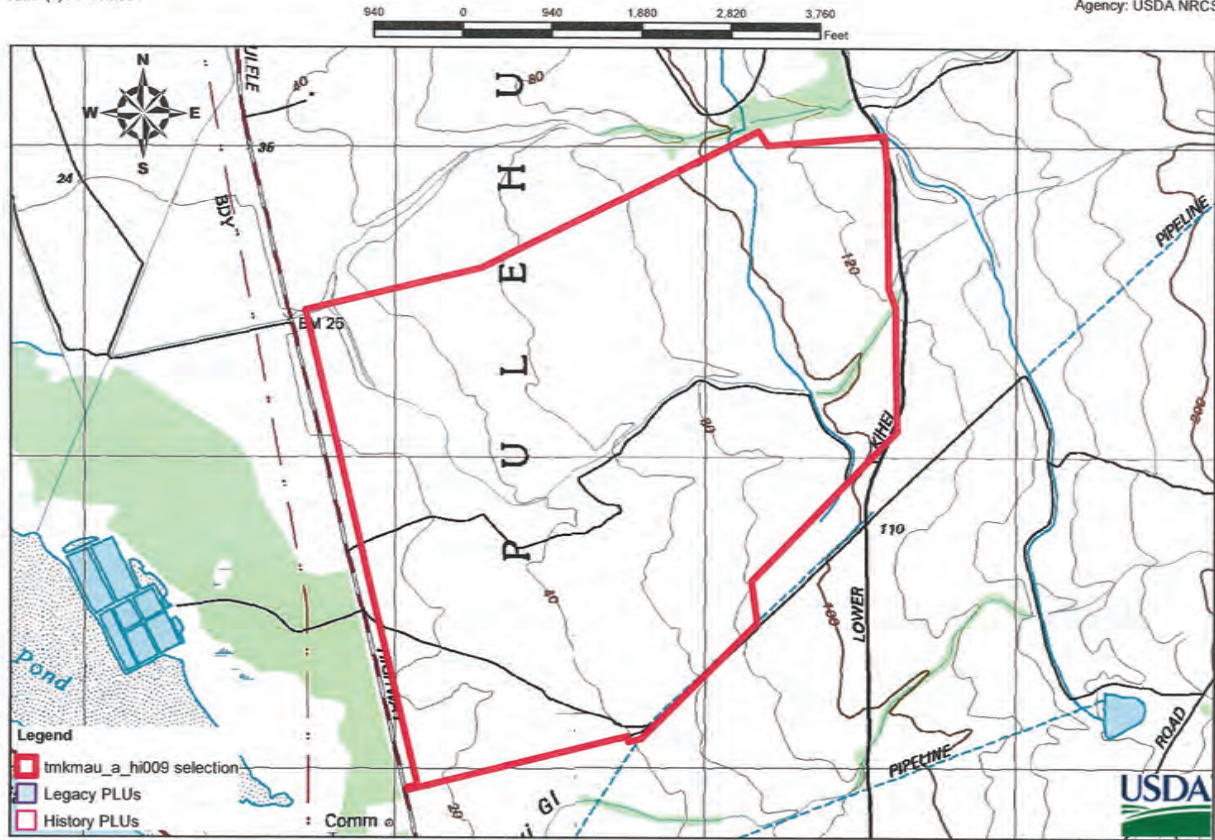
Appendix A

Topography and Rainfall Data

District: CENTRAL MAUI SWCD
 Approximate Acres: 646.0
 CTA Applicant: SALLY RICE
 TMK: (2)3-8-008:034

TOPOGRAPHIC / LOCATION MAP

Field Office: KAHULUI SERVICE CENTER
 Assisted By: KAHANA STONE
 Date: 4/24/2018
 Agency: USDA NRCS



District: CENTRAL MAUI SWCD
 Approximate Acres: 646.0
 CTA Applicant: SALLY RICE
 TMK: (2)3-8-008:034

ANNUAL RAINFALL MAP

Field Office: KAHULUI SERVICE CENTER
 Assisted By: KAHANA STONE
 Date: 4/24/2018
 Agency: USDA NRCS



Appendix B Soils Information



Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------------|----------------|
| AaB | AaB sandy loam, 3 to 7 percent slopes | 104.2 | 16.4% |
| AcB | AcB cobbly sandy loam, 3 to 7 percent slopes | 31.9 | 5.0% |
| EsA | EsA silty clay loam, 0 to 3 percent slopes | 16.0 | 2.5% |
| PoA | PoA silt loam, 0 to 3 percent slopes | 12.2 | 1.9% |
| PrA | PrA cobbly silt loam, 0 to 3 percent slopes | 315.7 | 49.0% |
| WcB | WcB silty clay loam, 3 to 7 percent slopes | 4.9 | 0.8% |
| WgB | WgB very stony silty clay loam, 3 to 7 percent slopes | 29.7 | 4.7% |
| WhB | WhB extremely stony silty clay loam, 3 to 7 percent slopes | 14.2 | 2.2% |
| WlD2 | WlD2 extremely stony silty clay loam, 3 to 25 percent slopes, eroded | 110.3 | 17.4% |
| Totals for Area of Interest | | 634.2 | 100.0% |

Appendix C

State of Hawaii Land Classification Maps



DATE: 4/16/2018

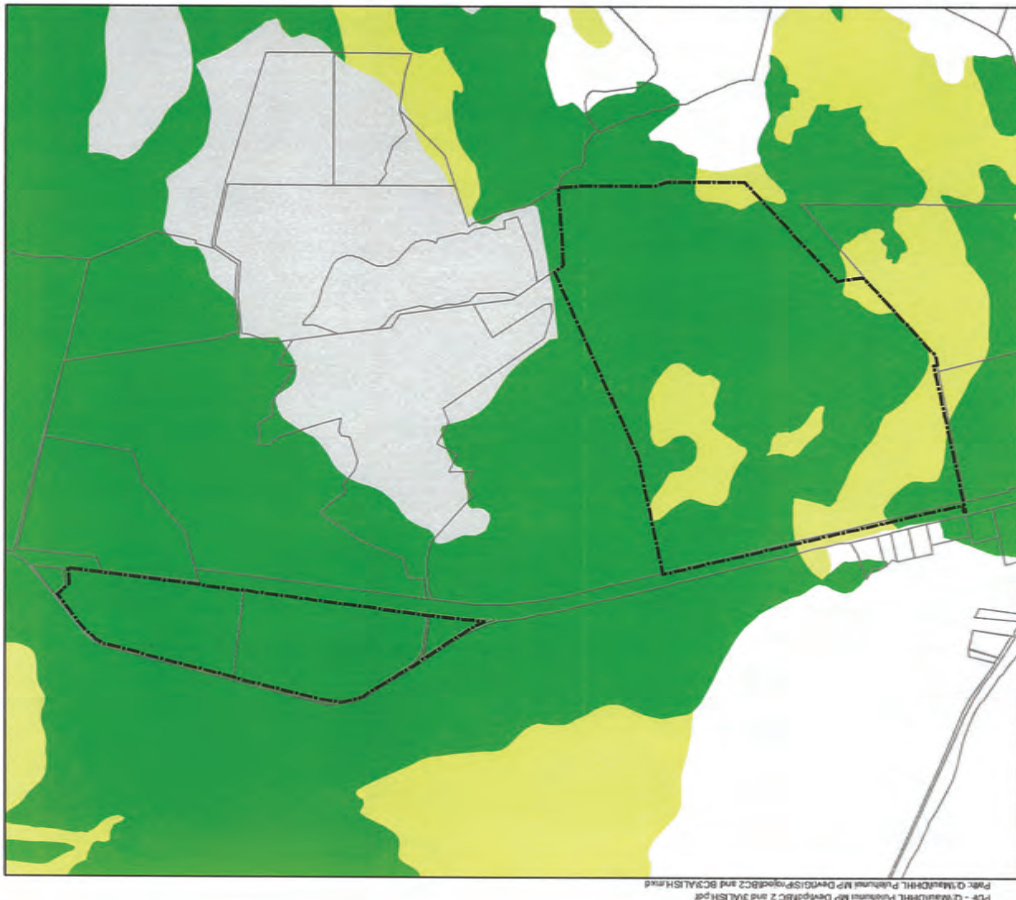
NRCES Land Evaluation and Site Assessment (LESA)
DHHL LANDS AT PULEHUNUI

Department of Planning, Research and Statistics
 State of Hawaii

LEGEND

- DHHL Lands at Pulehunui
- TMK parcels
- Important/Agricultural Lands as delineated by the LESA Commission

Source: EERI (online basemap, NRCES LESA Commission, 1986).
 The information on this map was derived from the best available data and should not be used for any purpose other than that for which it was prepared.



DATE: 4/16/2018

ALISH Classifications
DHHL LANDS AT PULEHUNUI

Department of Planning, Research and Statistics
 State of Hawaii

LEGEND

- DHHL Lands at Pulehunui
- TMK parcels
- Ag. Lands of Importance to the State of Hawaii
 - Prime ALISH
 - Unique ALISH
 - Other ALISH
 - Unclassified

Source: EERI (online basemap, ALISH: State of Hawaii Department of Agriculture, 1977).

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Maui Farmer's Markets

Farmer's Market of Maui, Kihei
 61 South Kihei Road, Kihei, HI 96753-2807
 808-875-0949
 Monday-Thursday, 8:00 a.m.-4:00 p.m.
 Friday, 8:00 a.m.-5:00 p.m.

Long's Drugs, Kihei
 1215 South Kihei Road, Kihei, HI 96753
 808-879-2033
 Saturday, 8:00 a.m.-noon

Lipoa Street Farmer's Market
 95 Lipoa Street, Kihei, HI 96753
 808-357-4564
 Saturday, 8:00 a.m.-noon

Maui Open Market, Maui Tropical Plantation
 2570 Honoapiʻian Highway, Wahee, HI 96723
 808-446-4128
 Sunday and Monday, 8:00 a.m.-3:00 p.m.

Farmers' Market of Maui, Honokowai
 3656 Loner-Honokowai Road, Lahaina, HI 96761
 808-669-7004
 Monday, Wednesday, Friday, 7:00 a.m.-11:00 a.m.

ONO Organic Farms Farmer's Market
 149 Hana Highway, Hana, HI 96713
 808-248-7779
 Monday, Thursday, All day

The Maui's Fresh Produce Farmer's Market
 Queen Kaahumanu Center, 215 W. Kaahumanu Ave, Kahului, HI 96732
 808-268-4269
 Friday, 9:30 a.m.-5:00 p.m.

The Farmer's Market, Kahului
 Kahului Shopping Center, 83 W. Kaahumanu Ave, Kahului, HI 96732
 808-333-2478
 Wednesday, 10:00 a.m.-2:00 p.m.



Join Us on Facebook

Maui Swap Meet
UH Maui College, 310 Kaahumanu Avenue, Kaneohe, HI 96741
808-244-3100
Saturday, 7:00 a.m. - 1:00 p.m.

Upcountry Farmer's Market
55 Kapaemāhāne Plaza, Makawao, HI 95765
808-572-8122
Saturday, 7:00 a.m. - 12:00 p.m.

Makawao Farmers Market
365A Baldwin Ave., Makawao, HI 95765
808-280-8516
Wednesday, 10:00 a.m. - 5:00 p.m.

Lānaʻi Kea Community Farm
639 Baldwin Ave., Upper Paia
Monday-Saturday 8:30 a.m. - 5:30 p.m.

Lahaina Produce, Sugar Train Station
Ruralist Station & Highway 30
808-288-3465
Everyday, 9:00 a.m. - 6:00 p.m.

Hāna Fresh Market
455C Hāna Highway, Hāna
Monday, 3:00 p.m. - 6:00 p.m.
Thursday, 11:00 a.m. - 3:00 p.m.

Molokai Saturday Market
Aunani Street at the Thomas Trade Building, located between Bank of Hawaii and American Savings Bank.
Saturday, 7:00 a.m. - Noon

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Grown on Maui

The *Grown on Maui* campaign is a joint effort between Maui County Office of Economic Development and Maui County Farm Bureau. It seeks to expand the market share of local farmers.

Why is this important?

Buying Grown on Maui ensures that farming remains a viable lifestyle, and that the lands our keiki (child) can remain green. Buying local preserves our agricultural heritage and our connection to our ancestral roots. As Maui's second-largest industry, agriculture enables tourism, Maui's leading industry.

Besides providing beauty for visitors, ag is at the core of agritourism, education and entertainment, and Maui as a culinary destination. In short, buying local is vital to our culture, our community, our economy, our health.

And we are lucky. Home to over 800 farms, Maui already grows a stunning variety of nutritious, flavorful foods, including heirloom varieties. With its multiple climates, it can grow foods year-round, and just about any crop. We believe that this is an agricultural privilege and a responsibility.

Are you a consumer?

Look for our Grown on Maui seal when you shop for fresh foods and flowers. The Grown on Maui symbol assures you that what you purchase was grown locally on Maui.

Are you a farmer?

Join our Grown on Maui marketing program to increase sales of your farm goods.

Are you a Friend of Ag?

A partnership between Maui County Farm Bureau, Maui 100 Kā, Oʻi magazine and the County of Maui, the annual Friend of Agriculture award program is designed to bring into the limelight those businesses that show exemplary support for products that are locally grown.



Join Us on Facebook

Mahalo to our Sp



MONSANTO



Maui County Farm Bureau Friend of Agriculture recipients are announced annually at the annual 'Aipono Awards Gala' hosted by Maui No Ka Oi magazine.

Past recipients include:

- 2007 Peter Merriman, Hula Grill Ka'anapali
- 2008 James McDonald, Pacific O. I., Feast at Lole, Ana Gourmet and O'o Farm
- 2009 Peter Merriman, Merriman's Kappala
- 2010 Jenna Haguanaud, Fairbread Co
- 2011 Justin Pardo, Maui's Fresh Bistro
- 2012 Tyjun Peng, Ko at The Fairmont Kea Lani, Maui
- 2013 Scott McGill and Chris Schobel, 15 Restaurants (Hula Grill, Lelan's & Duke's Beach House)
- 2014 Eric Fivire, Grand Valley

Eating local is the right thing to do. Why?

Buying Grown on Maui:

- Improves our level of food security
- Keeps money flowing through our community and strengthens its economy
- Decreases the "food miles" involved in transporting foods
- Reduces the likelihood of introducing harmful invasive pests
- Allows us to know where our food comes from and who cared for it
- Allows our farmers to remain in business
- Preserves managed green open space and other farms-and-grasslands ecosystem values
- Delivers local produce that's flavorful, healthy, and fresh, picked at its peak
- Builds relationships and community
- Traces products back to their source, which increases food safety.
- Nurtures an exciting cuisine that relies on local and fresh
- Nurtures tourism with beauty, a sense of place, fresh food
- Holds a resource of knowledge and education for our children
- Supports Maui

How are we doing so far in buying Grown on Maui?

In 2011, a study led by the Uluopono Initiative revealed that around 75 percent of islanders feel that growing our own local foods is important. Yet only about 8 percent of our food budgets currently go to locally grown. Some more stats:

- Statewide, locally produced fruit has a 42 percent market share
- Locally grown fresh vegetables have a 36 percent market share
- We grow 95 percent of the papayas we eat, 55 percent of bananas, 81 percent water melons
- We buy 92 percent of the broccoli we consume from overseas farms, and 85 percent of romaine
- We import all our grains and nearly all other starches. Maybe we don't have to, but we aren't in the habit of serving taro or breadfruit as our daily starch

- Statewide, sweet potatoes have been at record-high commercial production in recent years, up to 6.1 million pounds in 2008, but while Hawai'i's farmers provide 75 percent of local demand, the majority of the crop is destined for export
- We also import most of our proteins. About 25 percent of beef produced in Hawai'i is for local consumption, but the total market share isn't much higher than 10 percent
- The share of locally produced seafood is substantial. However, depletion of marine resources is a threat, and we are only at the beginning of aquaculture as an alternative
- Less than 10 percent of milk, eggs, and pork meat is locally grown

Facts at a Glance:

- Agriculture (including farm production, forestry, fishing and related activities, food product manufacturing, agritourism) generates \$2.9 billion for Hawai'i's annual economy (HDOA)
- The food processing industry contributes about half of this total
- Agriculture provides directly or indirectly 42,000 jobs
- Direct farm gate revenues for 2010 totaled \$689.6 million, up 7 percent from 2009 (NASS)
- Hawai'i hired agricultural workforce totaled 7,300 workers in the fall of 2011.
- The average wage paid to these workers was estimated at \$14.83 per hour
- If islanders statewide were to add to their current purchases just six new locally-grown products – milk, beef, tomatoes, eggs, romaine lettuce, and bananas – Hawai'i could add nearly 3,000 ag jobs, collect close to \$8 million in extra State taxes, and create an additional combined revenue of well over \$200 million in direct and secondary sales. Our farmers would earn altogether \$62 million more. (Uluopono Initiative, 2011)
- Farm land accounted for 1.1 million acres in 2008, about 27 percent of total land area. (Not all land is in crop.)
- The average age of a farm operator in Hawai'i is 59 years old (agclassroom.org)
- The average farm size in Hawai'i is 149 acres, and 92 percent are smaller than 100 acres.
- Maui was home to more than 1100 farms in 2008, according to the latest NASS bulletin.
- The number includes about 150 cattle operations, plus hog, milk, honey and egg producers
- Maui farm acreage was 230,000 acres in 2008, about half of total land area. (Not all land is in crop.)
- No definitive numbers exist, but farmers around the nation suggest that sustainable agriculture can produce enough food to feed at least two people per acre throughout the year. Some believe that number to be much higher. (Maui has a population of about 150,000.)
- Agricultural sales for Maui County topped \$144 million in 2008 (NASS)
- Maui hired 1,700 workers for its farms in 2008
- Ag tourism on Maui brought in \$4.994 million in 2008
- Imported produce from overseas must travel 2,500 miles to reach Maui. Chances are, a Maui farmer is growing something that you want within a 25-mile radius of your home



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Appendix E

Resources

APPENDIX E-1

**BIOLOGICAL RESOURCES SURVEY,
PŪLEHUNUI NORTH**

BIOLOGICAL RESOURCES SURVEY
Department of Hawaiian Home Land
Pūhānui Master Plan

INTRODUCTION

The DHHL Pūhānui Master Plan Project is situated on 184.5 acres of land on the central Maui plain along Mokuale Highway, TMK's (2) 3-8-08:08, 35 & 36 (see Figure 1). This biological resources study was initiated in compliance with environmental requirements of the planning process.

SITE DESCRIPTION

This project area consists of gently sloping lands of Maui's central isthmus. It lies on the west side of Mokuale Highway and on the east side of the old Kīhei Bypass Road about halfway between Pū'ūnē and Kīhei. Elevations range between 40 feet and 100 feet above sea level. Soils are made up of deep silty loams and silty clayloams of the Pūlehu and Ewa soil series with 0% to 3% slopes (Foot et al, 1972). Rainfall averages 13 inches to 15 inches per year with most of it occurring during one to three winter storms (Armstrong, 1983). Vegetation consists of sugar cane crops and agricultural weeds.

BIOLOGICAL HISTORY

During pre-contact times the central Maui isthmus was vegetated with low growing, hardy native plants that could survive in this dry windy environment. Typical species included 'ilima (*Sida fallax*), 'a'ali'i (*Dodonaea viscosa*), mā'ō hauhele (*Hibiscus brackenridgei*), nāio (*Myoporum sandwicense*), *Bonania morrisii*) no common name, pū'ū o Hī'iaka (*Jaquemonita ovalifolia* subsp. *sandwicense*) and scattered wīlīwī trees (*Erythrina sandwicensis*). Over the past 200 years most of these species have become rare here or have disappeared, primarily through the effects of agriculture, fires and grazing animals.

This land was converted to sugar cane agriculture in the late 1800s and was plowed, cultivated, burned and harvested in continuous cycles. During World War II most of this area was developed with infrastructure for the adjacent Pū'ūnē Military Airfield. Following the war this land was returned to sugar cane agriculture.

Today about 2/3 of this project area is still planted with sugar cane while the remaining 1/3 on the northern end lies fallow and is vegetated with low agricultural weeds.

BIOLOGICAL RESOURCES SURVEY

for the

State of Hawai'i, Department of Hawaiian Home Lands
Pūhānui Master Plan

by

Robert W. Hobby
Environmental Consultant
Kokomo, Maui
November 2011

Prepared for:
State of Hawai'i,
Department of Hawaiian Home Lands

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Department of Hawaiian Home Lands Pūlehuunui Master Plan project which was conducted in November 2011. The objectives of the survey were to:

1. Document what plant and animal species occur on the property or may likely occur in the existing habitat.
2. Document the status and abundance of each species.
3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.
4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.
5. Note which aspects of the proposed development pose significant concerns for plants or for wildlife and recommend measures that would mitigate or avoid these problems.

BOTANICAL SURVEY REPORT

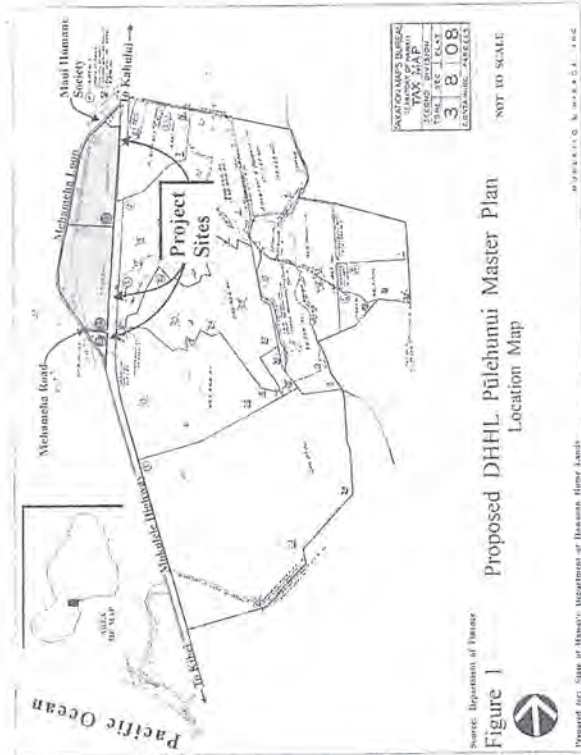
SURVEY METHODS

A walk-through botanical survey method was used following routes to ensure maximum coverage of this large property. Areas most likely to harbor native or rare plants such as undisturbed areas were more intensively examined. Notes were made on plant species, distribution and abundance as well as terrain and substrate.

DESCRIPTION OF THE VEGETATION

The project area is vegetated with sugar cane and a variety of agricultural weeds, the most common of which were: sugar cane (*Saccharum officinarum*), nut sedge (*Cyperus rotundus*), buffelgrass (*Cenchrus ciliaris*), spiny amaranth (*Amaranthus spinosus*), hairy mercurial (*Merremia aegyptia*), creeping indigo (*Indigofera hendecaphylla*), 'uhaloa (*Waltheria indica*), cheeseweed (*Malva parviflora*) and apple of Peru (*Miconia physalodes*).

A total of 52 plant species were recorded during the survey. Of these just two are indigenous native plants: 'uhaloa (*Waltheria indica*) and 'ilima (*Sida fallax*). These two species are both widespread and common in Hawai'i and occur on numerous other islands in the Pacific as well. The remaining 50 species include the crop plant, sugar cane, and a variety of common agricultural weeds.



DISCUSSION AND RECOMMENDATIONS

The vegetation throughout the project area is dominated by a great variety of non-native plants. These and the two native species 'uhaloa and 'ilima, are all common and of no particular environmental concern.

No federally listed Endangered or Threatened native plant species (USFWS, 2009) were encountered during the course of the survey. Nor were any species that are candidate for such status seen. No special habitats or rare plant communities were seen on the property.

As a result of these above conditions there is little of botanical concern on this property and the proposed land use changes are not expected to have a significant negative impact on the botanical resources in this part of Maui.

No recommendations are deemed necessary or appropriate regarding the botanical resources on this property.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of two groups: Monocots and Dicots. Taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English or Hawaiian name.
3. Bio-geographical status. The following symbols are used:
endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
non-native = all those plants brought to the islands intentionally or accidentally after western contact.

4. Abundance of each species within the project area:

abundant = forming a major part of the vegetation within the project area.
common = widely scattered throughout the area or locally abundant within a portion of it.
uncommon = scattered sparsely throughout the area or occurring in a few small patches.
rare = only a few isolated individuals within the project area.

| SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE | SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE |
|--|---------------------|------------|-----------|--|--------------------|------------|-----------|
| MONOCOTS | | | | | | | |
| CYPERACEAE | | | | | | | |
| <i>Cyperus rotundus</i> L. | nut sedge | non-native | common | <i>Crotalaria bicana</i> L. | fuzzy rattlespod | non-native | uncommon |
| POACEAE (Grass Family) | | | | <i>Crotalaria pallida</i> Aiton | smooth rattlespod | non-native | rare |
| <i>Cenchrus ciliaris</i> L. | buffelgrass | non-native | common | <i>Desmanthus pernanthicus</i> (L.) Thellung | slender mimosa | non-native | uncommon |
| <i>Chloris barbata</i> (L.) Sw. | swollen fingergrass | non-native | uncommon | <i>Indigofera henricaphylla</i> Jacq. | creeping indigo | non-native | common |
| <i>Cynodon dactylon</i> (L.) Pers. | Bermuda grass | non-native | uncommon | <i>Leucaena leucocephala</i> (Lam.) de Wit | koa baobab | non-native | uncommon |
| <i>Eleusine indica</i> (L.) Gaertn. | wiregrass | non-native | rare | <i>Macropitium latyroides</i> (L.) Urb. | stratro | non-native | rare |
| <i>Eragrostis pectinacea</i> (Michx.) Nees | Carolina lovegrass | non-native | uncommon | <i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth | wild bean | non-native | uncommon |
| <i>Megathyrsus maximus</i> (Jacq.) Simon & Jacobs | Guinea grass | non-native | uncommon | <i>Samanea saman</i> (Jacq.) Merr. | kiawe | non-native | uncommon |
| <i>Saccharum officinarum</i> L. | sugar cane | Polynesian | common | <i>Senna occidentalis</i> (L.) Link | monkey pod | non-native | rare |
| <i>Setaria verticillata</i> (L.) P. Beauv. | bristly foxtail | non-native | uncommon | LAMIACEAE (Mint Family) | coffee semia | non-native | rare |
| DICOTS | | | | <i>Leonotis nepetifolia</i> (L.) R. Br. | lion's ear | non-native | rare |
| AMARANTHACEAE (Amaranth Family) | | | | MALVACEAE (Mallow Family) | | | |
| <i>Alternanthera pungens</i> Kunth | khaki weed | non-native | rare | <i>Malva parviflora</i> L. | chicsee weed | non-native | common |
| <i>Amaranthus spinosus</i> L. | spiny amaranth | non-native | common | <i>Mabustrum coromandelianum</i> (L.) Garcke | false mallow | non-native | uncommon |
| <i>Atriplex suberecta</i> Vard. | saltbush | non-native | rare | <i>Sida ciliaris</i> L. | red ilima | non-native | rare |
| <i>Chenopodium murale</i> L. | sheath | non-native | uncommon | <i>Sida fallax</i> Walp. | 'ilima | indigenous | uncommon |
| ASTERACEAE (Sunflower Family) | | | | <i>Sida rhombifolia</i> L. | Cuban jute | non-native | rare |
| <i>Emilia fosbergii</i> Nicolson | red psalele | non-native | rare | <i>Waltheria indica</i> L. | 'uhaloa | Indigenous | common |
| <i>Lactuca sativa</i> L. | prickly lettuce | non-native | uncommon | NYCTAGINACEAE (Four-o'clock Family) | | | |
| <i>Pluchea carolinensis</i> (Jacq.) G. Don | sourbush | non-native | rare | <i>Boerhavia coccinea</i> Mill. | scarlet spiderling | non-native | rare |
| <i>Pluchea indica</i> (L.) Less. | Indian fleabane | non-native | rare | SOLANACEAE (Nighthshade Family) | | | |
| <i>Tridax procumbens</i> L. | coat buttons | non-native | rare | <i>Datura stramonium</i> L. | jimson weed | non-native | uncommon |
| <i>Verbesina encelioides</i> (Cav.) Benth. & Hook. | golden crown-beard | non-native | uncommon | <i>Nicotiana glauca</i> R.C. Graham | apple of Peru | non-native | common |
| BRASSICACEAE (Mustard Family) | | | | ZYGOPHYLLACEAE (Creosote Bush Family) | | | |
| <i>Sisymbrium altissimum</i> L. | tumble mustard | non-native | rare | <i>Tribulus terrestris</i> L. | puncture vine | non-native | uncommon |
| CLEOMACEAE (Cleome Family) | | | | | | | |
| <i>Cleome gynandra</i> L. | wild spider flower | non-native | rare | | | | |
| CONVOLVULACEAE (Morning Glory Family) | | | | | | | |
| <i>Ipomoea obscura</i> (L.) Ker. Gawl. | little bell | non-native | uncommon | | | | |
| <i>Ipomoea triloba</i> L. | hairy merremia | non-native | common | | | | |
| CUCURBITACEAE (Gourd Family) | | | | | | | |
| <i>Momordica charantia</i> L. | hedgethog gourd | non-native | uncommon | | | | |
| <i>Cucumis dipsaceus</i> Ehrenb. ex Spach | bitter melon | non-native | uncommon | | | | |
| EUPHORBIACEAE (Spurge Family) | | | | | | | |
| <i>Euphorbia hirta</i> L. | hairy spurge | non-native | uncommon | | | | |
| <i>Euphorbia hypericifolia</i> L. | graceful spurge | non-native | rare | | | | |
| FABACEAE (Pea Family) | | | | | | | |
| <i>Ricinus communis</i> L. | Castor bean | non-native | uncommon | | | | |
| Chamaecrista nictitans (L.) Moench | partridge pea | non-native | rare | | | | |

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through fauna survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and location as well as observations of trails, tracks, scat and signs of feeding. In addition an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Three species of non-native mammals or their signs were observed during two site visits. Taxonomy and nomenclature follow Tomich (1986). These include signs of domestic dog (*Canis familiaris*), feral cat (*Felis catus*) and rat (*Rattus* sp.).

Other non-native mammals one would expect to see in this habitat include mice (*Mus domesticus*) and mongoose (*Herpestes auripunctatus*). These rodents feed on seeds, fruits, insects, eggs and herbaceous vegetation and are prey for the cats and mongoose.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey at two sites in the area. When present in an area these bats can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the glow of twilight. No evidence of such activity was observed though visibility was excellent and plenty of flying insects were seen. In addition, a bat-detecting device (Baubox IID) was employed after dusk, set to the frequency of 27,000 Hertz which these bats are known to use for echolocation. No bats were detected at either site using this device.

BIRDS

There were moderate levels of both bird species and total numbers observed across the project area during two site visits. Temporary puddles from agricultural drip irrigation draw in a number of these species to the area. Fourteen bird species were recorded, including 12 non-native species, 1 migratory species, the Pacific golden plover or kōlea (*Pluvialis fulva*), and 1 indigenous waterbird, the black-crowned night-heron or 'auku'u (*Nycticorax nycticorax hoacti*). Taxonomy and nomenclature follow American Ornithologists' Union (2011).

Two bird species were common around the sugar cane fields: zebra dove (*Geopelia striata*) and spotted dove (*Streptopelia chinensis*). Less common were the rock dove (*Columba livia*) and the migratory kōlea. One 'auku'u was seen at dusk flying over the project area towards a plantation reservoir where it would roost for the night. A few other non-native bird species such as the northern cardinal (*Cardinalis cardinalis*), house finch (*Carpodacus mexicanus*) and the nutmeg mannikin (*Lonchura punctulata*) might also be expected to occur here, but the habitat is not suitable for Hawai'i's native forest birds that are presently restricted to higher elevations beyond the range of mosquitoes and the deadly avian diseases they transmit. None of the endangered nēnē goose (*Branta sandwicensis*) were seen in the habitat.

Hawaiian Biodiversity and Mapping records indicate that several of the Endangered Hawaiian stilt (*Himantopus mexicanus knudseni*) and Hawaiian coot (*Fulica alai*) have been seen at Kealia National Wildlife Refuge a mile to the south and at small plantation reservoirs over a mile to the north of the project area. These water birds are attracted to such aquatic features. No such aquatic features occur in the project area and these birds are not likely to utilize this dry habitat.

INSECTS

There were moderate numbers of insect species encountered in this project area. A total of 10 non-native species were identified within 6 insect Orders (See Fauna Inventory). Taxonomy and nomenclature follow Nishida et al (1992). No native species were seen. Two species were of common occurrence in the project area: the common honey bee (*Apis mellifera*) and the long-tailed blue butterfly (*Lamipridis boeticus*).

A special effort was made to look for the Endangered Blackburn's sphinx moth (*Manduca blackburni*) (USFWS 2008) by carefully examining the approximately 30 specimens of its non-native alternate host plant, the tree tobacco (*Nicotiana glauca*), that were found in the project. No adult moths, their larvae or their eggs were found on these plants.

Also looked for were small native bees of the genus Hylaeus, some of which are Endangered. These bees frequent the flowers of the native shrub 'ilima (*Sida fallax*) a few of which were scattered around the north end of the project. Though some of the 'ilima were in flower careful observation did not turn up any of these native bees.

No reptiles or mollusks were found in the project area during the course of the survey.

DISCUSSION AND RECOMMENDATIONS

The fauna on this project area is strongly dominated by non-native species. Of 3 mammals, 14 birds, and 10 insects observed, only one common indigenous bird, the 'auku'u, was seen flying across the area at dusk toward an off-site destination. None of these species are of any special protected status or heightened conservation concern.

No Endangered Hawaiian hoary bats were detected during the survey, and the nearly complete lack of trees or large shrubs in the project area makes this area unlikely habitat for them.

The habitat in this project area is not suitable for any of Hawai'i's native forest birds, water birds or seabirds. Nonetheless, there are native seabirds, the Endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the Threatened Newell's shearwater (*Puffinus newelli*) that fly over these lowlands on the way to their burrows high in the mountains. These seabirds, and especially the fledglings, are attracted to bright lights in the evenings and early dawn hours and can become disoriented and crash. They are then vulnerable to injury, vehicle strikes and predators. It is recommended that any significant outdoor lighting in any proposed development on this property be shielded to direct the light downward to minimized disorientation of these protected seabirds.

While no Blackburn's sphinx moths, their eggs or larvae were found in the project area, they are known from similar habitat about two miles northwest of this site. It is possible that they are present but dormant in chrysalis form in the soil beneath the potential tree tobacco host plants in the northern portion of the

project area. These plants should be examined again during the latter part of the wet season to get a more definitive reading of their presence or absence.

No other issues with wildlife species are anticipated and no further recommendations are offered.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within five groups: Mammals, Birds, Reptiles, Insects and Mollusks. For each species the following information is provided:

1. Common name
2. Scientific name
3. Bio-geographical status. The following symbols are used:
 - endemic = native only to Hawaii; not naturally occurring anywhere else in the world.
 - indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
 - non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.
 - migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the overwintering/non-breeding phase of their life cycle.

4. Abundance of each species within the project area:

abundant = many flocks or individuals seen throughout the area at all times of day.
 common = a few flocks or well scattered individuals throughout the area.
 uncommon = only one flock or several individuals seen within the project area.
 rare = only one or two seen within the project area.

| COMMON NAME | SCIENTIFIC NAME | STATUS | ABUNDANCE |
|------------------------------------|--|------------|-----------|
| MAMMALS | | | |
| Domestic dog | <i>Canis familiaris</i> L. | non-native | rare |
| Feral cat | <i>Felis catus</i> L. | non-native | rare |
| Rat | <i>Rattus sp.</i> | non-native | rare |
| BIRDS | | | |
| Zebra dove | <i>Geopelia striata</i> L. | non-native | common |
| Spotted dove | <i>Streptopelia chinensis</i> Scopoll | non-native | common |
| Rock dove, Pigeon | <i>Columba livia</i> Gmelin | non-native | uncommon |
| Pacific golden-plover | <i>Plivialis fulva</i> Gmelin | migratory | uncommon |
| African silverbill | <i>Lonchura cantans</i> Gmelin | non-native | rare |
| Gray francolin | <i>Francolinus pondicerianus</i> Gmelin | non-native | rare |
| Java sparrow | <i>Padda oryzivora</i> L. | non-native | rare |
| Common myna | <i>Acridotheres tristis</i> L. | non-native | rare |
| Chicken | <i>Gallus gallus</i> L. | non-native | rare |
| Black francolin | <i>Francolinus francolinus</i> L. | non-native | rare |
| House sparrow | <i>Passer domesticus</i> L. | non-native | rare |
| Chestnut marnikin | <i>Lonchura malacca</i> L. | non-native | rare |
| Northern mockingbird | <i>Mimus polyglottos</i> L. | non-native | rare |
| Black-crowned night heron, 'Aukulu | <i>Nycticorax nycticorax hiacilli</i> L. | indigenous | rare |

| COMMON NAME | SCIENTIFIC NAME | STATUS | ABUNDANCE | Literature Cited |
|---|---|------------|-----------|--|
| INSECTS | | | | |
| Order ARANAE - true spiders | | | | American Ornithologists' Union 2011. Check-list of North American Birds. 7 th edition. American Ornithologists' Union. Washington D.C. |
| ARANEIDAE (Orb Weaver Family) | | | | |
| European garden spider | <i>Aranus diadematus</i> Clerck | non-native | rare | Armstrong, R. W. (ed.) 1983. Atlas of Hawaii. (2 nd , ed.) University of Hawaii Press. |
| Order COLEOPTERA - beetles | | | | |
| COCCINELLIDAE (Lady Beetle Family) | | | | Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Dept. of Agriculture, Soil Conservation Service. Washington, D.C. |
| Seven-spot lady beetle | <i>Coccinella septempunctata</i> Mullsant | non-native | rare | |
| Order DIPTERA - flies | | | | |
| SYRPHIDAE (Hoverfly Family) | | | | Nishida, G.N., G.A. Samuelson, J.S. Straznec and K.S. Kami, 1992. Hawaiian Terrestrial Arthropod Checklist. Hawaiian Biological Survey. Honolulu. |
| Australian hoverfly | <i>Simosyrphus grandisornis</i> Macquart | non-native | rare | |
| Order HYMENOPTERA - bees and wasps | | | | Tomich, P.Q. 1986. Mammals in Hawaii. Bishop Museum Press, Honolulu. |
| APIIDAE (Honey Bee Family) | | | | |
| Honey bee | <i>Apis mellifera</i> L. | non-native | common | U.S. Fish and Wildlife Service, 2009. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12 (update of 1999 listings) |
| Sonoran carpenter bee | <i>Xylocopa sonorina</i> Smith | non-native | uncommon | |
| FORMICIDAE (Ant Family) | | | | |
| Argentine ant | <i>Linepithema humile</i> Mayer | non-native | rare | U.S. Fish and Wildlife Service, 2003. Endangered and threatened wildlife and plants: determination of endangered status for Blackburn's sphinx moth from Hawaii. Federal Register 65(21): 4770-4779. |
| VESPIDAE (Vespid Wasp Family) | | | | |
| Keyhole wasp | <i>Pachodynerus nasidens</i> Latreille | non-native | rare | Wagner, W. L., D.R. Herbst, and S. H. Sohmer. 1999. Manual of the flowering plants of Hawaii. Univ. of Hawaii Press and Bishop Museum Press. Honolulu. |
| Order LEPIDOPTERA - butterflies and moths | | | | |
| LYCAENIDAE (Gossamer Wing Butterfly Family) | | | | |
| Long tail blue butterfly | <i>Lampides boeticus</i> L. | non-native | common | |
| NOCTUIDAE (Owllet Moth Family) | | | | |
| Castor semi-loopet | <i>Achea janata</i> L. | non-native | rare | |
| Order ORTHOPTERA - grasshoppers, locusts and crickets | | | | |
| ACRIDIDAE (Grasshopper Family) | | | | |
| Short-horned grasshopper | <i>Oedotus abruptus</i> Thunberg | non-native | rare | |

APPENDIX E-2

**BIOLOGICAL RESOURCES SURVEY,
PŪLEHUNUI SOUTH**

FLORA AND FAUNA SURVEY
DHHL PULEHUNUI MASTER PLAN
PULEHUNUI, MAUI, HAWAII

BIOLOGICAL RESOURCES SURVEY

for the

DEPARTMENT OF HAWAIIAN HOME LANDS PULEHUNUI MASTER PLAN

PULEHUNUI, MAUI, HAWAII

INTRODUCTION

The DHHL Pulehunui Master Plan project lies on 646 acres of former sugar cane fields in lower Pulehunui, north Kihei adjacent to Maui Veterans Highways TMK (2) 3-8-08-034 (see Figure 1). This biological resources survey was initiated by the Department of Hawaiian Home Lands (DHHL) in compliance with environmental requirements of the planning process.

SITE DESCRIPTION

The project area lies on gently sloping land between the elevations of 18 feet and 136 feet above sea level. The vegetation consists of low grasses and agricultural weeds left over on the now-fallow fields following the last cane harvest a little over a year ago. Large kiawe trees grow in the intermittent Kalalao Stream channel and one other small unnamed gully. A few areas with rocky outcrops and shallow soils that were not planted with cane lie within the area. Soils are characterized as a variety of well-drained silty loams, clay loams and silty clay loams in the Alae Pulehu, Waiakoa and Ewa Soil Series (Foote et al, 1972). Rainfall averages about 12 inches per year and occurs mostly during the winter months.

by

Robert W. Hobby
Environmental Consultant
Kokomo, Maui
October 2017

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed DHHL Pulehunui Master Plan Project which was conducted in October 2017. The objectives of the survey were to:

1. Document what plant, and animal species occur on the property or may likely occur in the existing habitat.
2. Document the status and abundance of each species.
3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered (D.O.I. 2003) (U.S.F. W.S. 2017). If such occur, identify what features of the habitat may be essential for these species.
4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.

Prepared for:
State of Hawaii
Department of Hawaiian Home Lands

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method was used for covering the entire project area. Old agricultural roads provided vehicular access to all areas. Notes were made on plant species, distribution and abundance as well as on terrain and substrate.

DESCRIPTION OF THE VEGETATION

Most of the vegetation in the recently harvested fallow fields was rather sparse and low in stature. Recent rains were just beginning to stimulate early sprouting and seasonal growth. A total of 59 plant species were recorded in the project area during three site visits. Two species were abundant in the area including buffelgrass (*Cenchrus ciliaris*) and 'uhaloa (*Waltheria indica*). An additional eight species were of common occurrence. Guinea grass (*Megathyrsus maximus*), swollen fingergrass (*Chloris barbata*), sugar cane (*Saccharum officinarum*), Russian thistle (*Kali tragus*), golden crown-beard (*Verbesina encelioides*), kiawe (*Prosopis pallida*), ilima (*Sida fallax*) and tree tobacco (*Nicotiana glauca*).

Four hardy indigenous native species were recorded in the area, the 'uhaloa, 'ilima, kīpūkai (*Heliotropium curassavicum*) and koali kuahulu (*Merremia aegyptia*). The remaining fifty-five species were all non-native grasses, shrubs and an assortment of agricultural weeds.

DISCUSSION AND RECOMMENDATIONS

The vegetation throughout the project area is dominated by non-native species that are of no particular environmental interest or concern. Just four common indigenous plants, 'ilima, 'uhaloa, kīpūkai and koali kuahulu (*Merremia aegyptia*) were found growing in the area. No federally listed Endangered or Threatened plant species (USFWS, 2017) were found, nor do any plants that are candidates for such status occur on the project area. No special plant habitats occur on or near the project and no potential wetlands occur in this dry upland site.

This project is not expected to have any significant negative impacts on the botanical resources in this part of Maui. No recommendations regarding botanical resources are deemed necessary or appropriate.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of two groups: Monocots and Dicots. Taxonomy and nomenclature of the plants are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation
2. Common English or Hawaiian name.
3. Bio-geographical status. The following symbols are used:
endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
Polynesian = all those plants brought to Hawaii during the course of Polynesian migrations
non-native = all those plants brought to the islands intentionally or accidentally after western contact.

4. Abundance of each species within the project area:

abundant = forming a major part of the vegetation within the project area.
common = widely scattered throughout the area or locally abundant within a portion of it.
uncommon = scattered sparsely throughout the area or occurring in a few small patches.
rare = only a few isolated individuals within the project area.

| SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE | SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE |
|---|-----------------------|------------|-----------|--|--------------------|------------|-----------|
| MONOCOTS | | | | | | | |
| ARECACEAE (Palm Family) | | | | CUCURBITACEAE (Gourd Family) | | | |
| <i>Washingtonia robusta</i> H. Wendl. | Mexican washingtonia | non-native | rare | <i>Coccinia grandis</i> (L.) Voigt | ivy gourd | non-native | rare |
| ASPARGACEAE (Asparagus Family) | | | | <i>Cucumis dipsaceus</i> Ehrenb. Ex Spach | hedgehog gourd | non-native | rare |
| <i>Furcraea foetida</i> (L.) Haw. | | | | <i>Momordica charantia</i> L. | bitter melon | non-native | uncommon |
| CYPERACEAE (Sedge Family) | | | | EUPHORBIACEAE (Spurge Family) | | | |
| <i>Cyperus rotundus</i> L. | Mauritius hemp | non-native | rare | <i>Euphorbia hypericifolia</i> L. | kaliko | non-native | rare |
| POACEAE (Grass Family) | nut sedge | non-native | rare | <i>Ricinus communis</i> L. | Castor bean | non-native | uncommon |
| <i>Cenchrus ciliaris</i> L. | buffelgrass | non-native | abundant | FABACEAE (Pea Family) | | | |
| <i>Cenchrus purpureus</i> (Schumach.) Morrone | Napier grass | non-native | rare | <i>Crotalaria incana</i> L. | fuzzy rattlespod | non-native | rare |
| <i>Chloris barbata</i> (L.) Sw. | swollen fingergrass | non-native | common | <i>Crotalaria pallida</i> Aiton | smooth rattlespod | non-native | rare |
| <i>Cynodon dactylon</i> (L.) Pers. | Bermuda grass | non-native | uncommon | <i>Crotalaria retusa</i> L. | rattlespod | non-native | uncommon |
| <i>Eragrostis pectinacea</i> (Michx.) Nees | Carolina lovegrass | non-native | rare | <i>Desmanthus permambucanus</i> (L.) Thellung | slender mimosa | non-native | rare |
| <i>Megathyrsus maximus</i> (Jacq.) Simon & Jacobs | Guinea grass | non-native | common | <i>Indigofera spicata</i> Forssk. | creeping indigo | non-native | rare |
| <i>Saccharum officinarum</i> L. | sugar cane | non-native | common | <i>Leucaena leucocephala</i> (Lam.) de Wit | koa haole | non-native | uncommon |
| <i>Setaria verticillata</i> (L.) P. Beauv. | bristly foxtail | non-native | rare | <i>Macropitium atropurpureum</i> (DC.) Urb. | siratiro | non-native | rare |
| DICOTS | | | | <i>Macropitium lathyroides</i> (L.) Urb. | wild bean | non-native | rare |
| AMARANTHACEAE (Amaranth Family) | | | | <i>Neonotonia wightii</i> (Wight & Arnott) Lackey | glycine | non-native | rare |
| <i>Amaranthus spinosus</i> L. | spiny amaranth | non-native | rare | <i>Prosopis pallida</i> (Humb. & Bonpl. Ex Willd.) Kunth | kiawe | non-native | common |
| <i>Atriplex suberecta</i> Verd. | saltbush | non-native | uncommon | <i>Senna occidentalis</i> (L.) Link | coffee senna | non-native | uncommon |
| <i>Chenopodium murale</i> L. | ãheaha | non-native | rare | LAMIACEAE (Mint Family) | | | |
| <i>Kali tragus</i> (L.) Scop. | Russian thistle | non-native | common | <i>Leonotis nepetifolia</i> (L.) R. Br. | lion's ear | non-native | rare |
| ANACARDIACEAE (Mango Family) | Christmas berry | non-native | rare | MALVACEAE (Mallow Family) | | | |
| <i>Schinus terebinthifolius</i> Raddi | | | | <i>Abutilon grandifolium</i> (Willd.) Sweet | hairy abutilon | non-native | rare |
| APOCYNACEAE (Dogbane Family) | | | | <i>Mahoe coromandelianum</i> (L.) Garcke | false mallow | non-native | rare |
| <i>Asclepias physocarpa</i> (E.Mey.) Schlect. | baloon plant | non-native | uncommon | <i>Sida ciliaris</i> L. | bracted fanpetals | non-native | rare |
| <i>Calotropis procera</i> (Aiton) Aiton | small crown flower | non-native | uncommon | <i>Sida rhombifolia</i> L. | 'ilima | indigenous | common |
| ASTERACEAE (Sunflower Family) | | | | <i>Waltheria indica</i> L. | arrow-leaved sida | indigenous | uncommon |
| <i>Conyza bonariensis</i> (L.) Cronq. | hairy horseweed | non-native | rare | MELIACEAE (Mahogany Family) | 'uhaloa | indigenous | abundant |
| <i>Lactuca sativa</i> L. | prickly lettuce | non-native | rare | <i>Melia azedarach</i> L. | pride-of-India | non-native | rare |
| <i>Pluchea carolinensis</i> (Jacq.) G. Don | sourbush | non-native | uncommon | MYRTACEAE (Myrtle Family) | | | |
| <i>Pluchea indica</i> L. | Indian fleabane | non-native | uncommon | <i>Syzygium cumini</i> (L.) Skeels | Java plum | non-native | rare |
| <i>Senecio madagascariensis</i> Poir. | Madagascar fireweed | non-native | rare | NYCTAGINACEAE (Four-o'clock Family) | | | |
| <i>Tridax procumbens</i> L. | coat buttons | non-native | rare | <i>Boerhavia coccinea</i> Mill. | scarlet spiderling | non-native | rare |
| <i>Verbena encelioides</i> (Cav.) Benth. & Hook. | golden crown-beard | non-native | common | SOLANACEAE (Nighthshade Family) | | | |
| <i>Xanthium strumarium</i> L. | kikania, cockle bur | non-native | rare | <i>Datura stramonium</i> L. | jimson weed | non-native | uncommon |
| BORAGINACEAE (Borage Family) | | | | <i>Nicotiana glauca</i> R.C. Graham | tree tobacco | non-native | common |
| <i>Heliotropium curassavicum</i> L. | kīpūkai | indigenous | rare | | | | |
| <i>Heliotropium procumbens</i> Mill. | four-spike heliotrope | non-native | rare | | | | |
| CONVOLVULACEAE (Morning Glory Family) | | | | | | | |
| <i>Ipomoea obscura</i> (L.) Ker - Gawl. | obscure morning glory | non-native | rare | | | | |
| <i>Ipomoea triloba</i> L. | little bell | non-native | rare | | | | |
| <i>Merremia aegyptia</i> (L.) Urb. | koali kuahulu | indigenous | rare | | | | |

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and location as well as observations of trails, tracks, scat and signs of feeding. In addition, an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the endemic and endangered 'ōpé'āpé'a Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Tracks of four mammal species were seen during three site visits in the project area. Recent rains left much muddy ground that facilitated track identification. Most common were feral pigs (*Sus scrofa*) whose tracks were everywhere, and some were seen. Axis deer (*Axis axis*) tracks were also widespread and one small herd was seen after dark. Also common were mongoose (*Herpestes auroreus*) tracks and scat. Tracks of one domestic dog (*Canis familiaris*) were seen.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey of the project area at four locations. A bat detecting device (Batbox IIID) was employed that steps-down the ultrasonic echo-location call they emit from 27,000 hertz into the audible range of humans. A single bat was detected at close range at one location in the northwest corner of the project area adjacent to Kolaloa Stream channel just above Maui Veterans Highway.

A few other non-native mammal species that could be expected to occur in the project area include mice (*Mus domesticus*), rats (*Rattus* spp.) and feral cats (*Felis catus*).

BIRDS

Birdlife was fairly diverse with 14 species being recorded during three site visits to the project area. Taxonomy and nomenclature follow American Ornithologists' Union (2017). Three species were common throughout the project area, including the zebra dove (*Geopelia striata*), the spotted dove (*Streptopelia chinensis*) and the gray francolin (*Francolinus pondicerianus*). Uncommon were the black francolin (*Francolinus francolinus*), mourning dove (*Zenaida macroura*), house finch (*Carpodacus mexicanus*), African silverbill (*Lonchura cantans*) and the 'akekeke or ruddy turnstone (*Arenaria interpres*). An additional six species were of rare occurrence.

Two species were indigenous, migratory birds that breed and raise their young in the arctic during the summer but spend their winter months in Hawaii: the 'akekeke and the kōlea or Pacific golden-plover (*Plinialis fubia*).

A few other non-native birds might occasionally be seen here, but the habitat is not suitable for Hawaii's native forest birds and seabirds that nest high in the mountains beyond the range of mosquitoes and the avian diseases they carry and transmit.

INSECTS

Insects were rather modest in species diversity and in total numbers in this normally dry habitat. A total of eleven species, representing six insect Orders, were found in the project area during three site visits. Taxonomy and nomenclature follow Nishida et al (1992). Just one species was of common occurrence, the graybird grasshopper (*Schistocera nitens*). Seven species were uncommon and three species were rare (see the Animal Species List).

Just one native dragonfly, the indigenous globe skimmer (*Pantala flavescens*) was recorded in moderate numbers.

DISCUSSION AND RECOMMENDATIONS

The wildlife within the project area are composed mostly of non-native species that are of no special conservation concern. Just one mammal, two birds and one insect were found in this project area that are species native to Hawaii. These species are addressed here along with other species that are either associated with native species or which could possibly utilize this habitat although not found during the survey.

'Ōpé'āpé'a or Hawaiian bat

One of these Endangered bats was positively detected in the northwest corner of the project area. Their Endangered status provides special protections and some habitat considerations that ensure that they are not harmed or killed. The U.S. Fish and Wildlife Services (USFWS) has jurisdiction over Endangered species under the authority of the Endangered Species Act (1973), and they may comment on this finding. These bats are wide ranging and may temporarily use this habitat in response to spikes in populations of nocturnal flying insects which they prey upon. These bats breed and raise their young between April and September. They place their immature young in trees during the night when the adults are out feeding on insects, and tend to them during the day. The USFWS recommends not removing trees during the breeding season. In this project area the vast majority of the land is recently harvested sugar cane fields that have no trees on them. Large kiawe and other trees are presently restricted to intermittent stream channels that pass through the project and along some of the boundaries.

'Akekeke and kōlea

Both of these migratory bird species are common winter visitors in Hawaii. They also occur in many other parts of the world as winter migrants. They are widespread and common and neither has any heightened conservation status. No recommendations are offered with regard to either of these bird species.

Globe skimmer dragonfly

This indigenous dragonfly is one of the most widespread insect species in Hawaii, and as its name implies, it is found in many other places around the globe. It is a species of least conservation concern and no recommendations are made.

Blackburn's sphinx moth

No Endangered Blackburn's sphinx moth (*Manduca blackburni*) adults, larvae or eggs were seen during the survey. This is due to the fact that the survey was conducted at the time of year when all three of the above life stages are in a dormant state. These moths are closely linked to certain plants in the nightshade family (*Solanaceae*) which have toxins to which the moths and larvae have adapted that provide protection from potential predators. The native species of 'aiea (*Nothocestrum* spp.) used to provide these protections, but have now become rare, and the Blackburn's sphinx moth has subsequently become rare as well. Fortunately for this moth it has found a source of similar toxins in a related non-native weedy shrub known as tree tobacco (*Nicotiana glauca*) and its numbers are starting to rebound. Tree tobacco thrives in hot dry climates and had invaded sugar cane fields where it enjoyed irrigation and fertilizer. It was held in check, however, during the harvesting process when the fields were burned. Now that sugarcane agriculture has ceased and these fields have become fallow, the tree tobacco plants are coming up by the thousands, especially in the lower half of this 646 acre project area.

While tree tobacco plants are considered to be weeds in Hawaii, they have been given federal protections when they are in association with the Endangered Blackburn's sphinx moth eggs and larvae. The USFWS may comment on or make recommendations on this situation in the review process.

Nēnē

The nēnē goose is listed as an Endangered species and is endemic to the Hawaiian Islands. Nēnē feed on succulent young grasses and herbaceous vegetation and are often found near water features on golf courses and parks. No nēnē were seen during the survey but they could be attracted to the rain puddles. Their use of the project area will be greatly lessened by the cessation of field irrigation. If nēnē show up they should not be bothered or harassed and should be allowed to leave at their own convenience.

Seabirds

While no seabirds were found in the project area, two federally protected species, the Endangered 'ua'u or Hawaiian petrel (*Phaethopygia sandwichensis*) and the Threatened 'a'o or Newell's shearwater (*Puffinus newelli*) are known to fly from the ocean at dusk to their nesting burrows high in the mountains and return to the ocean at dawn during the breeding season between March and November. They fly over the lowlands during these flights. These birds are known to be disoriented by bright lights and strike tall structures and be injured and grounded where they become vulnerable to vehicle strikes and predators. During October and November fledging young birds are particularly vulnerable to these threats. It is recommended that any outdoor lighting be hooded so the light is only visible from below.

As a result of these findings, and with consideration for the above guidance and recommendations, this project is not expected to have a significant negative impact on the wildlife resources in this part of Maui.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within three groups: Mammals, Birds and Insects. For each species the following information is provided:

1. Common name
2. Scientific name
3. Bio-geographical status. The following symbols are used:

endemic = native only to Hawaii; not naturally occurring anywhere else in the world.

indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).

non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.

migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the overwintering/non-breeding phase of their life cycle.

4. Abundance of each species within the project area:

abundant = many flocks or individuals seen throughout the area at all times of day.

common = a few flocks or well scattered individuals throughout the area.

uncommon = only one flock or several individuals seen within the project area.

rare = only one or two seen within the project area.

| COMMON NAME | SCIENTIFIC NAME | STATUS | ABUNDANCE | BIRDS |
|--|-----------------------|------------|-----------|--|
| MAMMALS | | | | |
| SUIDAE (Swine Family) <i>Sus scrofa</i> L. | pig | non-native | common | COLUMBIDAE (Dove Family) <i>Geopelia striata</i> L. zebra dove common |
| CERVIDAE (Deer Family) <i>Axis axis</i> Erxleben | axis deer | non-native | common | <i>Streptopelia chinensis</i> Scopoli spotted dove common <i>Zenaidura macroura</i> L. mourning dove uncommon |
| VIVERRIDAE (Mongoose Family) <i>Herpestes auropunctatus</i> Hodgson | small Indian mongoose | non-native | common | PHASIANIDAE (Pheasant Family) <i>Francolinus francolinus</i> L. black francolin uncommon <i>Francolinus pondicerianus</i> Gmelin gray francolin common |
| CANIDAE (Dog Family) <i>Canis familiaris</i> L. | domestic dog | non-native | rare | ESTRILIDAE (Estrilid Finch Family) <i>Lonchura cantans</i> Gmelin African silverbill uncommon |
| VESPERTILIONIDAE (Evening Bat Family) <i>Lasiorus cinereus semotus</i> H. Allen | ‘ōpe‘ōpe‘a | endemic | rare | FRINGILLIDAE (Carduelin Finch Family) <i>Carpodacus mexicanus</i> Muller house finch uncommon |
| | | | | SCOLOPACIDAE <i>Arenaria interpres</i> L. ruddy turnstone/‘akekeke indigenous/migratory uncommon |
| | | | | STURNIDAE (Starling Family) <i>Acridotheres tristis</i> L. common myna rare |
| | | | | CHARADRIIDAE (Plover Family) <i>Pluvialis fulva</i> Gmelin kōlea, Pacific golden-plover indigenous/migratory rare |
| | | | | CARDINALIDAE (Cardinal Family) <i>Cardinalis cardinalis</i> L. northern cardinal rare |
| | | | | THARAUPIDAE (Tanager Family) <i>Paroaria coronata</i> Miller red-crested cardinal non-native rare |
| | | | | ALAUDIDAE (Sky Lark Family) <i>Alauda arvensis</i> L. sky lark non-native rare |
| | | | | TYTONIDAE (Barn Owl Family) <i>Tyto alba</i> Scopoli barn owl non-native rare |

| COMMON NAME | SCIENTIFIC NAME | STATUS | ABUNDANCE |
|---|--------------------------|------------|-----------|
| INSECTS | | | |
| Order DIPTERA - flies | | | |
| MUSCIDAE (Housefly Family) | housefly | non-native | rare |
| <i>Musca domestica</i> L. | | | |
| Order HYMENOPTERA - bees, wasps, ants | | | |
| APIDAE (Honey Bee Family) | honey bee | non-native | uncommon |
| <i>Apis mellifera</i> L. | | | |
| <i>Xylocopa sonorina</i> Smith | Sonoran carpenter bee | non-native | uncommon |
| FORMICIDAE (Ant Family) | big-headed ant | non-native | uncommon |
| <i>Pheidole megacephala</i> Fabricius | | | |
| Order LEPIDOPTERA - butterflies, moths | | | |
| LYCAENIDAE (Gossamer-winged Butterfly Family) | Western pygmy blue | non-native | rare |
| <i>Brephidium exilis</i> Boisduval | | | |
| <i>Lamprodes boeticus</i> L. | long tail blue butterfly | non-native | uncommon |
| NYMPHALIDAE (Brush-footed Butterfly Family) | monarch butterfly | non-native | uncommon |
| <i>Danaus plexippus</i> L. | | | |
| PIERIDAE (Small White and Sulphur Butterfly Family) | sleepy orange butterfly | non-native | uncommon |
| <i>Eurema nicippe</i> Cramer | | | |
| Order MANTODEA - mantises | | | |
| MANTODEA (Praying Mantis Family) | narrow-winged mantis | non-native | rare |
| <i>Tenodera angustipennis</i> Saussure | | | |
| Order ODONATA - dragonflies, damselflies | | | |
| LIBELLULIDAE (Skimmer Dragonfly Family) | globe skimmer | indigenous | uncommon |
| <i>Pantala flavescens</i> Fabricius | | | |
| Order ORTHOPTERA - grasshoppers, crickets | | | |
| ACRIDIDAE (Grasshopper Family) | graybird grasshopper | non-native | common |
| <i>Schistocerca nitens</i> Thunberg | | | |

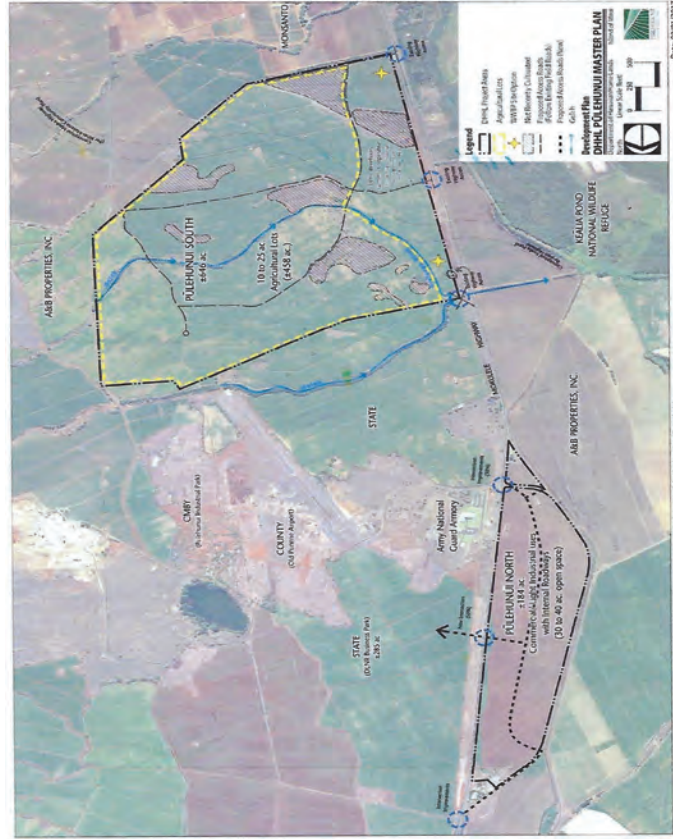


Figure 1. Project Area – Department of Hawaiian Home Lands Pulehunui South Master Plan.



Figure 2. View northwest from the southern boundary. Buffelgrass and scattered kiawe trees.

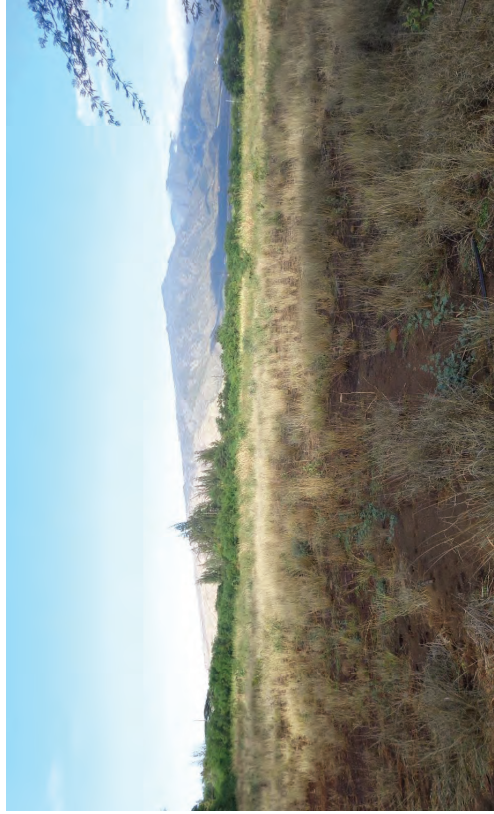


Figure 3. View west across a former sugar cane field, with West Maui Mountains in the distance.



Figure 4. View east from near Maui Veterans Highway across a former cane field. Note grasses, cane regrowth and tree tobacco plants with kiawe trees in the background.



Figure 5. View southeast from an old World War II munitions bunker showing rocky land in the foreground and open grassy agricultural fields in the background.



Figure 6. View northwest from atop the munitions bunker toward extensive open grasslands.



Figure 7. Sparse regrowth in an old fallow field with numerous tree tobacco plants coming up.

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APPENDIX F

ACOUSTIC STUDY

**ACOUSTIC STUDY FOR THE
DHHL NORTH AND SOUTH PARCELS
PUUNENE, MAUI, HAWAII**

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SEPTEMBER 2018

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The existing and future traffic noise levels in the vicinity of the proposed DHHL (Department of Hawaiian Home Lands) Pulehunui Master Plan in central Maui were evaluated for their potential impacts and their relationship to current FHA/HUD noise standards. The traffic noise level increases along the roadways servicing the project site (see Figure 1) were calculated. No significant increases in traffic noise levels are predicted to occur along Maui Veterans Highway as a result of project traffic following project build-out by CY 2038. Large increases of 6.3 DNL or more are expected to occur along project access roads to and from Maui Veterans Highway, primarily due to the low or nonexistent traffic currently on these access roads.

Along Maui Veterans Highway in the immediate vicinity of the project site, traffic noise levels are expected to increase by approximately 3.3 to 4.1 DNL by CY 2038 as a result of project and non-project traffic. Of this increase, a 2.9 to 3.6 DNL increase is expected to occur from non-project traffic and roadway improvements by CY 2038. Project traffic will account for approximately 0.4 to 0.8 DNL units of noise increase along Maui Veterans Highway in the immediate vicinity of the project. Along Kamaaina Road between Maui Veterans Highway and the project site, traffic noise levels are expected to increase by 0.5 DNL by CY 2038 as a result of project traffic. This level of traffic noise increase resulting from project generated traffic along Kamaaina Road is considered to be small, particularly when non-project traffic will cause a 15.2 DNL increase along this roadway.

Traffic noise impacts are possible within the planned DHHL Pulehunui South Parcel at noise sensitive receptors located along the Maui Veterans Highway east Right-of-Way. Traffic noise mitigation measures in the form of adequate buffer distance, sound attenuating walls/berms, or closure and air conditioning are recommended as required to meet FHA/HUD or State Department of Transportation noise abatement criteria.

The project site is located near an existing rock quarry, the Maui Humane Society, a motor sports facility, and military office facilities, and with relatively large buffer distances to the closest existing residential developments. Predicted worst case noise emissions from operating equipment within the proposed DHHL Pulehunui North Parcel are not expected to exceed noise impact thresholds at the nearest noise sensitive developments. Compliance with State Department of Health noise regulations for fixed on-site equipment are recommended to minimize adverse noise impacts on adjacent and distant properties.

The closest neighboring future developments to the planned DHHL Pulehunui South Parcel include the planned Punene Heavy Industrial Subdivision to the northeast, the planned DLNR Industrial and Business Park to the north. Noise from equipment within these two neighboring developments should not exceed 52 dBA at the closest noise sensitive receptors in the DHHL Pulehunui South Parcel and 60 dBA

at the eastern boundary of the DHHL Pulehunu North Parcel. Adverse noise impacts from these neighboring industrial land uses are not expected at the DHHL Pulehunu North and South Parcels during the daytime, but are possible if these noise sources continue through the nighttime period. Risks of exceeding the nighttime noise limit of 45 dBA at the DHHL Pulehunu South parcel are greatest from the Puunene Heavy Industrial Subdivision, and risks of exceeding the nighttime noise limit of 50 dBA at the DHHL Pulehunu North parcel are greatest from the DLNR Industrial and Business Park. Risks of adverse noise impacts at the possible hotel on the DHHL Pulehunu North parcel from nighttime industrial noise sources located at the DLNR Industrial and Business Park are considered to be low due to the probable use of closure and air conditioning at the possible hotel. Adverse noise impacts at the noise sensitive residences on the DHHL Pulehunu South parcel from nighttime industrial noise sources located at the Puunene Heavy Industrial Subdivision are considered to be possible under worst case development conditions at the heavy industrial subdivision. Exceedance of the 65 DNL FHA/HUD standard is not expected to occur at noise sensitive lots within the DHHL Pulehunu South parcel as a result of industrial noise sources located at the Puunene Heavy Industrial Subdivision or DLNR Industrial and Business Park.

Noise from Maui Raceway Park are predicted to be audible at noise sensitive receptors within the DHHL Pulehunu North and South Parcels. It is not known if the FHA/HUD noise standard of 65 DNL will be exceeded at noise sensitive lots of the DHHL Pulehunu parcels, but disclosure of the audibility of these noise sources is recommended to future project residents and tenants.

Adverse noise impacts at existing residences are not expected to occur during construction of the proposed project due to the relatively large buffer distances to the nearest developed residential properties. Because construction activities may be audible within the project site and at nearby properties, the quality of the acoustic environment may be degraded to unacceptable levels during periods of construction. Mitigation measures to reduce construction noise to inaudible levels will not be practical in all cases, but the use of quiet equipment and compliance with State Department of Health construction noise regulations are recommended as standard mitigation measures. Due to the relatively small buffer distances between the Maui Humane Society and the north end of the DHHL Pulehunu North Parcel, special noise mitigation measures may be required, particularly during the site preparation activities at the north end of that parcel.

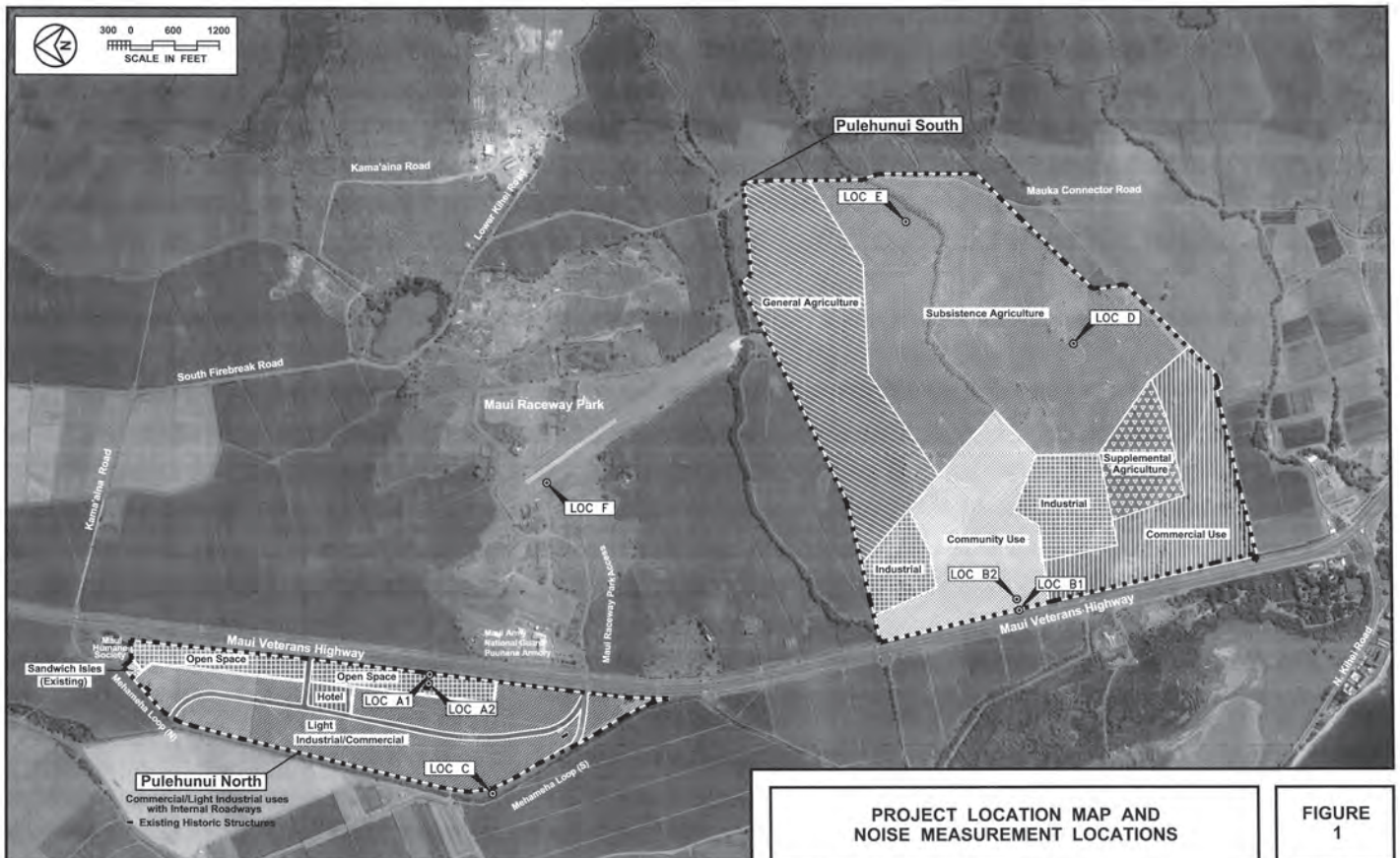


TABLE 1

POTENTIAL LAND USES ON DHHL PŪLEHUNUI SOUTH PARCEL

| DHHL Land Use Designation | DHHL Definition of Designation | Designation at Pūlehunui South | Possible Uses at Pūlehunui South |
|---------------------------|--|--------------------------------|--|
| General Ag | Intensive or extensive farming or ranching allowed. May serve as an interim use until opportunities for higher and better uses become available. | Farms | General lease for commercial farming. May include a shelter or accessory structure. Farmed areas can buffer residential areas from uses such as the Raceway Park. |
| Subsistence Ag | Small log agriculture. Close proximity to existing infrastructure. Lifestyle areas intended to allow for home consumption of agricultural products. | Ag Homesteads | Homestead lots for DHHL Beneficiaries. DHHL Subsistence Ag homesteads are typically up to 3 acres; assume 2-acre lots with 1 family per lot. Agricultural uses are at the discretion of the Beneficiary. Land lease is \$1/year. |
| Community Use | Common areas for community uses and public facilities. Includes space for parks and recreation, cultural activities, community based economic development, Utilities, and other public facilities and amenities. | Education | Hawaiian culture/immersion school(s); language programs; agricultural/mālama 'āina education; business & job training; daycare; capacity building |
| Community Use | Common areas for community uses and public facilities. Includes space for parks and recreation, cultural activities, community based economic development, Utilities, and other public facilities and amenities. | Culture & Arts | Lūau grounds, cultural venue, meeting space, gathering areas, pavilion, community center, commercial kitchen. Area may also support Beneficiary-led agritourism, ecotourism, cultural tourism and other outreach activities. |
| Industrial | Lands suitable for processing, construction, manufacturing, transportation, wholesale, warehousing, and other industrial activities. | Ag Support | Agricultural community resource. Packing, cooling, industrial processing of agricultural products, storage/warehousing |
| Supplemental Ag | Large lot agriculture. Intended to provide opportunities for agricultural production of supplemental income and home use. Agriculture waiting list. | Beneficiary Gardens | Large-scale community garden opportunities for Beneficiaries across the Island. Operated by the community. |
| Commercial | Common areas for community uses and public facilities. Includes space for parks and recreation, cultural activities, community based economic development, Utilities, and other public facilities and amenities. | Farmers Market | Beneficiary and public use. Marketing opportunity for agricultural goods produced across the island. |
| Commercial | Lands suitable for retail, business, and commercial activities | Commercial Enterprise | Provide light industrial lands to Hawaiian businesses. Baseyards, non ag-related uses. Lower intensity than private sector general lease industrial lands. Similar use to Central Maui Baseyard. Beneficiary-driven. Provide advantage to Native Hawaiians. |
| Industrial | Land Suitable for processing, construction, manufacturing, transportation, wholesale, warehousing, and other industrial activities. | Waste Water Treatment Facility | Engineering studies are underway to assess wastewater options to serve the region. Several site options for a possible wastewater treatment facility are being considered, both on Pūlehunui South and other State lands. If constructing a facility for wastewater is feasible and practical, the Department's Maui Island Plan would be amended to accommodate this. |
| - | - | Roads | Internal roads will be included under other DHHL land use designations (listed above). |
| - | - | Open space/gulch | Open space/gulch areas will be included under other DHHL land use designations (listed above). |

CHAPTER II. PURPOSE

The primary objective of this study was to describe the existing and future traffic noise environment in the environs of the proposed DHHL Pūlehunui Master Plan in central Maui. Traffic forecasts for 2038 were used. Traffic noise level increases and impacts associated with the proposed project were to be determined within the project site as well as along the public roadways which are expected to service the project traffic. A specific objective was to determine future traffic noise level increases associated with both project and non-project traffic, and the potential noise impacts associated with these increases.

Figure 1 depicts the locations of the DHHL Pūlehunui North and South Parcels, and Table 1 presents the potential land uses at the various DHHL Land Use Designations shown within the south parcel. The possible Hotel site shown in the DHHL Pūlehunui North Parcel may be relocated.

Existing noise levels on the project site resulting from activities at the Maui Raceway Park, and potential noise impacts on noise sensitive land uses of the project were discussed. Potential noise impacts from aircraft noise and from possible noise from planned neighboring industrial activities were also discussed.

Potential noise impacts from on-site activities and short term construction noise at the project site were also described. Recommendations for minimizing identified noise impacts were also to be provided as required.

CHAPTER III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

The noise descriptor currently used by federal agencies (such as FHA/HUD) to assess environmental noise is the Day-Night Average Sound Level (DNL). This descriptor incorporates a 24-hour average of instantaneous A-Weighted Sound Levels as read on a standard Sound Level Meter. By definition, the minimum averaging period for the DNL descriptor is 24 hours. Additionally, sound levels which occur during the nighttime hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the DNL descriptor. A more complete list of noise descriptors is provided in Appendix B to this report.

Table 2, derived from Reference 1, presents current federal noise standards and acceptability criteria for residential land uses. Table 3, also extracted from Reference 1, presents the general effects of noise on people in residential use situations. Land use compatibility guidelines for various levels of environmental noise as measured by the DNL descriptor system are shown in Figure 2 (from Reference 2). As a general rule, noise levels of 55 DNL or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas which are shielded from high volume streets, DNL levels generally range from 55 to 65 DNL, and are usually controlled by motor vehicle traffic noise. Residences which front major roadways are generally exposed to levels of 65 DNL, and as high as 75 DNL when the roadway is a high speed freeway. In the project area, existing traffic noise levels associated with Maui Veterans Highway are approximately 65 to 66 DNL along the Rights-of-Way due to the relatively large volume of traffic and high vehicle speeds on this thoroughfare.

For purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an exterior noise level of 65 DNL or less is considered acceptable for residences. This standard is applied nationally (Reference 3), including Hawaii. Because of our open-living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior-to-interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 DNL does not eliminate all risks of noise impacts. Because of these factors, and as recommended in Reference 4, a lower level of 55 DNL is considered as the "Unconditionally Acceptable" (or "Near-Zero Risk") level of exterior noise. However, after considering the cost and feasibility of applying the lower level of 55 DNL, government agencies such as FHA/HUD and VA have selected 65 DNL as a more appropriate regulatory standard.

For commercial, industrial, and other non-noise sensitive land uses, exterior noise levels as high as 75 DNL are generally considered acceptable. Exceptions to this occur when naturally ventilated office and other commercial establishments are exposed to exterior levels which exceed 65 DNL.

On the island of Maui, the State Department of Health (DOH) regulates noise from construction activities through the issuance of permits for allowing excessive

TABLE 2
EXTERIOR NOISE EXPOSURE CLASSIFICATION
(RESIDENTIAL LAND USE)

| NOISE EXPOSURE CLASS | DAY-NIGHT SOUND LEVEL | EQUIVALENT SOUND LEVEL | FEDERAL (1) STANDARD |
|----------------------|-----------------------------------|-----------------------------------|----------------------------|
| Minimal Exposure | Not Exceeding 55 DNL | Not Exceeding 55 Leq | Unconditionally Acceptable |
| Moderate Exposure | Above 55 DNL But Not Above 65 DNL | Above 55 Leq But Not Above 65 Leq | Acceptable(2) |
| Significant Exposure | Above 65 DNL But Not Above 75 DNL | Above 65 Leq But Not Above 75 Leq | Normally Unacceptable |
| Severe Exposure | Above 75 DNL | Above 75 Leq | Unacceptable |

Notes: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

(2) FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.

**TABLE 3
EFFECTS OF NOISE ON PEOPLE
(Residential Land Uses Only)**

| EFFECTS ¹ DAY-NIGHT AVERAGE SOUND LEVEL IN DECIBELS | Hearing Loss | Speech Interference | | Annoyance ² % of Population ³ Highly Annoyed | Average Community ⁴ Reaction | General Community Attitude Towards Area |
|--|-----------------------------|----------------------------|--|--|---|--|
| | | Qualitative Description | Indoor %Sentence Intelligibility | | | |
| | 75 and above | May Begin to Occur | 98% | 0.5 | | |
| 70 | Will Not Likely Occur | 99% | 0.9 | 25% | Severe | Noise is one of the most important adverse aspects of the community environment. |
| 65 | Will Not Occur | 100% | 1.5 | 15% | Significant | Noise is one of the important adverse aspects of the community environment. |
| 60 | Will Not Occur | 100% | 2.0 | 9% | Moderate to | Noise may be considered an adverse aspect of the community environment. |
| 55 and below | Will Not Occur | 100% | 3.5 | 4% | Slight | Noise considered no more important than various other environmental factors. |

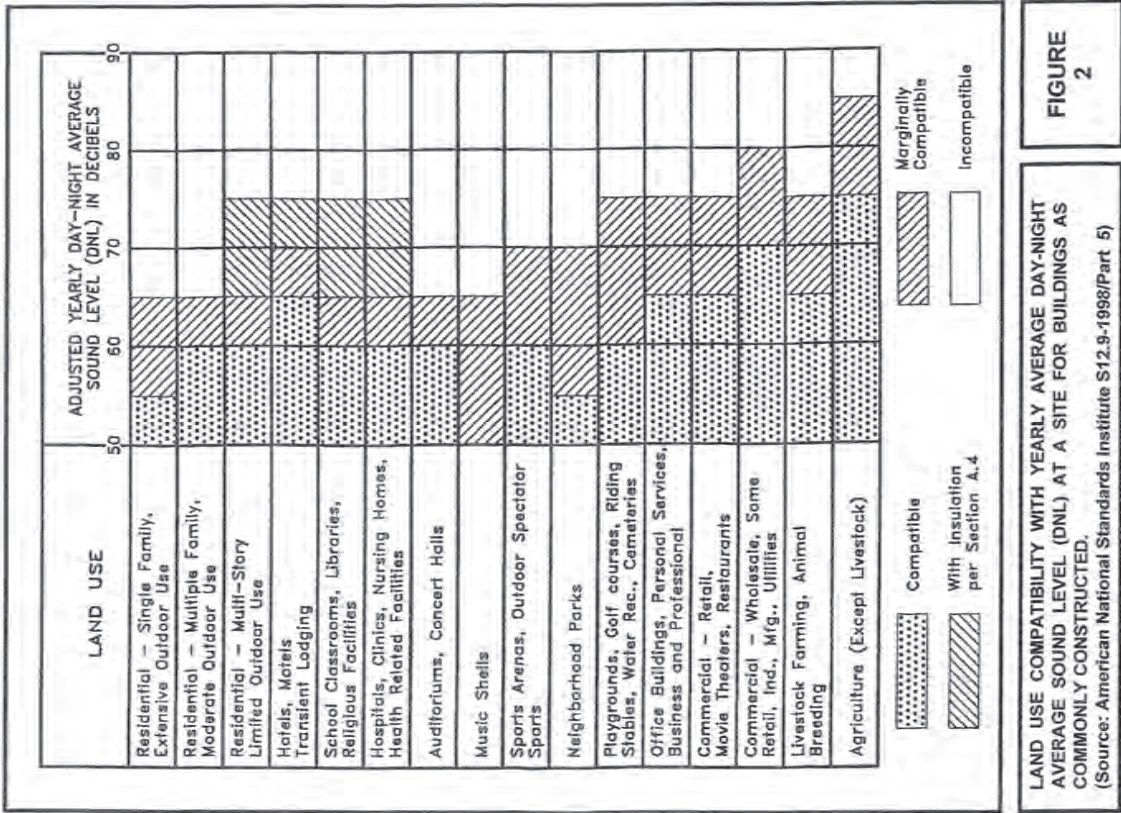
1. "Speech Interference" data are drawn from the following tables in EPA's "Levels Document": Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."

2. Depends on attitudes and other factors.

3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time.

4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE: Research implicates noise as a factor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been quantified.



noise during limited time periods. State DOH noise regulations are expressed in maximum allowable property line noise limits rather than DNL (see Reference 5). Although they are not directly comparable to noise criteria expressed in DNL, State DOH noise limits for residential, commercial, and industrial lands equate to approximately 55, 60, and 76 DNL, respectively.

CHAPTER IV. GENERAL STUDY METHODOLOGY

Existing traffic noise levels were measured at four locations (A1, A2, B1, and B2) in the project environs to provide a basis for developing the project's traffic noise contributions along the roadways which will service the proposed development. In addition, existing background noise measurements were obtained at the interior of the Pulehunu North and South parcels at Locations C, D, and E. The noise measurement locations are shown in Figure 1. Noise measurements were performed during the month of July 2018. The results of the traffic noise measurements were compared with calculations of existing traffic noise levels to validate the traffic noise level computer model used. The traffic noise measurement results, and their comparisons with computer model predictions of existing traffic noise levels are summarized in Table 4. Table 5 summarizes the results of all traffic and background noise measurement results.

Traffic noise calculations for the existing conditions as well as noise predictions for the Year 2038 were performed using the Federal Highway Administration (FHWA) Traffic Noise Model (Reference 6). Traffic data entered into the noise prediction model were: roadway and receiver locations; hourly traffic volumes; average vehicle speeds; estimates of traffic mix; and "Hard Soil" propagation loss factor. The traffic data and forecasts for the project (Reference 7), plus the spot traffic counts obtained during the noise measurement periods were the primary sources of data inputs to the model. Appendix C summarizes the AM and PM peak hour traffic volumes for CY 2017 and 2038 which were used to model existing and future traffic noise along the roadways in the vicinity of the project site. For existing and future traffic along the roadways in the vicinity of the project site, it was assumed that the 24-hour DNL along those roadways were equal to the average noise levels, or Leq(h), during the PM peak traffic hour plus 1.0 dB. This assumption was based on computations of both the hourly Leq and the 24-hour DNL of traffic noise on Maui Veterans Highway (see Figure 3) using State of Hawaii hourly traffic counts from Reference 8.

Traffic noise calculations for both the existing and future conditions in the project environs were developed for ground level receptors with and without the benefit of shielding from natural terrain features or man made obstructions. Traffic noise levels were also calculated for future conditions with and without the proposed project. The forecasted changes in traffic noise levels over existing levels were calculated with and without the project, and noise impact risks evaluated. The relative contributions of non-project and project traffic to the total noise levels were also calculated, and an evaluation of possible traffic noise impacts was made.

Evaluations of potential noise impacts from aircraft operating at Kahului Airport at the project site were performed using the aircraft noise contours provided in Reference 9.

Evaluations of potential noise impacts from future neighboring industrial noise

TABLE 4 (CONTINUED)

TRAFFIC NOISE MEASUREMENT RESULTS

| LOCATION | Time of Day (HRS) | Ave. Speed (MPH) | Hourly Traffic Volume | | | Measured Leq (dB) | Predicted Leq (dB) |
|--|----------------------|---------------------|-----------------------|---------|---------|----------------------|-----------------------|
| | | | AUTO | M.TRUCK | H.TRUCK | | |
| B1. 150 FT from the center-line of Maui Veterans Hwy (7/12/18) | 0700 | 45 | 2,115 | 92 | 101 | 61.1 | 62.0 |
| | TO 0800 | | | | | | |
| B2. 300 FT from the center-line of Maui Veterans Hwy (7/12/18) | 0700 | 45 | 2,115 | 92 | 101 | 57.8 | 57.6 |
| | TO 0800 | | | | | | |

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TABLE 4

TRAFFIC NOISE MEASUREMENT RESULTS

| LOCATION | Time of Day (HRS) | Ave. Speed (MPH) | Hourly Traffic Volume | | | Measured Leq (dB) | Predicted Leq (dB) |
|--|----------------------|---------------------|-----------------------|---------|---------|----------------------|-----------------------|
| | | | AUTO | M.TRUCK | H.TRUCK | | |
| A1. 120 FT from the center-line of Maui Veterans Hwy (7/10/18) | 1600 | 45 | 2,766 | 72 | 61 | 62.6 | 63.3 |
| | TO 1700 | | | | | | |
| A2. 240 FT from the center-line of Maui Veterans Hwy (7/10/18) | 1600 | 45 | 2,766 | 72 | 61 | 60.0 | 59.1 |
| | TO 1700 | | | | | | |
| A1. 120 FT from the center-line of Maui Veterans Hwy (7/11/18) | 0700 | 50 | 2,071 | 67 | 121 | 64.6 | 64.5 |
| | TO 0800 | | | | | | |
| A2. 240 FT from the center-line of Maui Veterans Hwy (7/11/18) | 0700 | 50 | 2,071 | 67 | 121 | 61.8 | 60.4 |
| | TO 0800 | | | | | | |
| B1. 150 FT from the center-line of Maui Veterans Hwy (7/11/18) | 1600 | 50 | 2,713 | 71 | 59 | 62.7 | 63.4 |
| | TO 1700 | | | | | | |
| B2. 300 FT from the center-line of Maui Veterans Hwy (7/11/18) | 1600 | 50 | 2,713 | 71 | 59 | 60.2 | 58.8 |
| | TO 1700 | | | | | | |

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FIGURE 3
HOURLY TRAFFIC NOISE LEVELS VS. TIME OF DAY
 STA. B74031100000, PUUNENE AVE - KUIHELANI HWY. TO MAUI VETERANS HWY.; 09/28/2011

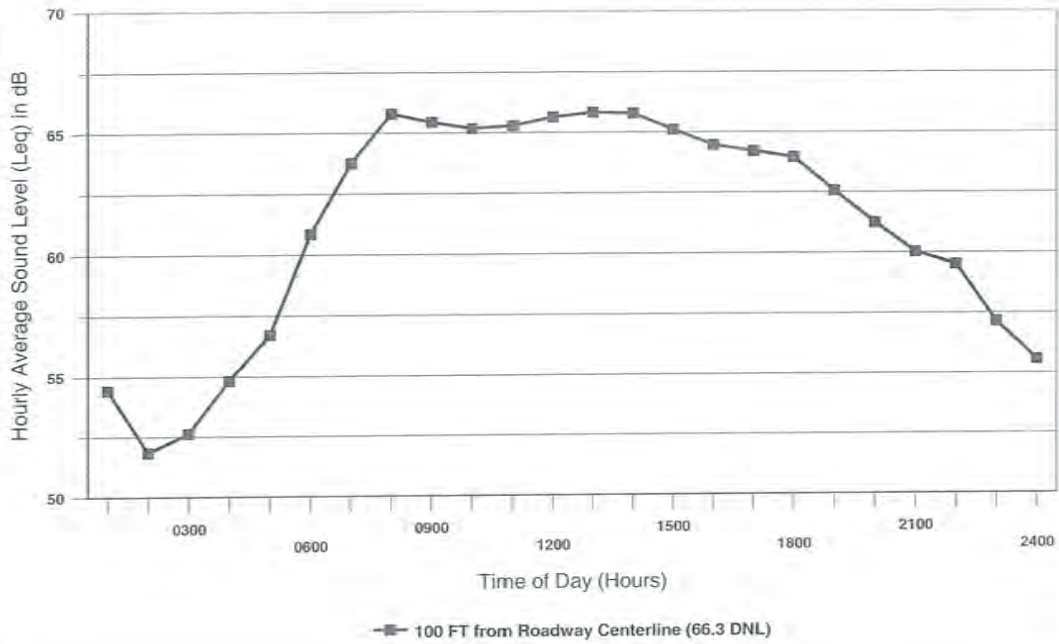


TABLE 5
SUMMARY OF TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

LOCATION: DHHH Puiehunui Master Plan
 DATE: July 10-12, 2018

| Start Time | End Time | Location | L _{max} | L _{Aeq} | L _{Amin} | LA10 | Event Description |
|----------------|----------|----------|------------------|------------------|-------------------|------|--------------------------------------|
| July 10, 2018: | | | | | | | |
| 1130 | 1230 | C | 67.4 | 49.5 | 39.5 | 52.3 | Aircraft landing at Kahului Airport. |
| 1400 | 1500 | C | 74.4 | 51.6 | 39.5 | 53.2 | Aircraft landing at Kahului Airport. |
| 1600 | 1700 | A1 | 74.8 | 62.6 | 46.8 | 65.4 | |
| 1600 | 1700 | A2 | 75.3 | 60.0 | 43.0 | - | |
| July 11, 2018: | | | | | | | |
| 0700 | 0800 | A1 | 78.2 | 64.6 | 45.7 | 68.1 | |
| 0700 | 0800 | A2 | 74.4 | 61.8 | 46.2 | - | |
| 1130 | 1230 | D | 67.8 | 55.0 | 36.5 | 59.1 | 10 to 20 mph winds moving grass. |
| 1600 | 1700 | B1 | 82.6 | 62.7 | 49.5 | 65.0 | |
| 1600 | 1700 | B2 | 82.0 | 60.2 | 49.5 | - | |
| July 12, 2018: | | | | | | | |
| 0700 | 0800 | B1 | 72.2 | 61.1 | 48.0 | 63.7 | |
| 0700 | 0800 | B2 | 73.7 | 57.8 | 47.8 | - | |
| 1130 | 1230 | E | 69.3 | 50.4 | 40.1 | 53.1 | 5 to 10 mph low winds. |

Notes:

- a. L_{Aeq} = Average A-Weighted Sound Level (in dBA)
- b. L_{max} = Maximum A-Weighted Sound Level (in dBA)
- c. L_{Amin} = Minimum A-Weighted Sound Level (in dBA)
- d. LA10 = A-Weighted Sound Level (in dBA) which was exceeded 10 percent of the time.

sources located at other planned industrial/commercial developments were performed by predicting the noise levels from these neighboring noise sources at the closest noise sensitive receptors within the proposed DHHL Pulehunui North and South Parcels. These noise predictions utilized previously estimated maximum number of industrial noise sources within the neighboring developments (see References 10 and 11) which could continuously operate at the maximum sound level of 70 dBA as allowed for industrial properties by the State DOH noise regulations (Reference 5). The worst case sound levels at the closest noise sensitive developments of the project and resulting from this hypothetical worst case noise modeling assumptions were evaluated to identify potential noise impacts at noise sensitive project receptors from industrial equipment on neighboring developments.

The potential noise levels during drag racing events at the adjacent Maui Raceway Park were estimated at potential noise sensitive receptor locations within the proposed DHHL Pulehunui North and South Parcels. Potential noise impacts from Friday and Saturday drag racing events were discussed.

Calculations of average exterior and interior noise levels from construction activities were performed for typical naturally ventilated and air conditioned buildings. Predicted noise levels were compared with existing background ambient noise levels, and the potential for noise impacts was assessed.

V. EXISTING ACOUSTICAL ENVIRONMENT

Traffic, Aircraft, and Wind Noise. The existing background ambient noise levels at locations removed from Maui Veterans Highway and within the project site are moderate and less than 55 dBA, except during passbys of heavy motor vehicles on the cane field service roads or during flybys of aircraft operating at Kahului Airport, or during moderate to high winds which rustle foliage and tall grass. During low wind conditions, background ambient noise levels drop to 40 dBA. Traffic along Maui Veterans Highway controls the background noise levels within 1,000 feet the centerline of Maui Veterans Highway at approximately 50 dBA during low wind conditions. The loudest noise sources at the project site are probably heavy trucks traveling along the roadways closest to the north and south project sites' boundaries, and aircraft in transit to or from Kahului Airport.

Traffic noise measurements were obtained in July 2018 at four locations (A1, A2, B1, and B2) in the project environs for validating the FHWA Traffic Noise Model (TNM, Version 2.5). These locations are shown in Figure 1. The results of the traffic noise measurements are summarized in Table 4, with measurement locations identified in Figure 1. The measurement locations were all at approximately 5 feet above ground level. As shown in Table 4, correlation between measured and predicted traffic noise levels was satisfactory. The Traffic Noise Models "Hard Soil" propagation loss factor was used to obtain the "Predicted Leq (dB)" values shown in Table 4.

Table 5 summarizes the traffic and background noise measurements results obtained in July 2018. Daytime background noise measurements were obtained at the interior portions of Pulehunui North and South Parcels at Locations C, D, and E where shown in Figure 1. Figures 4 and 5 depict the daytime background noise measurement results at Location C, with aircraft flyby events depicted in the figures. Figures 6 and 7 depict the daytime background noise measurement results at Locations D and E, respectively, with wind speed dependent foliage noise causing the large variations in background noise. During low to brisk winds (4 to 20 mph) at these interior locations, steady background noise levels ranged between 46 to 52 dBA. During moderate to brisk winds (15 to 20 mph), steady background noise levels ranged from 50 to 52 dBA at these interior locations. Intermittent aircraft noise levels were between 58 to 75 dBA at Location C during flyby events, but annually averaged DNL values were clearly less than the current Hawaii State Department of Transportation, Airport Division's 60 DNL recommended noise criteria for noise sensitive land uses. At Locations C, D, and E, existing background noise levels from traffic, wind, and aircraft noise sources were less than the FHA/HUD standard of 65 DNL for noise sensitive land uses.

Calculations of existing traffic noise levels during the PM peak traffic hour are presented in Table 6. The hourly Leq (or Equivalent Sound Level) contribution from each roadway section in the project environs was calculated for comparison with forecasted traffic noise levels with and without the project. In Table 6, the PM peak hour Leq values shown were assumed to be approximately 1.0 dB lower than the DNL

FIGURE 5. 1 HOUR DBA VS. TIME RECORD AT LOCATION C (1400 TO 1500 HOURS; JULY 10, 2018)

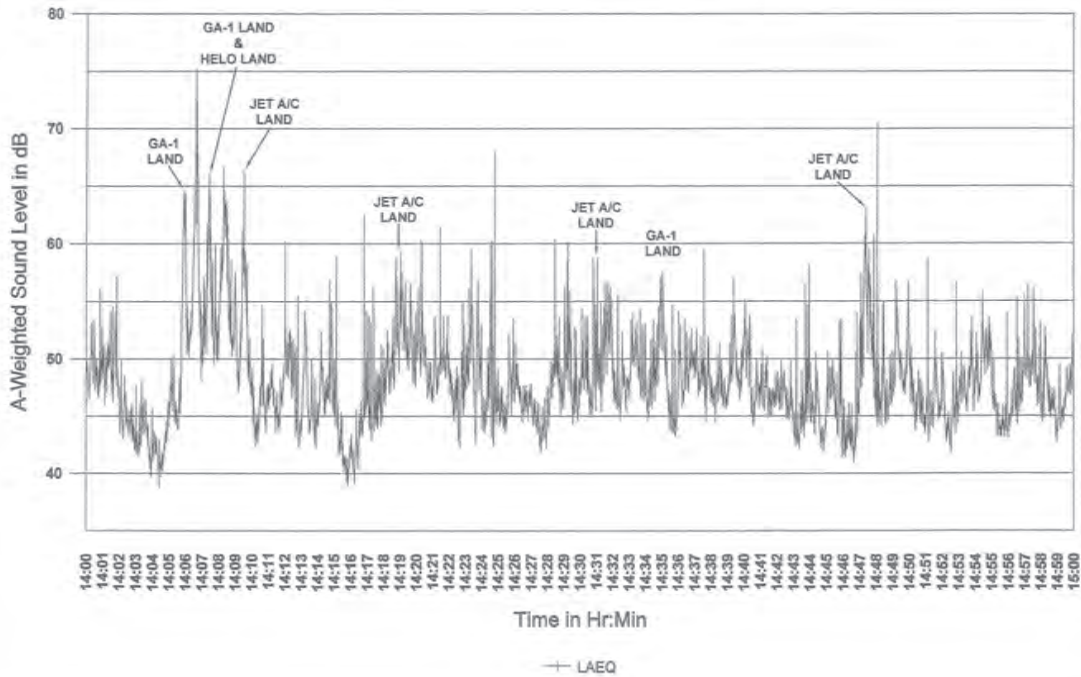
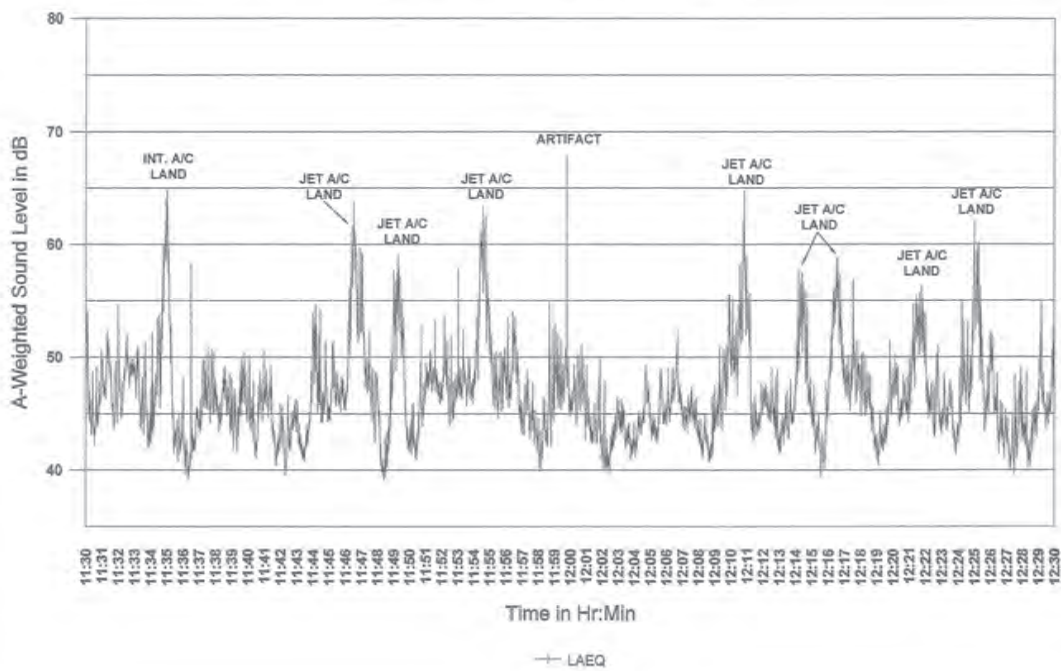
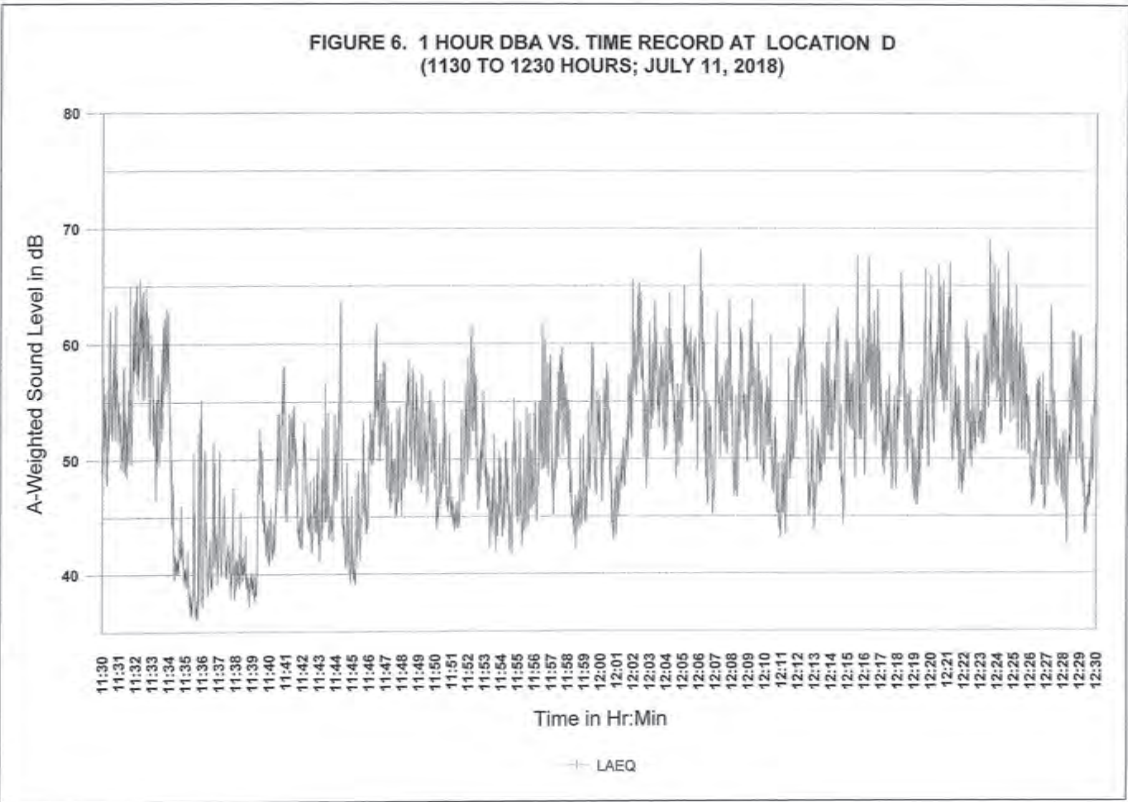
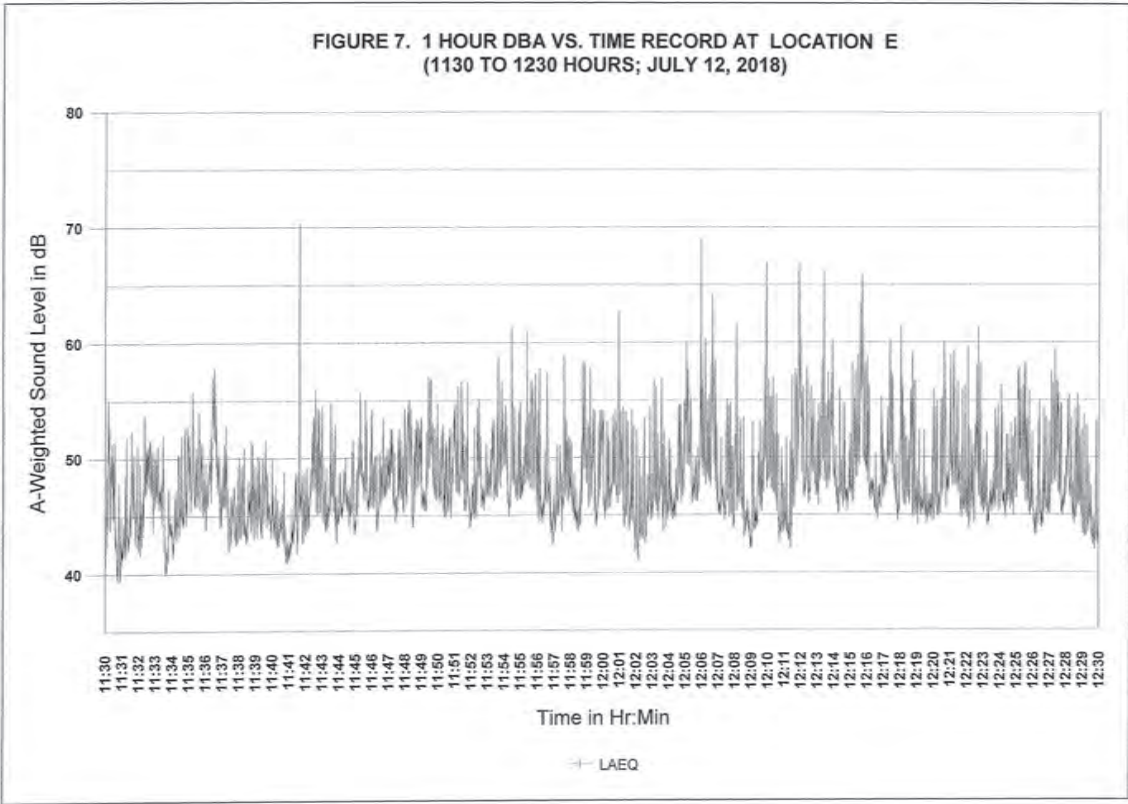


FIGURE 4. 1 HOUR DBA VS. TIME RECORD AT LOCATION C (1130 TO 1230 HOURS; JULY 10, 2018)





values for the roadways shown. The existing setback distances from the roadways' centerlines to their associated 55 and 70 DNL contours were also calculated as shown in Table 7. The contour line setback distances do not take into account noise shielding effects or the additive contributions of traffic noise from intersecting street sections.

The existing traffic noise levels in the project environs along the Maui Veterans Highway Rights-of-Way are in the "Significant Exposure, Normally Unacceptable" category for residences, and at 65 to 66 DNL along the highway's west Right-of-Way. Along the highway's east Right-of-Way, existing traffic noise levels are slightly less than 65 DNL, and in the "Moderate Exposure, Acceptable" category for residences. Existing traffic noise levels at the Maui Humane Society building closest to Maui Veterans Highway are approximately 64 to 65 DNL, which is considered to be acceptable for office buildings. Existing traffic noise levels at the Maui Army National Guard Puunene Armory are approximately 59 to 60 DNL, which is also considered to be acceptable for office buildings.

Raceway Park Noise. During Saturdays and occasionally on Fridays, Sundays, and holidays, noise from activities at the Maui Raceway Park are probably the loudest noise sources at the proposed homestead areas of Pulehuni South. Sound level measurements of noise during drag racing time trials at Maui Raceway Park were obtained on February 25, 2018 at Location F where shown in Figure 1. These measurements were used to determine if potential noise impacts are possible at future tenants of the project during similar drag racing events at Maui Raceway Park.

The sound levels of drag racing noise events previously recorded at Location F [at the north (starting line) end of the dual drag strip] were assumed to also be representative of noise levels occurring at the south end of the dual drag strips during drag racing events, and were used to predict the sound levels during drag racing events at interior locations on the Pulehuni Project site. Drag racing noise events recorded at Location F are shown in Figures 8 through 12, which depict the noise events as recurring, short duration, 90 to 117 dBA bursts of noise at 115 to 150 feet distance from the starting line of the dual lane, drag strip. These five figures were extracted from Figures 4 through 8 of Reference 10, with the "x" marks depicting the times of racing vehicles leaving the starting line, and are representative of the close-in noise levels during drag racing events at the Maui Raceway Park.

The drag strip at Maui Raceway Park was not operating during 2018 prior to the completion of this noise study for the DHHL Pulehuni North and South parcels, so noise measurements at the Pulehuni Project site were not possible. In order to estimate the maximum noise levels at the DHHL Pulehuni South Parcel during similar drag racing events, it was assumed that these typical maximum noise levels shown in Figures 8 through 12 would also be present at 135 feet from the finish line of the dual drag strips. The closest planned residences at DHHL Pulehuni South are located approximately 3,000 feet south of the finish line of the Maui Raceway Park dual drag strips. At this distance, predicted maximum noise levels were approximately 33 dBA less than those measured at 135 feet roadside of the starting line in February 2017.

TABLE 6

EXISTING (CY 2017) TRAFFIC VOLUMES AND NOISE LEVELS
ALONG ROADWAYS IN PROJECT AREA
(PM PEAK HOUR)

| LOCATION | SPEED (MPH) | TOTAL VPH | ***** VOLUMES (VPH) ***** | | | | | |
|---|----------------|--------------|---------------------------|----------|----------|----------|----------|----------|
| | | | AUTOS | M TRUCKS | H TRUCKS | 100' Leq | 200' Leq | 400' Leq |
| Maui Veterans Hwy. N. of Nakii Rd. | 50 | 3,053 | 2,913 | 76 | 64 | 65.6 | 61.3 | 56.8 |
| Maui Veterans Hwy. Between Nakii Rd. & Kamaaina Rd. | 50 | 2,818 | 2,689 | 70 | 59 | 65.2 | 61.0 | 56.4 |
| Maui Veterans Hwy. Between Kamaaina Rd. & DLNR Access Rd. | 50 | 2,666 | 2,543 | 67 | 56 | 65.0 | 60.8 | 56.2 |
| Maui Veterans Hwy. Btwn. DLNR Acc. Rd. & Mehamaha Lp. (South) | 50 | 2,666 | 2,543 | 67 | 56 | 65.0 | 60.8 | 56.2 |
| Maui Veterans Hwy. Btwn. Mehamaha Lp. (South) & DHHL Acc.1 | 50 | 2,692 | 2,568 | 67 | 57 | 65.0 | 60.8 | 56.2 |
| Maui Veterans Hwy. Btwn. DHHL Acc.1 & DHHL Acc.2 | 50 | 2,692 | 2,568 | 67 | 57 | 65.0 | 60.8 | 56.2 |
| Maui Veterans Hwy. Btwn. DHHL Acc.2 & DHHL Acc.3 | 50 | 2,692 | 2,568 | 67 | 57 | 65.0 | 60.8 | 56.2 |
| Maui Veterans Hwy. Btwn. DHHL Acc.3 & N. Kihai Rd. | 50 | 2,692 | 2,568 | 67 | 57 | 65.0 | 60.8 | 56.2 |
| Maui Veterans Hwy. S. of N. Kihai Rd. | 50 | 3,171 | 3,025 | 79 | 67 | 65.7 | 61.5 | 56.9 |
| Mehameha Lp. (North) at Maui Veterans Hwy. | 35 | 60 | 58 | 1 | 1 | 49.1 | 45.3 | 40.8 |
| Kamaaina Rd. At Maui Veterans Hwy. | 35 | 38 | 38 | 0 | 0 | 45.8 | 41.8 | 37.2 |
| DHHL Access At Maui Veterans Hwy. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| DLNR Access At Maui Veterans Hwy. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Maui Raceway Park Access Rd. At Maui Veterans Hwy. | 35 | 17 | 17 | 0 | 0 | 42.2 | 38.4 | 33.7 |
| Mehameha Lp. (South) At Maui Veterans Hwy. | 35 | 2 | 2 | 0 | 0 | 33.0 | 29.1 | 24.4 |
| DHHL Access1 Rd. At Maui Veterans Hwy. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| DHHL Access2 Rd. At Maui Veterans Hwy. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| DHHL Access3 Rd. At Maui Veterans Hwy. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

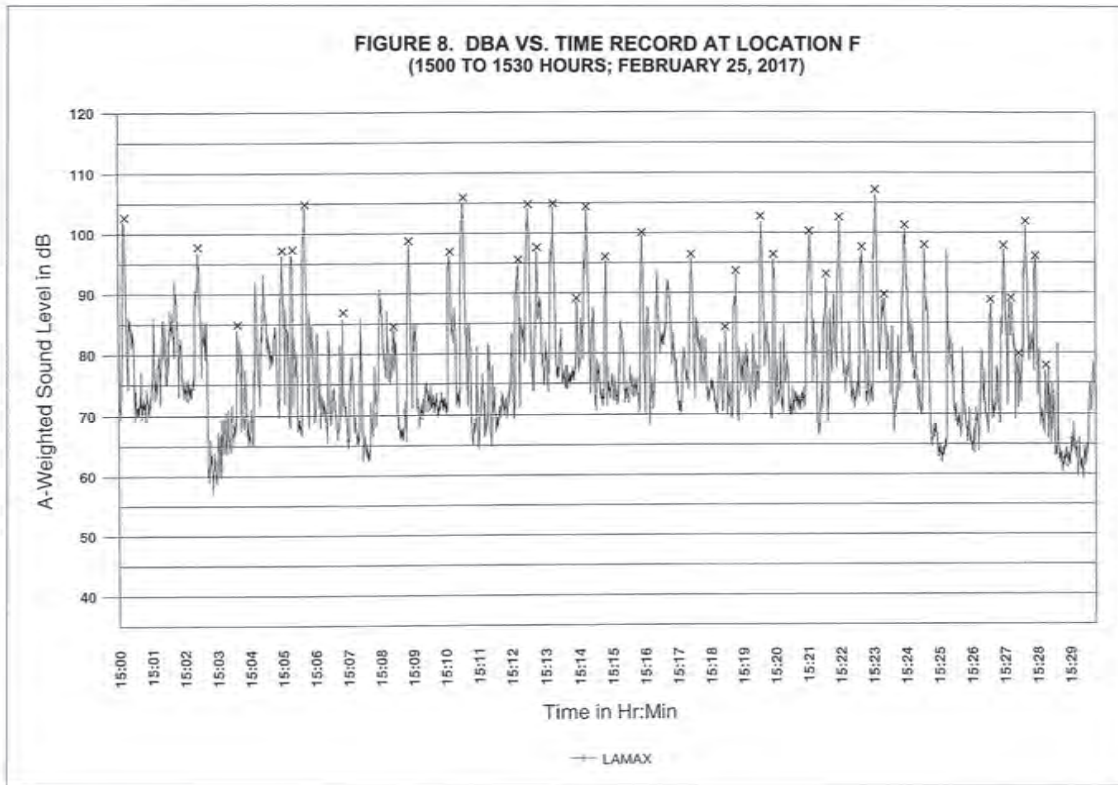


TABLE 7

**EXISTING AND CY 2038 DISTANCES TO 65
AND 70 DNL CONTOURS**

| STREET SECTION | 65 DNL SETBACK (FT) | | 70 DNL SETBACK (FT) | |
|---|---------------------|---------|---------------------|---------|
| | EXISTING | CY 2038 | EXISTING | CY 2038 |
| Maui Veterans Hwy. N. of Nakii Rd. | 129 | 241 | 58 | 112 |
| Maui Veterans Hwy. Between Nakii Rd. & Kamaaina Rd. | 122 | 228 | 53 | 105 |
| Maui Veterans Hwy. Between Kamaaina Rd. & DLNR Access Rd. | 118 | 215 | 52 | 98 |
| Maui Veterans Hwy. Btwn. DLNR Acc. Rd. & Mehamaha Lp. (South) | 118 | 212 | 52 | 97 |
| Maui Veterans Hwy. Btwn. Mehamaha Lp. (South) & DHHL Acc1. | 118 | 224 | 52 | 103 |
| Maui Veterans Hwy. Btwn. DHHL Acc.1 & DHHL Acc.2 | 118 | 222 | 52 | 102 |
| Maui Veterans Hwy. Btwn. DHHL Acc.2 & DHHL Acc.3 | 118 | 224 | 52 | 102 |
| Maui Veterans Hwy. Btwn. DHHL Acc.3 & N. Kihei Rd. | 118 | 219 | 52 | 98 |
| Maui Veterans Hwy. S. of N. Kihei Rd. | 132 | 222 | 58 | 100 |
| Mehameha Lp. (North) at Maui Veterans Hwy. | 7 | 24 | 3 | 10 |
| Kamaaina Rd. At Maui Veterans Hwy. | 4 | 68 | 2 | 28 |
| DHHL Access At Maui Veterans Hwy. | N/A | 47 | N/A | 19 |
| DLNR Access At Maui Veterans Hwy. | N/A | 93 | N/A | 38 |
| Maui Raceway Park Access Rd. At Maui Veterans Hwy. | 2 | 36 | 1 | 14 |
| Mehameha Lp. (South) At Maui Veterans Hwy. | 0 | 32 | 0 | 13 |
| DHHL Access1 Rd. At Maui Veterans Hwy. | N/A | 8 | N/A | 3 |
| DHHL Access2 Rd. At Maui Veterans Hwy. | N/A | 37 | N/A | 15 |
| DHHL Access3 Rd. At Maui Veterans Hwy. | N/A | 6 | N/A | 2 |

Notes:

- (1) All setback distances are from the roadways' centerlines.
- (2) See Tables 6 and 8 for traffic volume, speed, and mix assumptions.
- (3) Setback distances are for ground level receptors.

FIGURE 10. DBA VS. TIME RECORD AT LOCATION F
(1621 TO 1637 HOURS; FEBRUARY 25, 2017)

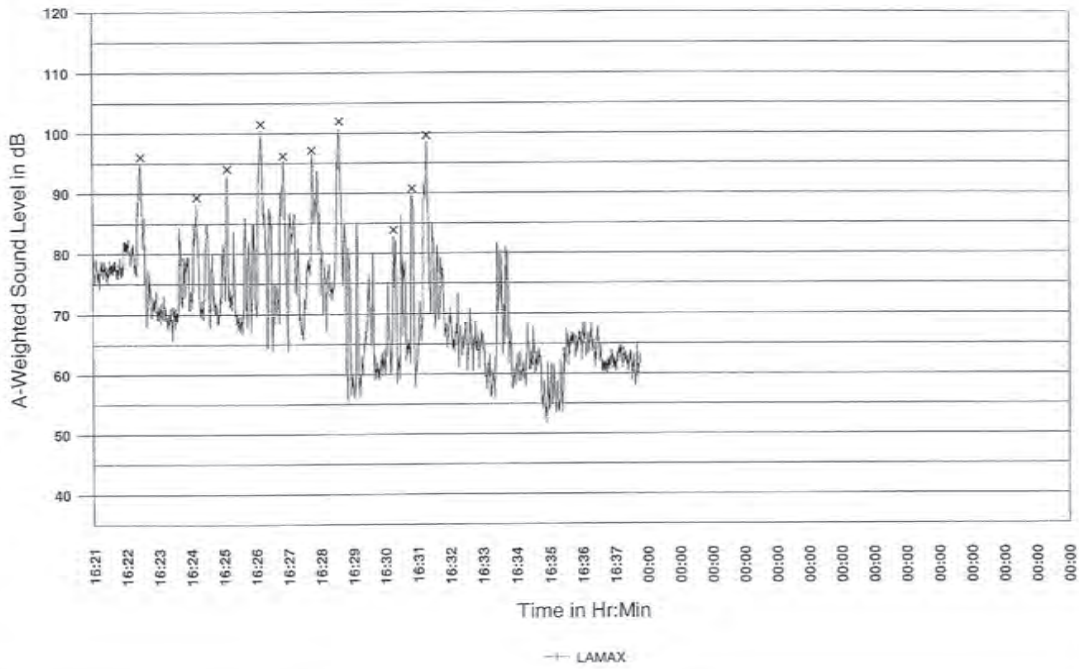


FIGURE 9. DBA VS. TIME RECORD AT LOCATION F
(1546 TO 1615 HOURS; FEBRUARY 25, 2017)

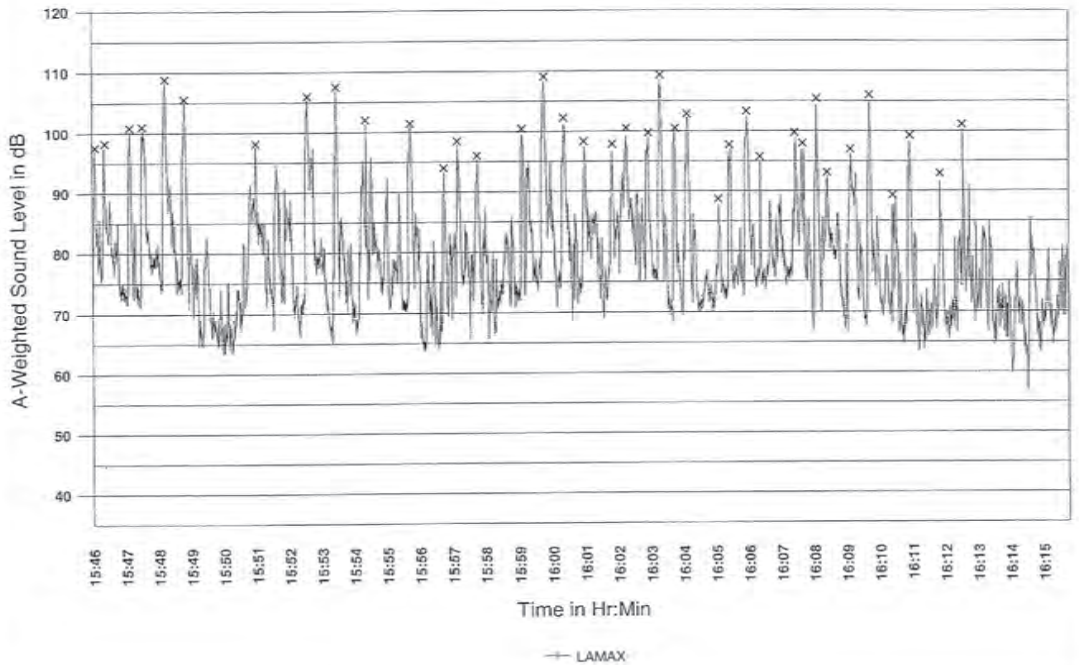


FIGURE 12. DBA VS. TIME RECORD AT LOCATION F
(1757 TO 1811 HOURS; FEBRUARY 25, 2017)

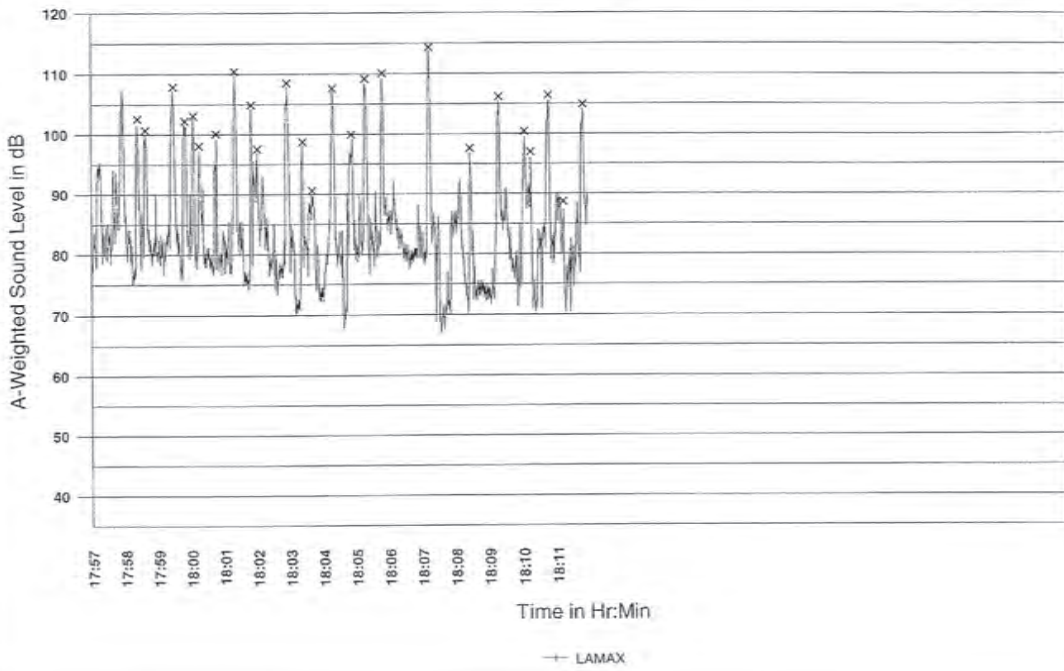
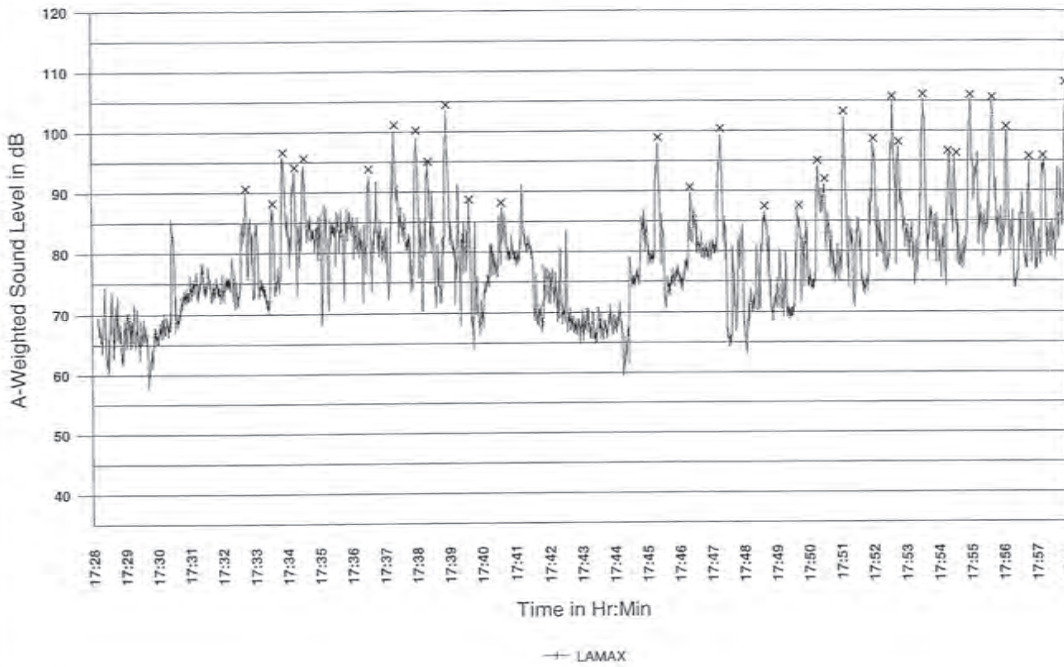
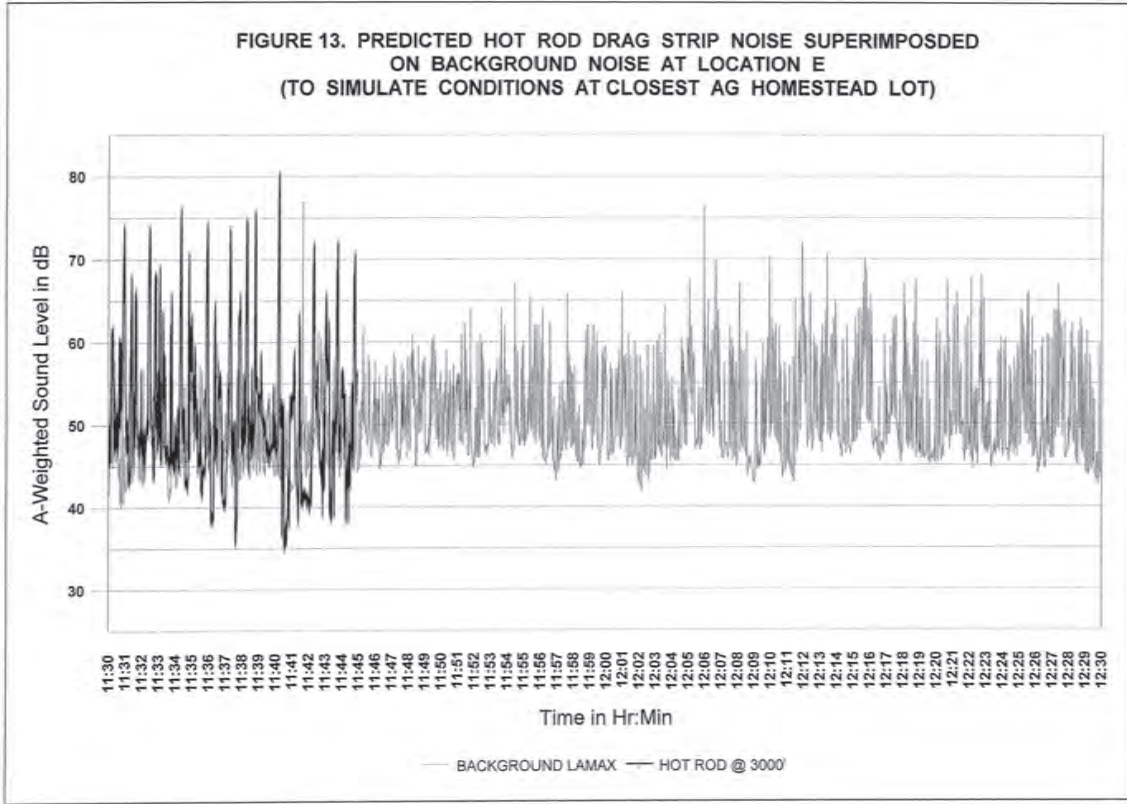


FIGURE 11. DBA VS. TIME RECORD AT LOCATION F
(1728 TO 1756 HOURS; FEBRUARY 25, 2017)





A graphical depiction of the estimated drag racing noise levels at 3,000 feet from the finish line is superimposed on the measured daytime background noise levels at Location E which were obtained on July 12, 2018 during lower wind conditions, and is shown in Figure 13. From Figure 13, it is clear that drag racing noise events of 95 to 115 dBA measured at 135 feet from the starting line will probably be audible at the north end of the AG Homesteads planned at DHHL Pulehunui South. At the south end of the AG Homesteads planned at DHHL Pulehunui South, drag racing noise levels should be reduced to levels approximately 46 dBA below those measured at 135 feet from the starting line. This situation at approximately 7,600 feet from the finish line is depicted in Figure 14 where the close-in noise levels which were reduced by 46 dBA were then superimposed onto the measured daytime background noise levels at Location D. From Figure 14, it was concluded that drag racing noise events may be audible even during high wind conditions at the south end of the AG Homesteads of DHHL Pulehunui South. The calculated maximum and minimum aural detectability indices of a loud hot rod noise event in Figures 13 and 14 were 42.7 and 17.1, respectively, where an index of less than 1.0 indicates that the noise event would not be aurally detectable.

At the lots within the DHHL Pulehunui South Parcel designated for Education uses beyond 4,000 feet from the finish line of the dual drag strip, drag racing noise events will probably be audible during low wind conditions at the north end of the Education lots. Reductions of 37 dBA from those measured at 135 feet broadside of the starting line in February 2017 are predicted at the Education lots as shown in Figure 15, in which measured background noise levels at Location E are used to depict the assumed background noise levels at the Education lots.

A similar depiction of drag racing noise at the possible hotel within the DHHL Pulehunui North Parcel at an assumed distance of 5,000 feet from the start or finish line of the dual drag strip is shown in Figure 16, with the drag racing noise at 5,000 feet superimposed onto the measured background noise level at Location C. At both the Education lots and the possible Hotel, the noise from the Maui Raceway Park drag races were considered to be potentially audible with detectability indices greater than 1.0.

Based on the use of noise measurements of drag racing qualifying events at Maui Raceway Park reported in Reference 10, the extrapolation of those data to noise sensitive locations within the DHHL Pulehunui North and South Parcels, the comparison of the extrapolated drag racing noise to measured daytime background noise levels on the project site, and the calculations of the aural detectability indices using the race car and background noise data, it was concluded that drag racing noise will probably be audible at the planned noise sensitive receptor locations within the DHHL Pulehunui North and South Parcels.

FIGURE 15. PREDICTED HOT ROD DRAG STRIP NOISE SUPERIMPOSED ON BACKGROUND NOISE AT LOCATION E (TO SIMULATE CONDITIONS AT CLOSEST EDUCATION LOT)

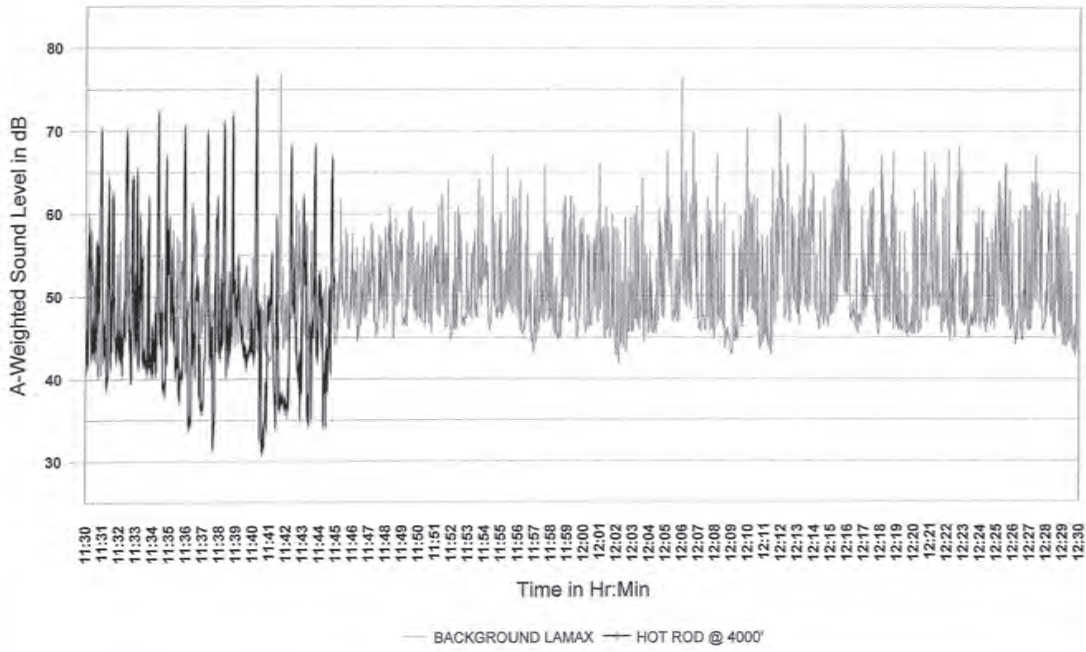
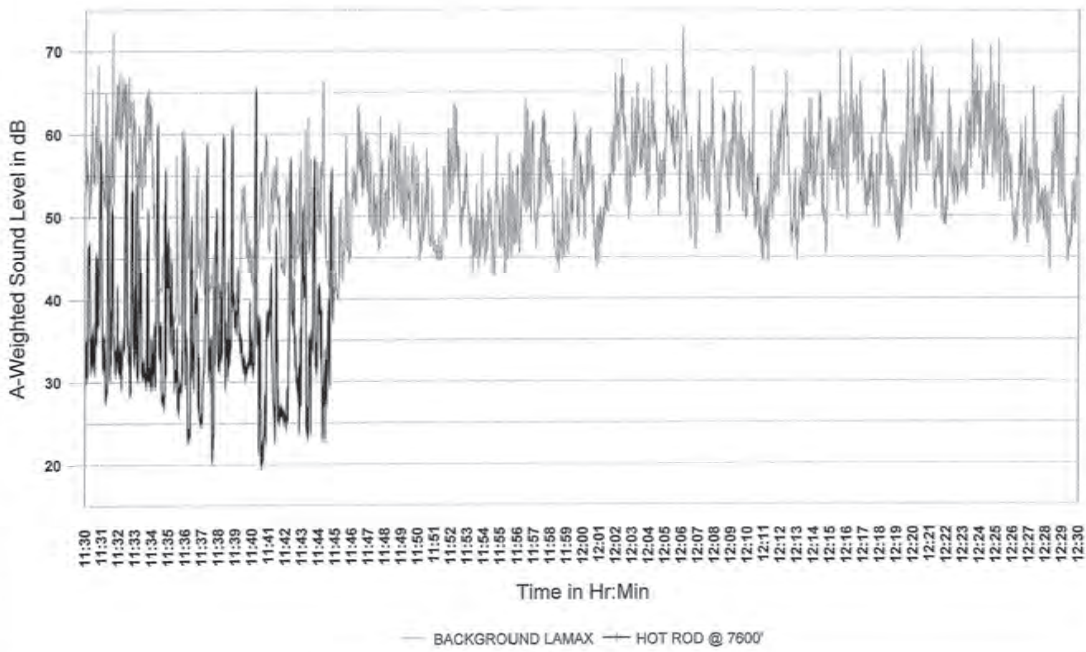


FIGURE 14. PREDICTED HOT ROD DRAG STRIP NOISE SUPERIMPOSED ON BACKGROUND NOISE AT LOCATION D (TO SIMULATE CONDITIONS AT FARTHEST AG HOMESTEAD LOT)



CHAPTER VI. FUTURE NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume assignments of Reference 7 for CY 2038 without and with the proposed project. Estimates of CY 2038 traffic volumes with and without the project were contained in Reference 7, and are summarized in Appendix C. The future projections of project plus non-project traffic noise levels on the roadways which would serve the project are shown in Table 8 for the PM peak hour of traffic, and under the Build Alternative. Predicted increases in the setback distances to the 65 and 70 DNL contours are shown in Table 7. The separate non-project and project traffic noise contributions under the Build Alternative are shown in Table 9. For the CY 2038 traffic noise level calculations with or without the project, it was assumed that the additional traffic lanes identified in Figures 5.5 and 5.6 of Reference 7 will be completed so as to represent the maximum number of anticipated traffic lanes along Maui Veterans Highway. These assumptions would tend to maximize the future traffic noise level predictions due to reduced buffer distances between the nearest travel lane and the highway Rights-of-Way, and due to increased average speeds due to improved Level of Service conditions.

Small to moderate changes in traffic noise levels (0.4 to 0.8 DNL) are expected along Maui Veterans Highway in the project environs between CY 2017 and 2038 as a result of project traffic and anticipated roadway improvements. The growth in non-project traffic and anticipated roadway improvements by CY 2038 are predicted to result in much higher traffic noise level increases of 2.6 to 3.6 DNL along Maui Veterans Highway. By CY 2038, traffic noise levels in the project area along Maui Veterans Highway are expected to increase primarily due to the anticipated growth in non-project traffic, with small to moderate increases in future traffic noise of 0.4 to 0.8 DNL associated with the project traffic.

Along the planned project access roads (DHHL access at DLNR Industrial and Business Park, and DHHL Access Roads 1 through 3), large traffic noise level increase are expected solely as a result of project traffic. These new access roads will be located between the existing Kamaaina Road intersection and the southwest corner of the DHHL Pulehunui South Parcel. The increases in traffic noise levels due to project traffic are relatively high on these four new roadways, primarily due to the non-existent traffic on these two roads prior to development of the DHHL Pulehunui North and South Parcels.

The dominant traffic noise source in the project environs will continue to be traffic along Maui Veterans Highway, with the increases in future traffic noise levels from project generated traffic being relatively small along this roadway, and primarily associated with non-project traffic. Due to the planned large, 1,900 foot buffer distance to the highway's centerline, future traffic noise levels at the planned Ag Homesteads within the DHHL Pulehunui South Parcel are predicted to not exceed 55 DNL by CY 2038, and will be controlled by traffic moving within the south parcel and on perimeter

FIGURE 16. PREDICTED HOT ROD DRAG STRIP NOISE SUPERIMPOSED ON BACKGROUND NOISE AT LOCATION C (TO SIMULATE CONDITIONS AT HOTEL)

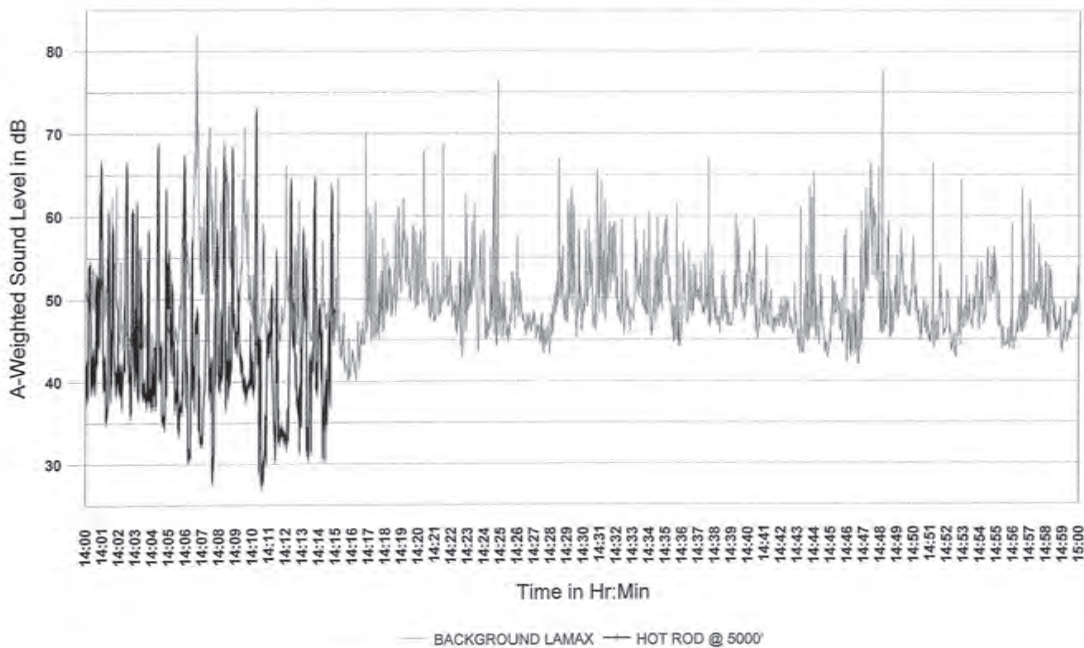


TABLE 9
CALCULATIONS OF PROJECT AND NON-PROJECT
TRAFFIC NOISE CONTRIBUTIONS (CY 2038)
(DNL)

| STREET SECTION | NOISE LEVEL INCREASE DUE TO | |
|---|-----------------------------|-----------------|
| | NON-PROJECT TRAFFIC | PROJECT TRAFFIC |
| Maui Veterans Hwy. N. of Nakii Rd. | 3.5 | 0.5 |
| Maui Veterans Hwy. Between Nakii Rd. & Kamaaina Rd. | 2.8 | 0.8 |
| Maui Veterans Hwy. Between Kamaaina Rd. & DLNR Access Rd. | 2.6 | 0.8 |
| Maui Veterans Hwy. Btwn. DLNR Acc. Rd. & Mehamaha Lp. (South) | 2.6 | 0.7 |
| Maui Veterans Hwy. Btwn. Mehamaha Lp. (South) & DHHL Acc1. | 3.6 | 0.5 |
| Maui Veterans Hwy. Btwn. DHHL Acc.1 & DHHL Acc.2 | 3.6 | 0.5 |
| Maui Veterans Hwy. Btwn. DHHL Acc.2 & DHHL Acc.3 | 3.6 | 0.5 |
| Maui Veterans Hwy. Btwn. DHHL Acc.3 & N. Kihei Rd. | 3.3 | 0.6 |
| Maui Veterans Hwy. S. of N. Kihei Rd. | 2.9 | 0.4 |
| Mehameha Lp. (North) at Maui Veterans Hwy. | 0.8 | 6.3 |
| Kamaaina Rd. At Maui Veterans Hwy. | 15.2 | 0.5 |
| DHHL Access At Maui Veterans Hwy. | N/A | 51.3 |
| DLNR Access At Maui Veterans Hwy. | 63.3 | 0.4 |
| Maui Raceway Park Access Rd. At Maui Veterans Hwy. | 16.4 | 0.3 |
| Mehameha Lp. (South) At Maui Veterans Hwy. | 4.0 | 20.8 |
| DHHL Access1 Rd. At Maui Veterans Hwy. | N/A | 41.7 |
| DHHL Access2 Rd. At Maui Veterans Hwy. | N/A | 50.2 |
| DHHL Access3 Rd. At Maui Veterans Hwy. | N/A | 40.3 |

TABLE 8
FUTURE (CY 2038) TRAFFIC VOLUMES AND NOISE LEVELS
ALONG ROADWAYS IN PROJECT AREA
(PM PEAK HOUR, BUILD)

| LOCATION | SPEED (MPH) | TOTAL VPH | ***** VOLUMES (VPH) ***** | | | | | |
|---|-------------|-----------|---------------------------|----------|----------|----------|----------|----------|
| | | | AUTOS | M TRUCKS | H TRUCKS | 100' Leg | 200' Leg | 400' Leg |
| Maui Veterans Hwy. N. of Nakii Rd. | 50 | 7,075 | 6,749 | 177 | 149 | 69.7 | 65.3 | 60.5 |
| Maui Veterans Hwy. Between Nakii Rd. & Kamaaina Rd. | 50 | 6,560 | 6,258 | 164 | 138 | 69.3 | 64.9 | 60.2 |
| Maui Veterans Hwy. Between Kamaaina Rd. & DLNR Access Rd. | 50 | 5,918 | 5,646 | 148 | 124 | 68.9 | 64.5 | 59.8 |
| Maui Veterans Hwy. Btwn. DLNR Acc. Rd. & Mehamaha Lp. (South) | 50 | 5,815 | 5,548 | 145 | 122 | 68.8 | 64.4 | 59.7 |
| Maui Veterans Hwy. Btwn. Mehamaha Lp. (South) & DHHL Acc1. | 50 | 6,300 | 6,010 | 158 | 132 | 69.2 | 64.8 | 60.0 |
| Maui Veterans Hwy. Btwn. DHHL Acc.1 & DHHL Acc.2 | 50 | 6,228 | 5,941 | 156 | 131 | 69.1 | 64.7 | 60.0 |
| Maui Veterans Hwy. Btwn. DHHL Acc.2 & DHHL Acc.3 | 50 | 6,295 | 6,006 | 157 | 132 | 69.1 | 64.8 | 60.0 |
| Maui Veterans Hwy. Btwn. DHHL Acc.3 & N. Kihei Rd. | 50 | 6,330 | 6,039 | 158 | 133 | 68.9 | 64.6 | 60.0 |
| Maui Veterans Hwy. S. of N. Kihei Rd. | 50 | 6,470 | 6,172 | 162 | 136 | 69.0 | 64.7 | 60.1 |
| Mehameha Lp. (North) at Maui Veterans Hwy. | 35 | 255 | 249 | 3 | 3 | 55.7 | 51.7 | 47.8 |
| Kamaaina Rd. At Maui Veterans Hwy. | 35 | 1,065 | 1,028 | 13 | 14 | 61.8 | 57.9 | 53.3 |
| DHHL Access At Maui Veterans Hwy. | 35 | 665 | 648 | 8 | 9 | 59.8 | 55.9 | 51.3 |
| DLNR Access At Maui Veterans Hwy. | 35 | 1,600 | 1,560 | 19 | 21 | 63.6 | 59.7 | 55.1 |
| Maui Raceway Park Access Rd. At Maui Veterans Hwy. | 35 | 605 | 590 | 7 | 8 | 58.7 | 55.1 | 50.5 |
| Mehameha Lp. (South) At Maui Veterans Hwy. | 35 | 420 | 410 | 5 | 5 | 57.7 | 53.9 | 49.2 |
| DHHL Access1 Rd. At Maui Veterans Hwy. | 35 | 80 | 78 | 1 | 1 | 50.1 | 46.2 | 41.7 |
| DHHL Access2 Rd. At Maui Veterans Hwy. | 35 | 575 | 561 | 7 | 7 | 58.6 | 54.8 | 50.2 |
| DHHL Access3 Rd. At Maui Veterans Hwy. | 35 | 50 | 48 | 1 | 1 | 48.6 | 44.8 | 40.3 |

roadways. The area designated for Education lots within the south parcel are planned to be located with minimum 750 foot buffer distance from the centerline of Maui Veterans Highway, with corresponding traffic noise levels of less than 60 DNL, which should be "Compatible" for education uses (see Figure 2). The lots adjacent to the highway Right-of-Way and designated for Culture and Arts within south parcel are expected to be exposed to incompatible traffic noise levels from Maui Veterans Highway, which exceed 65 DNL. The lots adjacent to the highway Right-of-Way and designated for commercial uses within the south parcel are predicted to be exposed to traffic noise levels between 65 and 70 DNL, and are considered to be "Marginally Compatible" but not "Incompatible", (see Figure 2). Traffic noise levels at the interior lots of the Culture and Arts and Commercial portions of the DHHL Pulehunui South Parcel will probably become "Compatible" for their planned uses as man-made structures provide noise shielding effects from the highway noise. Traffic noise levels at the planned "Industrial" lots within the south parcel should be "Compatible" due to their larger setbacks from the highway. Risks of adverse noise impacts from future traffic noise are considered to be low at all parcels of the south parcel, except at the Culture and Arts front lots.

The DHHL Pulehunui North Parcel includes a possible Hotel in addition to Commercial/Light Industrial uses. The possible hotel should be "Compatible" with 2038 highway noise levels as long as a minimum 215 feet setback is maintained from the centerline of the highway, so as to not exceed 65 DNL. Commercial/Light Industrial uses on the north parcel should not be exposed to "Incompatible" highway noise levels of 75 DNL because of their minimum setback distance of 110 feet from the highway centerline. Risks of adverse noise impacts from future traffic noise at the north parcel are considered to be very low.

CHAPTER VII. DISCUSSION OF PROJECT-RELATED NOISE IMPACTS AND POSSIBLE MITIGATION MEASURES

Traffic Noise. Existing traffic noise levels along Maui Veterans Highway are relatively high, and are expected to remain so through CY 2038. The potential for future traffic noise impacts along the highway will increase with the designation of noise sensitive receptors along the highway's east Right-of-Way in the DHHL Pulehunui South Parcel. The possible Hotel development in the DHHL Pulehunui North Parcel should not create added risks of adverse noise impacts as long as a minimum 215 foot buffer distance is included between the possible hotel and the centerline of Maui Veterans Highway.

Project related traffic along Maui Veterans Highway is not expected to cause significant increases in future traffic noise levels. The predicted increases of 0.4 to 0.8 DNL in project related traffic noise are small compared to the 2.6 to 3.6 DNL increases expected from non-project traffic.

Because highway improvements along Maui Veterans Highway in the vicinity of the DHHL Pulehunui South Parcel may occur prior to 2038 (see Figure 4.4 of Reference 7), traffic noise mitigation measures in the form of a highway berm and/or barrier may need to be considered as part of the highway improvement project (see Reference 12). Planned noise sensitive uses within the Culture & Arts lots of the DHHL Pulehunui South Parcel will need a minimum buffer distance of 165 feet from the centerline of Maui Veterans Highway to not exceed the 66 Leq noise abatement criteria in Reference 12 for state and/or federal sponsored highway improvement projects. In order to meet the FHA/HUD 65 DNL standard, these noise sensitive uses will need a minimum 224 foot buffer distance from the centerline of the highway.

In lieu of increased buffer distances from the highway, the use of closure and air conditioning of indoor spaces in noise sensitive buildings may be used as a noise mitigation measure. For both indoor and outdoor spaces, the use of sound attenuating walls and/or berms may also be used as a traffic noise mitigation measure. For state and/or federal sponsored highway improvement projects, the sound attenuating wall or berms will need to meet a minimum 7 dB attenuation requirement and not exceed a project cost limit. For FHA/HUD sponsored projects, the outdoor noise levels at the noise sensitive receptor locations must be attenuated so as to not exceed 65 DNL.

Anticipated sound attenuating wall heights required for single story noise sensitive structures or ground level receptors at 10 foot setback distance from the east highway Right-of-Way are as follows: approximately 7 feet height above ground level will be required to not exceed 65 DNL; and approximately 6 feet height above ground level will be required to achieve 7 dB of attenuation from the wall. The wall will need to be continuous along the highway Right-of-Way fronting the "Community Use" lots shown in Figure 1. For two-story structures at 10 foot setback from Right-of-Way, wall height requirements are significantly greater.

On-Site Noise Sources. By existing State Department of Health (DOH) regulations, fixed machinery located on lots zoned for industrial or agricultural uses may emit sound levels continuously during the day and night, as long as their sound levels do not exceed 70 dBA at or beyond the lots' property boundaries. Much lower noise levels are allowed from single family residential or public uses where the allowable noise levels from fixed machinery located in those lots are 55 dBA during the daytime (7:00 am to 10:00 pm) and 45 dBA during the nighttime (10:00 pm to 7:00 am). Where mixed uses occur on adjacent lands with small buffer spaces between them, the possibility of noise conflicts and adverse noise impacts exist, and enforcement of the DOH noise limits may not provide a remedy. If residences or other noise sensitive uses are located on lands zoned Agriculture or on unzoned lands reserved for Ag Homesteads, the DOH enforcement actions could not be relied upon to limit machinery noise from neighboring residents to 55 dBA during the daytime and 45 dBA during the nighttime at residences. Therefore, within the DHHL Pulehunui parcels, and particularly in the South Parcel, DHHL policies or other land development agreements will need to be relied upon to minimize potential adverse noise impacts or conflicts within the DHHL Pulehunui parcels.

Off-Site Aircraft Noise Sources. The potential risk of aircraft noise impacts at the DHHL Pulehunui project site from aircraft operations at Kahului Airport (OGG) were evaluated using available noise contours for OGG. Aircraft noise events were measured at Location C (see Figure 1) on July 10, 2018, and were relatively low but audible (see Figures 4 and 5). For noise sensitive land uses as well as transient living units, such as the possible hotel rooms, Hawaii State Department of Transportation, Airports Division (HDOTA), has recommended that these uses should not be located in areas exposed to aircraft noise levels greater than 60 DNL (Day-Night Average Sound Level) in 14 CFR Part 150 Noise Compatibility Programs for state airports. If the siting of such uses occur after consideration of all other factors including noise by local authorities, HDOTA has recommended that sound insulation be provided for such facilities so as to not exceed 45 DNL within the interior of such facilities.

The DHHL Pulehunui project site is located near the normal flight tracks of aircraft landing at Kahului Airport during trade wind conditions, but is relatively far from the departure end of Runway 2 for aircraft departing from Kahului Airport during trade wind conditions. By the most recent aircraft noise contours developed for Kahului Airport under the 14 CFR Part 150 Noise Compatibility Program for state airports (see Reference 9), the project site is located outside the 55 and 60 DNL (noise contours developed for CY 1993 and 1998. These noise contours are probably out of date for the following reasons: the noisier interisland Stage 2 passenger aircraft [B-737(200) and DC-9(50)] previously used by Aloha and Hawaiian Airlines have been replaced with quieter B-717(200) aircraft used by Hawaiian Airlines; and the CY 1998 noise contours included a 2,500 foot extension of Runway 2/20 to the south, which has not been implemented. Recent measurements of aircraft noise at the project site indicate that the project site is probably located outside the 55 DNL noise contour. Because the 14 CFR Part 150 noise contours of Reference 9 had built-in biases toward higher aircraft noise levels at the Pulehunui project, and because the aircraft noise levels measured at

Location C in July 2018 were relatively low, it is anticipated that the DHHL Pulehunui site should remain outside the 55 DNL contour of OGG through 2038.

Off-Site Maui Raceway Park Noise Sources. Because noise during drag racing events at Maui Raceway Park will probably be audible at planned noise sensitive locations on the DHHL Pulehunui South Parcel, and because future residences are potential receptors at these locations, there is a risk that noise complaints may occur regarding these noise producing activities at Maui Raceway Park. It is not known what the annually averaged noise exposure levels associated with noise from Maui Raceway Park are over the DHHL Pulehunui South parcel, or if they exceed the 65 DNL FHA/HUD noise standard. While lands designated for agricultural or industrial uses can technically be compatible with outdoor noise exposure levels as high as 76 DNL (see Figure 2), residences or other noise sensitive receptors located on these lands could react unfavorably when exposed to such high intermittent noise levels as shown in bold in Figure 13. The DNL levels associated with noise from Maui Raceway Park will probably be numerically lower than the dBA values of raceway noise events shown in Figures 13 to 16 due to the annually averaging process used with the DNL metric, which requires that all individual raceway park noise events over a 1 year period be combined and then annually averaged over 365 days. Because raceway park noise events do not occur 24 hours per day or 365 days per year, the dBA sum of all raceway park events when annually averaged, will probably be lower than those individual noise events shown in bold in Figures 13 to 16. However, noise complaints resulting from exposure to intermittently high levels of noise associated with events at Maui Raceway Park may still occur at levels below the FHA/HUD noise standard of 65 DNL, so the use of noise disclosures is recommended at residential or other noise sensitive lots within the DHHL Pulehunui South Parcel.

Noise events from Maui Raceway Park may also be audible at a possible hotel located on the DHHL Pulehunui North parcel. It is not known where the possible hotel may be located on the north parcel, but drag racing noise events should be less than 78 dBA at the possible hotel. If the possible hotel is located near the southeast corner of the north parcel, noise levels from Maui Raceway Park could exceed those associated with existing aircraft noise events (see Figures 4 and 5). If the possible hotel is located near the west boundary of the north parcel at Location C (see Figure 1), noise levels from Maui Raceway Park will be more similar to those associated with existing aircraft noise events as shown in Figure 16. Because the use of closure and air conditioning is anticipated at the possible hotel, risks of adverse noise impacts from Maui Raceway Park are considered to be low at the possible hotel.

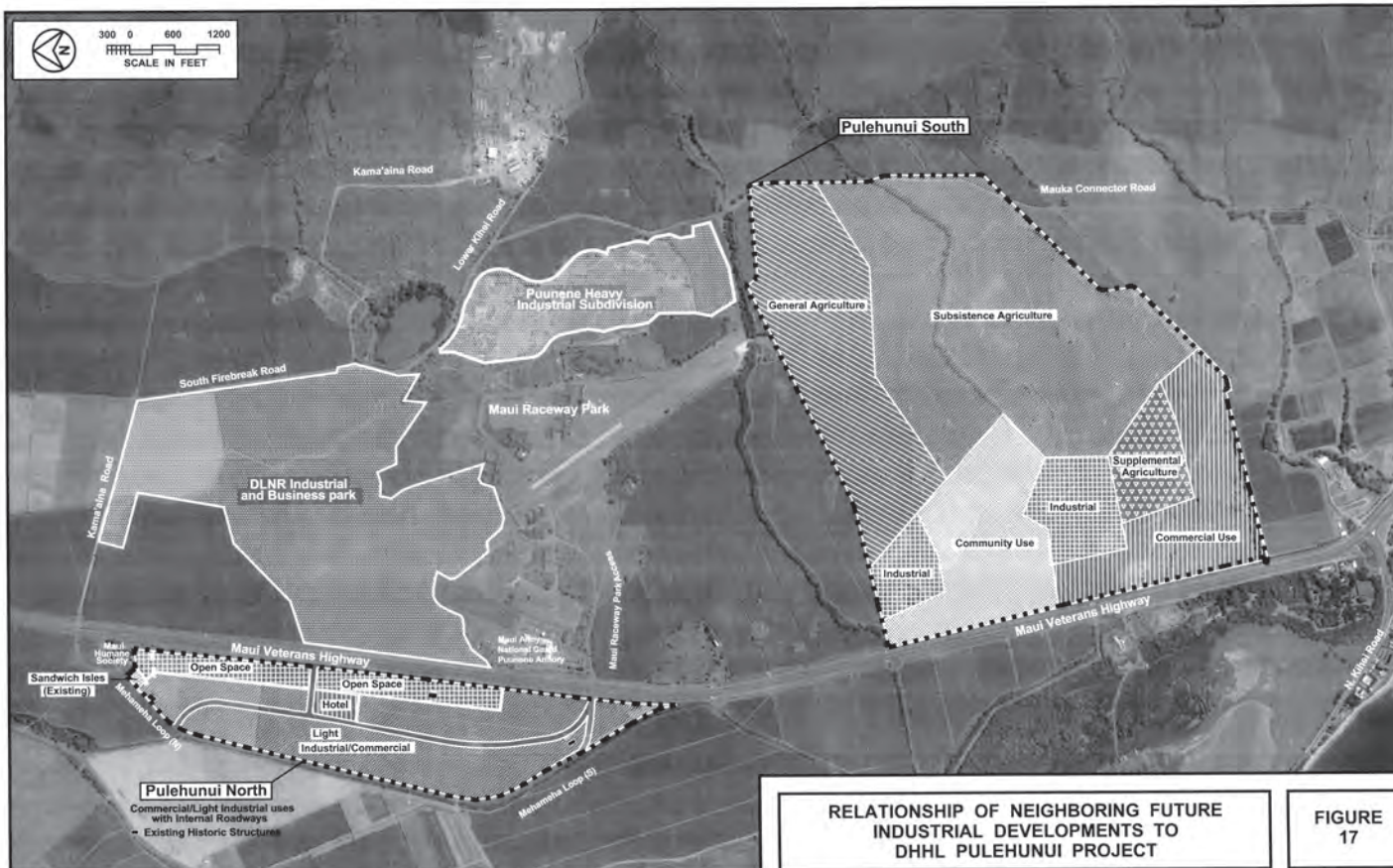
Off-Site Industrial Noise Sources. The DHHL Pulehunui parcels are adjacent to planned light and heavy industrial land uses at the Puunene Heavy Industrial Subdivision and the DLNR Industrial and Business Park (see Figure 17). Because multiple, continuous noise sources of 70 dBA at the industrial lot boundary lines are possible from these neighboring future developments, an examination of worst case noise levels from these industrial developments were made at the proposed noise sensitive land uses at the DHHL Pulehunui parcels.

At the Puunene Heavy Industrial Subdivision, it was assumed that there could be 4 large lots and 24 small lots within the subdivision. A total of 28 noise sources, each emitting sound levels of 70 dBA at their respective lot boundary lines, was assumed for modeling the potential sound level emissions from industrial noise sources within the Puunene Heavy Industrial Subdivision (see Reference 11). Under these hypothetical worst case conditions, the combined sound level from the 28 lots of the future industrial subdivision would be approximately 51 dBA at the closest Ag Homestead lot of DHHL Pulehunui South, 45 dBA at the closest Education lot of DHHL Pulehunui South, and 44 dBA at the eastern boundary of DHHL Pulehunui North.

At the planned DLNR Industrial and Business Park, it was assumed that there could be as many as 38 noise sources on the larger parcels, each emitting sound levels of 70 dBA at their respective lot boundary lines (see Reference 10). Under these hypothetical worst case conditions, the combined sound level from the 38 lots of the future industrial and business subdivision would be approximately 43 dBA at the closest Ag Homestead and Education lots of DHHL Pulehunui South, and 60 dBA at the eastern boundary of DHHL Pulehunui North.

Combined worst case noise levels from industrial sources located at the future Puunene Heavy Industrial Subdivision and DLNR Industrial and Business Park would not exceed the 55 dBA and 60 dBA daytime noise limits used by the State DOH for low density residential or public zoned lands and commercial zoned lands, respectively, but could exceed their respective 45 dBA and 50 dBA nighttime noise limits at the DHHL Pulehunui parcels. Risks of exceeding the nighttime noise limit of 45 dBA at the DHHL Pulehunui South parcel are greatest from the Puunene Heavy Industrial Subdivision, and risks of exceeding the nighttime noise limit of 50 dBA at the DHHL Pulehunui North parcel are greatest from the DLNR Industrial and Business Park. Risks of adverse noise impacts at the possible hotel on the DHHL Pulehunui North parcel from nighttime industrial noise sources located at the DLNR Industrial and Business Park are considered to be low due to the probable use of closure and air conditioning at the possible hotel. Adverse noise impacts at the noise sensitive residences on the DHHL Pulehunui South parcel from nighttime industrial noise sources located at the Puunene Heavy Industrial Subdivision are considered to be possible under worst case development conditions at the heavy industrial subdivision. Exceedance of the 65 dNL FHA/HUD standard is not expected to occur at noise sensitive lots within the DHHL Pulehunui South parcel as a result of industrial noise sources located at the Puunene Heavy Industrial Subdivision or DLNR Industrial and Business Park.

General Construction Noise. Audible construction noise will probably be unavoidable during the entire project construction period. The total time period for construction is unknown, but it is anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of exterior noise from construction activity (excluding pile driving activity) at various distances from the job site are shown in Figure 18. The impulsive noise levels of impact pile drivers are



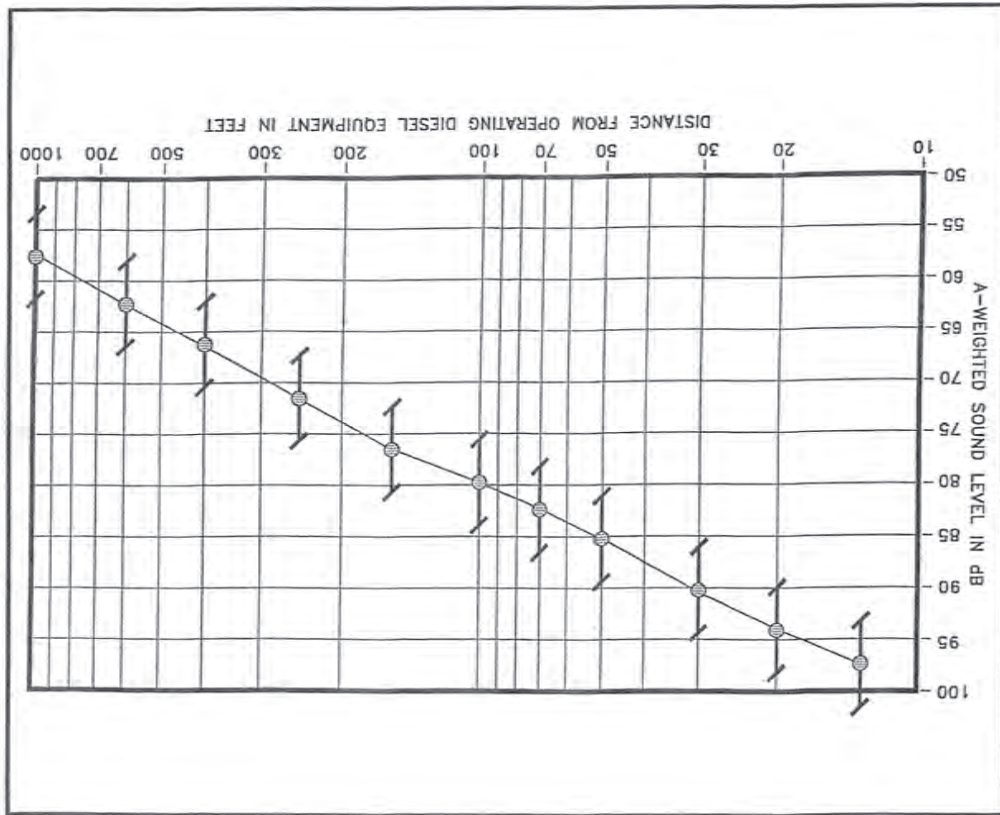


FIGURE 18

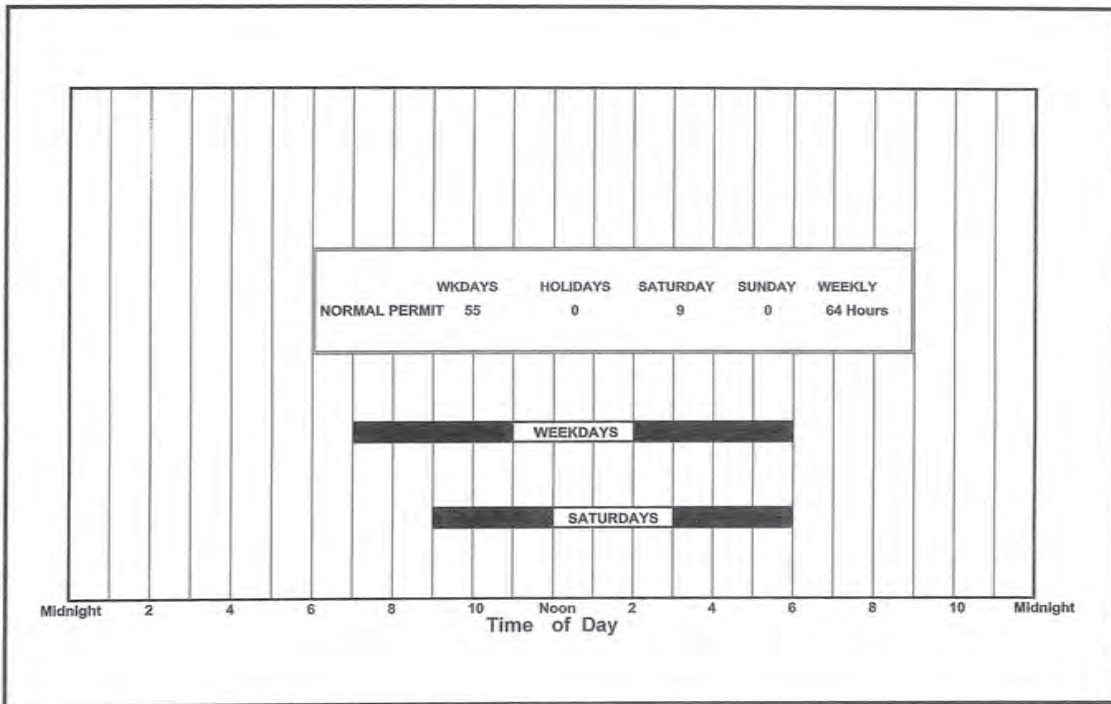
ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE

approximately 15 dB higher than the levels shown in Figure 18, while the intermittent noise levels of vibratory pile drivers are at the upper end of the noise level ranges depicted in the figure. Typical levels of construction noise inside naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the levels shown in Figure 18.

The closest existing residences to the project site are well beyond the 1,000 feet separation distance shown in Figure 18, and for this reason, risks of adverse noise impacts at existing residences during construction activity on the project site are expected to be very low. Construction noise impacts are possible at the Maui Humane Society due to the relatively small (350 ft) buffer distance to the planned DHHL Pulehunui North parcel. Special coordination procedures between the construction contractor and the animal caretakers may be required during close-in site preparation activities due to the relatively high (73+ dBA) construction noise levels which may occur. The use of temporary sound barriers (wooden walls, bumper-to-bumper buses with closure panels, etc.) or even portable air conditioning equipment could provide between 15 to 20 dBA of additional sound attenuation during site preparation activities.

Adverse noise impacts are possible following completion of initial site preparation and infrastructure construction activities at the early DHHL Pulehunui North and South Parcel tenants who are exposed to building construction noise from neighboring or nearby lots of the same parcel. Adverse noise impacts are not expected to occur inside air conditioned structures which are beyond 200 FT of a building construction site. Inside naturally ventilated structures, interior noise levels (with windows or doors opened) are estimated to range between 65 to 53 dBA at 200 FT to 600 FT distances from the building construction site. Closure of all doors and windows facing the building construction site would generally reduce interior noise levels by an additional 5 to 10 dBA.

The use of properly muffled construction equipment should be required on all job sites. The incorporation of State Department of Health construction noise limits and curfew times, which are applicable throughout the State of Hawaii (Reference 5), is another noise mitigation measure which is normally applied to construction activities. Figure 19 depicts the normally permitted hours of noisy construction activities. Noisy construction activities are not allowed on Sundays and holidays, during the early morning, and during the late evening and nighttime periods under the DOH permit procedures.



AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

FIGURE 19

APPENDIX A. REFERENCES

- (1) "Guidelines for Considering Noise in Land Use Planning and Control;" Federal Interagency Committee on Urban Noise; June 1980.
- (2) American National Standard, "Sound Level Descriptors for Determination of Compatible Land Use," ANSI S12.9-1998/ Part 5; Acoustical Society of America.
- (3) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B;" U.S. Department of Housing and Urban Development; July 12, 1979.
- (4) "Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety;" U.S. Environmental Protection Agency; EPA 550/9-74- 004; March 1974.
- (5) "Title 11, Administrative Rules, Chapter 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996.
- (6) "FHWA Highway Traffic Noise Model User's Guide;" FHWA-PD-96-009, Federal Highway Administration; Washington, D.C.; January 1998 and Version 2.5 Upgrade (April 14, 2004).
- (7) Final Draft "Traffic Impact Analysis Report; DHHL North and South Parcels;" Austin, Tsutsumi, & Associates, Inc.; August 3, 2018.
- (8) Hourly Traffic Counts At Station B7403110000, Puunene Ave. - Kulielani Hwy. to Maui Veterans Highway; Hawaii State Department of Transportation; September 28, 2011.
- (9) "Kahului Airport - FAR Part 150 Noise Compatibility Program; Volume II Noise Compatibility Program Report;" Hawaii State Department of Transportation, Airports Division; September 1995.
- (10) "Acoustic Study for the DLNR Industrial and Business Park; Puunene, Maui, Hawaii;" Y. Eblisu & Associates; November 2017.
- (11) "Acoustical Study for the Puunene Heavy Industrial Subdivision;" Y. Eblisu & Associates; November 2011.
- (12) "Highway Noise Policy and Abatement Guidelines;" State of Hawaii, Department of Transportation, Highways Division and U.S. Department of Transportation, Federal Highway Administration; April 18, 2016.

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

| TERM | SYMBOL |
|---|-------------|
| 1. A-Weighted Sound Level | L_A |
| 2. A-Weighted Sound Power Level | L_{WA} |
| 3. Maximum A-Weighted Sound Level | L_{max} |
| 4. Peak A-Weighted Sound Level | L_{Apk} |
| 5. Level Exceeded x% of the Time | L_x |
| 6. Equivalent Sound Level | L_{eq} |
| 7. Equivalent Sound Level over Time (T) (1) | $L_{eq}(T)$ |
| 8. Day Sound Level | L_d |
| 9. Night Sound Level | L_n |
| 10. Day-Night Sound Level | L_{dn} |
| 11. Yearly Day-Night Sound Level | $L_{dn}(Y)$ |
| 12. Sound Exposure Level | L_{SE} |

(1) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is $L_{eq}(1)$). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq}(WASH)$ to mean the washing cycle noise for a washing machine).

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, etc.), and the third stage indicates the weighting network (A, B, C, D, E, etc.). If no weighting network is specified, "A" weighting is assumed. The "A" weighting network is used for level and the A-weighted peak level, which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "AW". For example, a report on blast noise might wish to contrast the L_{dn} with the L_{dn}^{AW} .

Although not included in the tables, it is also recommended that "L_{ppm}" and "L_{ppm}" be used as symbols for perceived noise levels and effective perceived noise levels, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, L_{eq} is designated the "equivalent sound level". For L_d , L_n , and L_{dn} , "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "residual" to describe the level characteristic of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, dBA, PdBr, and SWdB are not to be used. Examples of this preferred usage are: the perceived noise level (Lpn was found to be 75 dB, Lpn = 75 dB). This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of dB except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "level weighted population" (LWP) replace "equivalent noise impact" (ENI). The term "relative change of impact" (RCI) shall be used for comparing the relative differences in LWP between the alternatives.

Further, when appropriate, "noise impact index" (NII) and "population weighted loss of hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Project Environmental Impact Statements (1977).

APPENDIX B (CONTINUED)

TABLE II
RECOMMENDED DESCRIPTOR LIST

| TERM | A-WEIGHTING | ALTERNATIVE(1) | OTHER(2) | WEIGHTING | UNWEIGHTED |
|--|--------------------|---------------------|---------------------|-----------------|---------------------|
| 1. Sound (Pressure)(3) | L _A | L _{pA} | L _{B'} | L _{pB} | L _p |
| 2. Sound Power Level | L _{WA} | | L _{WB} | | L _W |
| 3. Max. Sound Level | L _{max} | L _{Amax} | L _{Bmax} | | L _{pmax} |
| 4. Peak Sound (Pressure) Level | L _{Apk} | | L _{Bpk} | | L _{pik} |
| 5. Level Exceeded x% of the Time | L _x | L _{Ax} | L _{Bx} | | L _{px} |
| 5. Equivalent Sound Level | L _{eq} | L _{Aeq} | L _{Beq} | | L _{peq} |
| 7. Equivalent Sound Level (4) Over Time(T) | L _{eq(T)} | L _{Aeq(T)} | L _{Beq(T)} | | L _{peq(T)} |
| 8. Day Sound Level | L _d | L _{Ad} | L _{Bd} | | L _{pd} |
| 9. Night Sound Level | L _n | L _{An} | L _{Bn} | | L _{pn} |
| 10. Day-Night Sound Level | L _{dn} | L _{Adn} | L _{Bdn} | | L _{pdn} |
| 11. Yearly Day-Night Sound Level | L _{dn(Y)} | L _{Adn(Y)} | L _{Bdn(Y)} | | L _{pdn(Y)} |
| 12. Sound Exposure Level | L _S | L _{SA} | L _{SB} | | L _{Sp} |
| 13. Energy Average Value Over (Non-Time Domain) Set of Observations | L _{eq(e)} | L _{Aeq(e)} | L _{Beq(e)} | | L _{peq(e)} |
| 14. Level Exceeded x% of the Total Set of (Non-Time Domain) Observations | L _{x(e)} | L _{Ax(e)} | L _{Bx(e)} | | L _{px(e)} |
| 15. Average L _x Value | L _x | L _{Ax} | L _{Bx} | | L _{px} |

- (1) "Alternative" symbols may be used to assure clarity or consistency.
- (2) Only B-weighting shown. Applies also to C,D,E.....weighting.
- (3) The term "pressure" is used only for the unweighted level.
- (4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is L_{eq(1)}. Time may be specified in non-quantitative terms (e.g., could be specified as L_{eq(WASH)} to mean the washing cycle noise for a washing machine.

APPENDIX C
SUMMARY OF BASE YEAR AND YEAR 2038
TRAFFIC VOLUMES

| ROADWAY LANES | **** CY 2017 **** | | CY 2038 (NO BUILD) | | CY 2038 (BUILD) | |
|--|-------------------|--------|--------------------|--------|-----------------|--------|
| | AM VPH | PM VPH | AM VPH | PM VPH | AM VPH | PM VPH |
| MauI Veterans Hwy, N. of Naki Rd. (NB) | 1,347 | 1,480 | 2,180 | 3,330 | 2,885 | 3,875 |
| MauI Veterans Hwy, N. of Naki Rd. (SB) | 1,313 | 1,573 | 2,640 | 2,895 | 3,155 | 3,300 |
| Two-Way | 2,660 | 3,053 | 4,820 | 6,225 | 6,040 | 7,175 |
| MauI Veterans Hwy, Between Naki & Kamaaina (NB) | 1,282 | 1,352 | 1,985 | 3,003 | 2,190 | 3,333 |
| MauI Veterans Hwy, Between Naki & Kamaaina (SB) | 1,213 | 1,467 | 2,355 | 2,720 | 2,868 | 3,028 |
| Two-Way | 2,495 | 2,819 | 4,340 | 5,723 | 5,058 | 6,361 |
| MauI Veterans Hwy, Between Kamaaina & DLNR Access (NB) | 1,283 | 1,287 | 2,063 | 2,688 | 2,245 | 3,020 |
| MauI Veterans Hwy, Between Kamaaina & DLNR Access (SB) | 1,169 | 1,379 | 1,993 | 2,643 | 2,435 | 2,886 |
| Two-Way | 2,452 | 2,666 | 4,056 | 5,330 | 4,680 | 5,916 |
| MauI Veterans Hwy, Bypass DLNR Acc. & Mahanaha Lp. (South) (NB) | 1,263 | 1,287 | 2,223 | 2,438 | 2,448 | 2,798 |
| MauI Veterans Hwy, Bypass DLNR Acc. & Mahanaha Lp. (South) (SB) | 1,189 | 1,379 | 1,825 | 2,768 | 2,193 | 3,018 |
| Two-Way | 2,452 | 2,666 | 4,048 | 5,205 | 4,641 | 5,815 |
| MauI Veterans Hwy, Bypass Mahanaha Lp. (South) & DHHL Acc.1 (NB) | 1,263 | 1,269 | 2,345 | 2,523 | 2,600 | 2,833 |
| MauI Veterans Hwy, Bypass Mahanaha Lp. (South) & DHHL Acc.1 (SB) | 1,085 | 1,393 | 1,743 | 2,960 | 2,165 | 3,368 |
| Two-Way | 2,347 | 2,662 | 4,088 | 5,483 | 4,765 | 6,201 |
| MauI Veterans Hwy, Bypass DHHL Acc.1 & DHHL Acc.2 (NB) | 1,263 | 1,299 | 2,345 | 2,523 | 2,665 | 2,863 |
| MauI Veterans Hwy, Bypass DHHL Acc.1 & DHHL Acc.2 (SB) | 1,085 | 1,393 | 1,743 | 2,960 | 2,195 | 3,365 |
| Two-Way | 2,347 | 2,692 | 4,088 | 5,483 | 4,860 | 6,228 |
| MauI Veterans Hwy, Bypass DHHL Acc.2 & DHHL Acc.3 (NB) | 1,263 | 1,299 | 2,345 | 2,523 | 2,793 | 2,810 |
| MauI Veterans Hwy, Bypass DHHL Acc.2 & DHHL Acc.3 (SB) | 1,085 | 1,393 | 1,743 | 2,960 | 2,025 | 3,485 |
| Two-Way | 2,347 | 2,692 | 4,088 | 5,483 | 4,818 | 6,295 |
| MauI Veterans Hwy, Bypass DHHL Acc.3 & N. Kihali Rd. (NB) | 1,263 | 1,299 | 2,345 | 2,523 | 2,855 | 2,858 |
| MauI Veterans Hwy, Bypass DHHL Acc.3 & N. Kihali Rd. (SB) | 1,085 | 1,393 | 1,743 | 2,960 | 1,945 | 3,513 |
| Two-Way | 2,347 | 2,692 | 4,088 | 5,483 | 4,800 | 6,371 |
| MauI Veterans Hwy, S. of N. Kihali Rd. (NB) | 1,482 | 1,556 | 2,500 | 2,800 | 2,855 | 3,015 |
| MauI Veterans Hwy, S. of N. Kihali Rd. (SB) | 1,319 | 1,613 | 2,055 | 3,065 | 2,200 | 3,455 |
| Two-Way | 2,801 | 3,171 | 4,555 | 5,865 | 5,055 | 6,470 |
| Mahanaha Lp. (North) at MauI Veterans Hwy. (SB) | 4 | 26 | 10 | 40 | 40 | 145 |
| Mahanaha Lp. (North) at MauI Veterans Hwy. (WB) | 23 | 24 | 30 | 30 | 105 | 110 |
| Two-Way | 27 | 50 | 40 | 70 | 145 | 255 |
| Kamaaina Rd. At MauI Veterans Hwy. (SB) | 23 | 14 | 595 | 335 | 590 | 340 |
| Kamaaina Rd. At MauI Veterans Hwy. (WB) | 20 | 24 | 100 | 700 | 165 | 715 |
| Two-Way | 43 | 38 | 745 | 1,035 | 755 | 1,055 |
| DHHL Access At MauI Veterans Hwy. (EB) | N/A | N/A | N/A | N/A | N/A | 85 |
| DHHL Access At MauI Veterans Hwy. (WB) | N/A | N/A | N/A | N/A | N/A | 210 |
| Two-Way | N/A | N/A | N/A | N/A | N/A | 295 |

APPENDIX C (CONTINUED)

SUMMARY OF BASE YEAR AND YEAR 2038
TRAFFIC VOLUMES

| ROADWAY LANES | **** CY 2017 **** | | CY 2038 (NO BUILD) | | CY 2038 (BUILD) | |
|---|-------------------|--------|--------------------|--------|-----------------|--------|
| | AM VPH | PM VPH | AM VPH | PM VPH | AM VPH | PM VPH |
| DUNF Access At Maui Veterans Hwy, (EB) | N/A | N/A | 500 | 640 | 505 | 680 |
| DUNFL Access At Maui Veterans Hwy, (WB) | N/A | N/A | 170 | 895 | 180 | 940 |
| Two-Way | N/A | N/A | 670 | 1,535 | 685 | 1,000 |
| Maui Raceway Park Access Rd. At Maui Veterans Hwy, (EB) | 7 | 11 | 225 | 230 | 230 | 245 |
| Maui Raceway Park Access Rd. At Maui Veterans Hwy, (WB) | 4 | 6 | 105 | 345 | 110 | 380 |
| Two-Way | 11 | 17 | 330 | 575 | 340 | 605 |
| Manamana Ln. (South) At Maui Veterans Hwy, (EB) | 0 | 0 | 0 | 0 | 00 | 280 |
| Manamana Ln. (South) At Maui Veterans Hwy, (WB) | 2 | 2 | 5 | 5 | 190 | 160 |
| Two-Way | 2 | 2 | 5 | 5 | 280 | 420 |
| DHHL Access1 Rd. At Maui Veterans Hwy, (EB) | N/A | N/A | N/A | N/A | 25 | 5 |
| DHHL Access1 Rd. At Maui Veterans Hwy, (WB) | N/A | N/A | N/A | N/A | 50 | 75 |
| Two-Way | N/A | N/A | N/A | N/A | 75 | 80 |
| DHHL Access2 Rd. At Maui Veterans Hwy, (EB) | N/A | N/A | N/A | N/A | 485 | 200 |
| DHHL Access2 Rd. At Maui Veterans Hwy, (WB) | N/A | N/A | N/A | N/A | 200 | 375 |
| Two-Way | N/A | N/A | N/A | N/A | 685 | 575 |
| DHHL Access3 Rd. At Maui Veterans Hwy, (EB) | N/A | N/A | N/A | N/A | 75 | 25 |
| DHHL Access3 Rd. At Maui Veterans Hwy, (WB) | N/A | N/A | N/A | N/A | 15 | 25 |
| Two-Way | N/A | N/A | N/A | N/A | 90 | 50 |

APPENDIX G

AIR QUALITY IMPACT ASSESSEMENT



DHHL NORTH AND SOUTH PARCELS AIR QUALITY STUDY

Prepared for
PBR HAWAII AND ASSOCIATES INC.

Prepared by
TERRY A. HAYES ASSOCIATES INC.

AUGUST 2018

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1.0 SUMMARY OF FINDINGS

Terry A. Hayes Associates Inc. (TAHA) has completed an Air Quality Study for the Hawaii Department of Hawaiian Home Lands (DHHL) North and South Parcels Project (proposed project). Key findings are listed below.

- Construction activity would result in temporary emissions from construction vehicle exhaust, as well as fugitive dust emissions due to ground disturbance. The following control measures are recommended to reduce fugitive dust emissions.
 - AQ1** The construction contractor should use water or suitable chemicals to control fugitive dust in the demolition of any existing buildings or structures, construction operations, the grading of roads, or the clearing of land.
 - AQ2** The construction contractor should apply asphalt, water, or suitable chemicals on roads, material stockpiles, and other surfaces which may result in fugitive dust.
 - AQ3** The construction contractor should cover all moving, open-bodied trucks transporting materials which may result in fugitive dust.
 - AQ4** The construction contractor should maintain roadways in a clean manner.
 - AQ5** The construction contractor should promptly remove earth or other materials from paved streets which have been transported there by trucking, earth-moving equipment, erosion, or other means.
 - AQ6** Staging areas should be located away from on-site residential land uses.
 - AQ7** On-site electricity should be obtained from the electrical grid rather than temporary diesel or gasoline generators.
 - AQ8** Equipment and vehicle engines should be maintained in good condition and in proper tune per manufacturers' specifications.
 - AQ9** All construction equipment and delivery vehicles should be turned off when not in use or prohibit idling in excess of five minutes. Haul trucks in particular that stage waiting to be called to remove dirt from the site should not be allowed to idle while queuing.
- The DHHL North Parcel would generate 606 AM peak hour trips, 1,002 PM peak hour trips, and 1,298 weekend peak hour trips.¹ The DHHL South Parcel would generate 1,017 AM peak hour trips, 731 PM peak hour trips, and 671 weekend peak hour trips. Total new external trips would be 1,623 AM peak hour trips, 1,105 PM peak hour trips, and 1,969 weekend peak hour trips. Regarding regional emissions, the project site is located in an Attainment/Unclassified area for all National Ambient Air Quality Service (NAAQS) and regional air quality is good. There is no potential for the proposed project to substantially affect regional air quality.
- The proposed project includes industrial facilities that would generate truck trips and associated diesel particulate matter emissions. Possible land uses for the South Parcel

¹Austin, Tsutsumi & Associates, Inc., *Draft Traffic Impact Analysis Report: DHHL North and South Parcels*, August 3, 2018.

include residences and educational facilities and the North parcel may include a hotel. The following control measure is recommended to control exposure to pollutants.

- AQ10** Land uses sensitive to air pollution (e.g., residences, educational facilities, and hotels) should not be located within 1,000 feet of a distribution center that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week).
- Screening results for carbon monoxide (CO) dispersion modeling exercise determined that an intersection experiencing a peak hour volume of approximately 10,000 vehicles per hour—about twice the maximum within the project area—would generate a maximum 1-hour CO concentration of approximately 4.6 parts per million (ppm).² The traffic analysis prepared for the proposed project demonstrates that local intersection volumes do not approach 10,000 vehicles per hour. In addition, CO is not a pollutant of concern in the project area as evident by the lack of monitoring in the project area. There is no potential for the proposed project to result in a CO hotspot.
- The proposed project would result in indirect greenhouse gas (GHG) emissions through electricity generation and vehicle trips. Although the proposed project includes land use development, the project would set aside 30 to 40 acres for open space and include agriculture land shown in **Figure 2.2**. The proposed project would consider ways to incorporate state-of-the-art energy conservation and green practices in the building development. The proposed project would not interfere with the development of clean energy supplies.

²South Coast Air Quality Management District, *Final 2003 AQMP Appendix V: Modeling and Attainment Demonstrations*, August 2003.

2.0 INTRODUCTION

2.1 PURPOSE

The purpose of this report is to evaluate the potential for adverse air quality effects. Air quality emissions are assessed for construction and operational activities. Air quality control measures are recommended when appropriate to reduce emissions. Both short-term construction emissions occurring from activities such as site grading and haul truck trips, and long-term effects related to the ongoing operation are discussed in this section. This analysis focuses on air pollution from two perspectives: daily emissions and pollutant concentrations. "Emissions" refer to the quantity of pollutant released into the air, measured in pounds per day (ppd) or tons per year (tpy). "Concentrations" refer to the amount of pollutant material per volumetric unit of air, measured in ppm or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

2.2 PROJECT DESCRIPTION

The North and South Parcel project sites are located on the west side of Maui. The property TMKs are (2) 3-8-008:008, 035, and 036 (North) and (2) 3-8-008:034 (South). The DHHL North Parcel is located on an unoccupied parcel located to the west of Maui Veterans Highway, bound by the Maui Humane Society to the north, Maui Veterans Highway to the east, and Mehamaha Loop to the west and south. The DHHL South Parcel encompasses approximately 646 acres of land, located $\frac{3}{4}$ mile south of the DHHL Pulehunui North development, adjacent and east of Maui Veterans Highway and east of the Kealia Pond National Wildlife Refuge. The location of the project site is shown in **Figure 2-1**. Possible land uses for the South Parcel include residences and educational facilities.

The DHHL North Parcel proposes to develop approximately 184 acres of vacant land into a mix of open space, commercial development (e.g., possibly a hotel) and light industrial uses. 30 to 40 acres will be designated as open space. The remaining acreage will be commercial/light industrial space, and internal roadways. Land uses at the DHHL South Parcel will be similar to those shown on **Figure 2-2**.



Source: TAHA, 2018.

Taha
TAHA 2018-000
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FIGURE 2-1
REGIONAL LOCATION

3.0 TOPICAL BACKGROUND & REGULATORY FRAMEWORK

This section provides an overview of how ambient air quality is characterized and the applicable regulations that have been established to protect public health and the environment, as well as a discussion of GHG emissions, how they contribute to climate change, and the regulatory framework developed to reduce GHG emissions. According to the Hawaii Department of Health (DOH), air pollution is a general term that refers to the presence in the outdoor air of substances in quantities and for durations which may endanger human health or welfare, plant or animal life, or property; or which may reasonably interfere with the comfortable enjoyment of life and property.

Through extensive scientific research, specific chemical substances have been identified as air pollutants that are known to cause adverse health effects and degradation of environmental quality. Concentrations of the following pollutants in ambient air are regulated at the federal and state level to protect public health and the environment. A separate discussion of GHG emissions and climate change is provided subsequently.

3.1 AIR POLLUTANTS

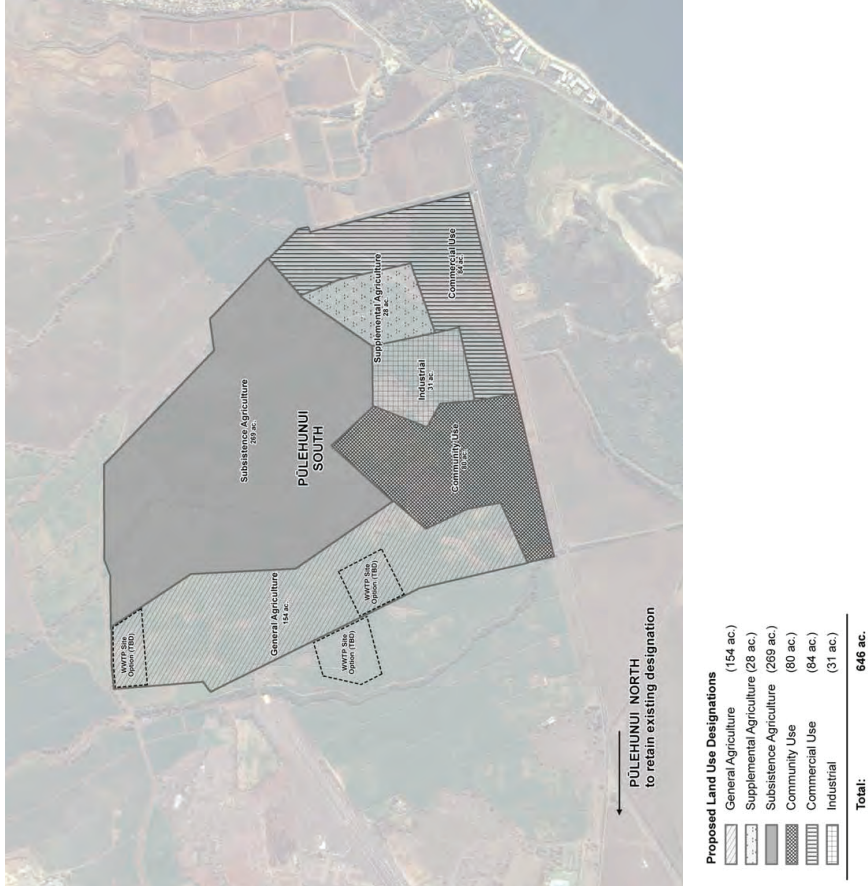
Ozone (O₃). O₃, or smog, is not emitted directly into the environment, but is formed in the atmosphere by complex chemical reactions between reactive organic gases (ROG) and nitrogen oxides (NO_x) in the presence of sunlight. O₃ formation is greatest on warm, windless, sunny days. The main sources of NO_x and ROG, often referred to as O₃ precursors, are combustion processes (including motor vehicle engines) the evaporation of solvents, paints, and fuels, and biogenic sources.

Automobiles are the single largest source of O₃ precursors. Tailpipe emissions of ROG are highest during cold starts, hard acceleration, stop-and-go conditions, and slow speeds. They decline as speeds increase up to about 50 miles per hour (mph), then increase again at high speeds and high engine loads. ROG emissions associated with evaporation of unburned fuel depend on vehicle and ambient temperature cycles. Nitrogen oxide emissions exhibit a different curve: emissions decrease as the vehicle approaches 30 mph and then begin to increase with increasing speeds.

O₃ levels usually build up during the day and peak in the afternoon hours. Short-term exposure can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, it can aggravate existing respiratory diseases such as asthma, bronchitis and emphysema. Chronic exposure to high O₃ levels can permanently damage lung tissue. O₃ can also damage plants and trees, and materials such as rubber and fabrics.

Nitrogen Dioxide (NO₂). NO₂ is a reddish-brown gas that is a by-product of combustion processes. Automobiles and industrial operations are the main sources of NO₂. Aside from its contribution to ozone formation, nitrogen dioxide can increase the risk of acute and chronic respiratory disease and reduce visibility. NO₂ may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high ozone levels.

Carbon Monoxide (CO). CO is an odorless, colorless gas formed by the incomplete combustion of fuels. The single largest source of CO is motor vehicles. Emissions are highest during cold starts, hard acceleration, stop-and-go driving, and when a vehicle is moving at low speeds. New findings indicate that CO emissions per mile are lowest at about 45 mph for the average light-duty motor vehicle and begin to increase again at higher speeds. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart and other body tissues. This condition is



Source: Department of Hawaiian Home Lands, 2018; TAHA, 2018.

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FIGURE 2-2
SOUTH PARCEL SITE PLAN

especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses. Even healthy people exposed to high CO concentrations can experience headaches, dizziness, fatigue, unconsciousness, and even death.

Sulfur Dioxide (SO₂). SO₂ is a colorless acid gas with a pungent odor. It has potential to damage materials and it can have health effects at high concentrations. It is produced by the combustion of sulfur-containing fuels, such as oil, coal and diesel. SO₂ can irritate lung tissue and increase the risk of acute and chronic respiratory disease.

Particulate Matter. Particulate matter refers to a wide range of solid or liquid particles in the atmosphere, including smoke, dust, aerosols, and metallic oxides. Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM₁₀. PM_{2.5} includes a subgroup of finer particles that have an aerodynamic diameter of 2.5 micrometers or less. Some particulate matter, such as pollen, is naturally occurring. Most particulate matter is caused by combustion, factories, construction, grading, demolition, agricultural activities, and motor vehicles. Extended exposure to particulate matter can increase the risk of chronic respiratory disease. PM₁₀ is of concern because it bypasses the body's natural filtration system more easily than larger particles, and can lodge deep in the lungs. The U.S. Environmental Protection Agency (USEPA) revised their PM standards to apply only to these fine particles. PM_{2.5} poses an increased health risk because the particles can deposit deep in the lungs and contain substances that are particularly harmful to human health.

Lead (Pb). Pb is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of Pb emissions. The highest levels of Pb in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient Pb concentrations in the air. In the early 1970s, the USEPA set national regulations to gradually reduce the Pb content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The USEPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the USEPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.

Toxic Air Contaminants (TACs). In addition to the criteria air pollutants listed above, another group of pollutants, commonly referred to as TACs or hazardous air pollutants can result in health effects that can be quite severe. Many TACs are confirmed or suspected carcinogens, or are known or suspected to cause birth defects or neurological damage. In addition, many TACs can be toxic at very low concentrations. For some chemicals, such as carcinogens, there are no thresholds below which exposure can be considered risk-free.

Industrial facilities and mobile sources are significant sources of TACs. The electronics industry, including semiconductor manufacturing, has the potential to contaminate both air and water due to the highly toxic chlorinated solvents commonly used in semiconductor production processes. Sources of TACs go beyond industry. Various common urban facilities also produce TAC emissions, such as gasoline stations (benzene), hospitals (ethylene oxide), and dry cleaners (perchloroethylene). Automobile exhaust also contains TACs such as benzene and 1,3-butadiene.

Odors and Dust. Other air quality issues of concern include nuisance impacts of odors and dust. Objectionable odors may be associated with a variety of pollutants. Common sources of odors include wastewater treatment plants, landfills, composting facilities, refineries and chemical

plants. Similarly, nuisance dust may be generated by a variety of sources including quarries, agriculture, grading and construction. Odors rarely have direct health impacts, but they can be very unpleasant and can lead to anger and concern over possible health effects among the public.

3.2 AIR QUALITY REGULATORY FRAMEWORK Federal Regulations

United States Environmental Protection Agency (USEPA). At the federal level, the USEPA has been charged with implementing national air quality programs. The USEPA's air quality mandates are drawn primarily from the Federal Clean Air Act (FCAA), which was enacted in 1963. The FCAA was amended in 1970, 1977, and most recently in 1990. The FCAA required the USEPA to establish primary and secondary National Ambient Air Quality Standards (NAAQS)—concentrations of pollutants not to be exceeded—shown below in **Table 3-1**. The NAAQS were devised to protect public health, reduce smog, and prevent degradation of environmental quality. Attainment of the NAAQS is achieved by demonstrating that measured concentrations of criteria pollutants for a region remained below the designated thresholds over a period of three years. The attainment status is shown in **Table 3-1**.

The FCAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The Federal Clean Air Act Amendments of 1990 (FCAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. USEPA has responsibility to review all state SIPs to determine conformance to the mandates of the FCAAA and determine if implementation will achieve air quality goals. If the USEPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area that imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated timeframe may result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

Federal Hazardous Air Pollutant Program. Title III of the FCAAA requires the USEPA to promulgate National Emissions Standards for Hazardous Air Pollutants (NESHAPs). The emissions standards were promulgated in two phases. In the first phase, the USEPA developed technology-based emission standards designed to produce maximum emission reductions. These standards are generally referred to as requiring Maximum Achievable Control Technology (MACT). In the second phase, the USEPA set health risk-based emissions standards to address risks remaining after implementation of the technology-based NESHAP standards. The FCAAA required the USEPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene.

Mobile Source Air Toxics (MSAT). The USEPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources on March 29, 2001. USEPA examined the impacts of existing and newly promulgated mobile source control programs, including: reformulated gasoline; national low emission vehicle standards; Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements; proposed heavy duty engine and vehicle standards; and on-highway diesel fuel sulfur control requirements. The Federal Highway Administration Projects that even with a substantial increase in vehicle miles traveled between 2000 and 2020 that these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and

acetaldehyde by 57 to 65 percent, and will reduce on-highway diesel particulate matter emissions by 87 percent. As a result, USEPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs.

State Regulations

Hawaii Department of Health (DOH). The DOH Clean Air Branch is responsible for air pollution control in the State. The primary services of the branch are provided by its three sections: Engineering, Monitoring, and Enforcement. These sections conduct engineering analysis and permitting, perform monitoring and investigations, and enforce the federal and State air pollution control laws and regulations. The DOH Hawaii Administrative Rules (HAR) includes two chapters representing the Clean Air Branch. Chapter 59 identifies State ambient air quality standards (Table 3-1), and Chapter 60 discusses air pollution control methodology. Chapter 60 includes air permitting, sampling, modeling, and fugitive dust and motor vehicle provisions.

Chapter 60 §11-60.1-33 includes the following fugitive dust prohibitions:

- No person shall cause or permit visible fugitive dust to become airborne without taking reasonable precautions. Examples of reasonable precautions are:
 - Use of water or suitable chemicals for control of fugitive dust in the demolition of any buildings or structures, construction operations, the grading of roads, or the clearing of land;
 - Application of asphalt, water, or suitable chemicals on roads, material stockpiles, and other surfaces which may result in fugitive dust;
 - Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Reasonable containment methods shall be employed during sandblasting or other similar operations;
 - Covering all moving, open-bodied trucks transporting materials which may result in fugitive dust;
 - Conducting agricultural operations, such as tilling of land and the application of fertilizers, in such manner as to reasonably minimize fugitive dust;
 - Maintenance of roadways in a clean manner; and
 - Prompt removal of earth or other materials from paved streets which have been transported there by trucking, earth-moving equipment, erosion, or other means.
- Except for persons engaged in agricultural operations or persons who can demonstrate to the director that the best practical operation or treatment is being implemented, no person shall cause or permit the discharge of visible fugitive dust beyond the property lot line on which the fugitive dust originates.

TABLE 3-1: STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS

| Pollutant | Averaging Period | Hawaii | | Federal | |
|---|-------------------------|-----------------------|-------------------|------------------------------------|-------------------|
| | | Standard | Attainment Status | Standard | Attainment Status |
| Ozone (O ₃) | 1-hour Average | -- | Attainment | -- | -- |
| | 8-hour Average | 0.08 ppm | Attainment | 0.070 ppm (137 µg/m ³) | Attainment |
| Respirable Particulate Matter (PM ₁₀) | 24-hour Average | 150 µg/m ³ | Attainment | 150 µg/m ³ | Attainment |
| | Annual Arithmetic Mean | 50 µg/m ³ | Attainment | -- | -- |
| Fine Particulate Matter (PM _{2.5}) | 24-hour Average | -- | -- | 35 µg/m ³ | Attainment |
| | Annual Arithmetic Mean | -- | -- | 15 µg/m ³ | Attainment |
| Carbon Monoxide (CO) | 8-hour Average | 4.4 ppm | Attainment | 9 ppm (10 mg/m ³) | Attainment |
| | 1-hour Average | 9 ppm | Attainment | 35 ppm (40 mg/m ³) | Attainment |
| Nitrogen Dioxide (NO ₂) | Annual Arithmetic Mean | 0.04 ppm | Attainment | 53 ppb (100 µg/m ³) | Attainment |
| | 1-hour Average | -- | Attainment | 100 ppb (188 µg/m ³) | Unclassified |
| | 24-hour Average | 0.14 ppm | Attainment | -- | -- |
| Sulfur Dioxide (SO ₂) | 3-hour Average | 0.5 ppm | -- | 0.5 ppm (1,300 µg/m ³) | -- |
| | 1-hour Average | -- | -- | 75 ppb (196 µg/m ³) | Attainment |
| | Annual Arithmetic Mean | 0.03 ppm | Attainment | -- | -- |
| Lead (Pb) | 30-day average | 1.5 µg/m ³ | Attainment | -- | -- |
| | Calendar Quarter | 1.5 µg/m ³ | -- | 1.5 µg/m ³ | Attainment |
| | Rolling 3-Month Average | -- | -- | 0.15 µg/m ³ | -- |
| Hydrogen Sulfide (H ₂ S) | 1-hour Average | 0.025 ppm | Attainment | -- | -- |

SOURCE: State of Hawaii Department of Health, *State of Hawaii Annual Summary 2015 Air Quality Data*, December 2016.

In regards to motor vehicles, Chapter 60 §11-60.1-34 includes the following:

- No person shall operate a gasoline-powered motor vehicle which emits visible smoke while upon streets, roads, or highways.
- No person shall operate a diesel-powered motor vehicle which emits visible smoke for a period of more than five consecutive seconds while upon streets, roads, or highways.

- No person shall cause, suffer, or allow any engine to be in operation while the motor vehicle is stationary at a loading zone, parking or servicing area, route terminal, or other off street areas, except:
 - During adjustment or repair of the engine at a garage or similar place of repair;
 - During operation of ready-mix trucks, cranes, hoists, and certain bulk carriers, or other auxiliary equipment built onto the vehicle or equipment that require power take-off from the engine, provided that there is no visible discharge of smoke and the equipment is being used and operated for the purposes as originally designed and intended. This exception shall not apply to operations of air conditioning equipment or systems;
 - During the loading or unloading of passengers, not to exceed three minutes; and
 - During the buildup of pressure at the startup and cooling down at the closing down of the engine for a period of not more than three minutes.
- No person shall remove, dismantle, fail to maintain, or otherwise cause to be inoperative any equipment or feature constituting an operational element of the air pollution control system or mechanism of a motor vehicle as required by the provisions of the Act except as permitted or authorized by law.

3.3 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Cumulative GHG emissions are believed to contribute to an increased greenhouse effect and global climate change, which may result in sea level rise, changes in precipitation, habitat, temperature, wildfires, air pollution levels and changes in the frequency and intensity of weather-related events. While criteria pollutants and TACs are pollutants of regional and local concern, GHG are global pollutants. The primary land-use related GHG are carbon dioxide (CO₂), methane (CH₄) and nitrous oxides (N₂O). The individual pollutant's ability to retain infrared radiation represents its "global warming potential" and is expressed in terms of CO₂ equivalents; therefore, CO₂ is the benchmark having a global warming potential of one. Methane has a global warming potential of 28 and thus has a 28 times greater global warming effect per metric ton of CH₄ than CO₂. N₂O has a global warming potential of 265. GHG emissions are generally expressed in units of annual metric tons of CO₂ equivalents (i.e., MTCO₂e/year).

3.4 CLIMATE CHANGE REGULATORY FRAMEWORK

International Regulations

A new international climate change agreement was adopted at the Paris United Nations Framework Convention on Climate Change conference in December 2015. The last two climate conferences in Warsaw (2013) and Lima (2014) decided that countries were to submit their proposed emissions reduction targets for the 2015 conference as "intended nationally determined contributions" prior to the Paris conference. The European Union has committed to an economy-wide, domestic GHG reduction target of 40 percent below 1990 levels by 2030. These targets are set with the goal of limiting global temperature rise to well below 2 degrees Celsius and getting to the 80 percent emission reduction by 2050.

Federal Regulations

The United States Supreme Court ruled in *Massachusetts v. EPA*, 127 S.Ct. 1438, that CO₂ and other GHGs are pollutants under the FCAA, which the USEPA must regulate if it determines they pose an endangerment to public health or welfare. On December 7, 2009, the USEPA made two distinct findings: 1) that the current and projected concentrations of the six key GHGs (CO₂, CH₄,

N₂O, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride) in the atmosphere threaten the public health and welfare of current and future generations; and 2) that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

On June 23, 2014, the U.S. Supreme Court ruled in *Utility Air Regulatory Group v. EPA* that the USEPA exceeded its statutory authority under the FCAA when it determined that stationary source emissions of GHGs would trigger permitting obligations under the Prevention of Significant Deterioration (PSD) program and Title V of the FCAA. The Court, however, upheld those portions of USEPA's rulemaking that require a source to apply best available control technology (BACT) to GHG emissions where the source would otherwise trigger PSD permitting on account of its emissions of other pollutants. The Supreme Court's decision was limited to USEPA's regulation of GHG emissions under the PSD and Title V provisions of the FCAA, and it left unanswered other questions regarding USEPA's permitting and BACT authority under the PSD program, and the USEPA's efforts to regulate GHG emissions from stationary sources.

State Regulations

In 2007, Hawaii became the second State in the nation to set a binding cap on GHG emissions through Act 234: Hawaii's Climate Change Law, which declared a policy to reduce GHG emissions statewide to 1990 levels by the year 2020. Act 234 served as the foundation for the Hawaii Greenhouse Gas Program, which was established by the DOH to combat the threat of climate change and sea level rise. This Program utilizes the Air Pollution Control Permit process of DOH's Clean Air Branch to regulate GHG emissions statewide, in conjunction with other federal and Hawaii State programs to mitigate GHGs. Parts of Act 234 are codified in Chapter 342B (Air Pollution Control) of the Hawaii Revised Statutes.

Senate Bill (SB) 559, which was signed into law on June 8, 2017, expands strategies and mechanisms to reduce GHG emissions in alignment with the principles and goals adopted in the Paris Agreement, discussed above. SB 559 documents the State's commitment to combat climate change by systematically reducing GHG emissions and improving resiliency to climate change aligned with the principles and goals set by the Paris Agreement. It expands on strategies and mechanisms to reduce GHG emissions through the reduction of energy use, adoption of renewable energy, and control of air pollution among all agencies, departments, industries, and sectors, including transportation. SB 559 states that "Such strategies and mechanisms shall utilize the best available science, technologies, and policies to reduce GHG emissions and shall be closely aligned with the climate change principles and goals adopted in the Paris Agreement and Hawaii's share of obligations within the expectations apportioned to the United States in the Paris Agreement, regardless of federal action. In addition, "The State shall strive to formulate and communicate long-term low greenhouse gas emission development strategies and shall take actions to conserve and enhance long-term sinks and reservoirs of greenhouse gases, by prioritizing the development of parks, greenways, and restoration of native upland and coastal forests and wetlands."

4.0 EXISTING ENVIRONMENTAL SETTING

4.1 AIR POLLUTION CLIMATOLOGY

Air quality on Maui is considered to be good due to the presence of northeasterly trade winds that tend to disperse pollutants seaward. On the Leeward side (Southeast side) of Maui, the conditions are generally dry and sunny.

4.2 LOCAL CLIMATE

The project area is a tropical climate with average monthly temperatures ranging from a low of 63 degrees Fahrenheit to a high of 88 degrees Fahrenheit. Average monthly precipitation ranges from 0.42 inches in June to 2.87 inches in December.³

4.3 AIR MONITORING DATA

The Island of Maui has two active air monitoring stations, with the nearest air monitoring station to the project area located in Kihei. The Kihei Monitoring Station measures only concentrations of PM_{2.5}.⁴ Table 4-1 shows monitoring data.

TABLE 4-1: KIHAI AIR MONITORING DATA SUMMARY

| Pollutant | Standard | Maximum 2015 | Maximum 2016 | Maximum 2017 |
|-------------------|---------------------------------|-----------------------|-----------------------|-----------------------|
| PM _{2.5} | 3.5 µg/m ³ (24-hour) | 23 µg/m ³ | 47 µg/m ³ | 29 µg/m ³ |
| | 12 µg/m ³ (Annual) | 4.8 µg/m ³ | 3.7 µg/m ³ | 4.1 µg/m ³ |

SOURCE: USEPA, Monitor Value Reports, August 6, 2018.

4.4 SENSITIVE RECEPTORS

Sensitive land uses are locations where people reside or where the presence of substantial air pollutant concentrations could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered sensitive and may warrant unique measures for protection from pollutant emissions. Possible land uses for the South Parcel include residences and educational facilities and the North parcel may include a hotel. The nearest off-site sensitive receptors are residential areas located approximately 0.4 miles to the southwest and 0.5 miles to the south-southeast.

5.0 SIGNIFICANCE CRITERIA

According to the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations (CFR) §§ 1500-1508), the determination of a significant impact is a function of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Both short- and long-term effects are relevant. Intensity refers to the severity of impact. To determine significance, the severity of the impact must be examined in terms of the type, quality and sensitivity of the resource involved; the location of the project; the duration of the effect (short- or long-term) and other consideration of context. Adverse effects will vary with the setting of the proposed action and the surrounding area.

³Intellicast, <http://www.intellicast.com/Local/History.aspx?location=USH0048>, August 6, 2018.
⁴State of Hawaii Department of Health, *State of Hawaii Annual Summary 2015 Air Quality Data*, August 6, 2018.

6.0 ENVIRONMENTAL EFFECTS

6.1 CONSTRUCTION AIR POLLUTANT EMISSIONS

Heavy construction is a source of dust emissions that may have substantial temporary impact on local air quality.⁵ Building and road construction are two examples of construction activities with high emissions potential. Emissions during the construction of a building or road can be associated with land clearing, drilling and blasting, ground excavation, cut and fill operations (i.e., earth moving), and construction of a particular facility itself. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. A large portion of the emissions results from equipment traffic over temporary roads at the construction site.

The DHHL North Parcel proposes to develop approximately 184 acres of vacant land into a mix of open space, commercial development and light industrial uses. 30 to 40 acres will be designated as open space. The remaining acreage will be commercial/light industrial space, and internal roadways. Land uses at the DHHL South Parcel will be similar to those shown on **Figure 2-2**. Each project site would require substantial earthwork to prepare for development. The equipment requirements are not known at this time in the project planning process, but it is anticipated that activities would involve multiple scrapers, graders, dozers and other heavy-duty equipment.

Particulate matter (i.e., PM_{2.5}) is the primary pollutant of concern in the project area as it is the only pollutant monitored at the nearest station. It is recommended that Air Quality Control Measures **AQ1** through **AQ9** be implemented to reduce particulate matter emissions, including fugitive dust, associated with construction activities.

Construction Air Quality Control Measures

- AQ1** The construction contractor should use water or suitable chemicals to control fugitive dust in the demolition of any existing buildings or structures, construction operations, the grading of roads, or the clearing of land.
- AQ2** The construction contractor should apply asphalt, water, or suitable chemicals on roads, material stockpiles, and other surfaces which may result in fugitive dust.
- AQ3** The construction contractor should cover all moving, open-bodied trucks transporting materials which may result in fugitive dust.
- AQ4** The construction contractor should maintain roadways in a clean manner.
- AQ5** The construction contractor should promptly remove earth or other materials from paved streets which have been transported there by trucking, earth-moving equipment, erosion, or other means.
- AQ6** Staging areas should be located away from on-site residential land uses.
- AQ7** On-site electricity should be obtained from the electrical grid rather than temporary diesel or gasoline generators.

⁵USEPA, *Air Emissions Factors and Quantification, AP-42: Compilation of Air Emissions Factors, Chapter 13, Miscellaneous Sources.*

AQ8 Equipment and vehicle engines should be maintained in good condition and in proper tune per manufacturers' specifications.

AQ9 All construction equipment and delivery vehicles should be turned off when not in use or prohibit idling in excess of five minutes. Haul trucks in particular that stage waiting to be called to remove dirt from the site should not be allowed to idle while queuing.

6.2 OPERATIONAL AIR POLLUTANT EMISSIONS

Criteria Pollutant Emissions

Conformity is a requirement of the FCAA (Section 176(c), at 42 United States Code (U.S.C.) 7506(c)), to ensure that federal actions are consistent with the SIP to achieve and maintain NAAQS. Conformity only applies in areas that are designated nonattainment or maintenance for criteria pollutants. The project site is located in an Attainment/Unclassified area for all NAAQS. Therefore, conformity requirements do not apply.

The proposed project does not include a source of direct pollutant emissions. Indirect source of emissions includes off-site electrical generation activities (if the energy source is non-renewable) and tailpipe emissions from on-road vehicles. Although the proposed project includes land use development, the project would set aside 30 to 40 acres for open space and include agriculture land shown in **Figure 2.2**. The proposed project would consider ways to incorporate state-of-the-art energy conservation and green practices in the building development. The proposed project would not interfere with the development of clean energy supplies.

The DHHL North Parcel would generate 606 AM peak hour trips, 1,002 PM peak hour trips, and 1,298 weekend peak hour trips.⁶ The DHHL South Parcel would generate 1,017 AM peak hour trips, 731 PM peak hour trips, and 671 weekend peak hour trips. Total new external trips would be 1,623 AM peak hour trips, 1,105 PM peak hour trips, and 1,969 weekend peak hour trips. There are no receptors within 500 meters (1,640 feet) of the project site. There is no potential for on-site emissions to affect local off-site land uses.

The proposed project includes industrial facilities that would generate truck trips. Possible land uses for the South Parcel include residences and educational facilities and the North parcel may include a hotel. Neither the State of Hawaii nor the USEPA have established standards for locating new sensitive land uses near distribution facilities. However, the California Air Resources Board recommends avoiding siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week).⁷ It is recommended that Air Quality Control Measures **AQ10** be implemented to reduce exposure reduce on-site exposure to diesel particulate matter emissions.

Regarding regional emissions, the project site is located in an Attainment/Unclassified area for all NAAQS and regional air quality is good. There is no potential for the proposed project to substantially affect regional air quality.

Regarding off-site emissions, the USEPA has published guidance on prevention of CO "hot spots" at congested intersections resulting from idling and slow-moving vehicles. The guidance focuses on the avoidance of localized spikes in CO concentrations causing violations of the ambient air

⁶Austin, Tsutsumi & Associates, Inc., *Draft Traffic Impact Analysis Report: DHHL North and South Parcels, August 3, 2018.*

⁷California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective, April 2005.*

quality standards. In response to the guidance promulgated by the USEPA, numerous regulatory agencies throughout the country undertook research to determine the types of intersections that may pose air quality concerns with regards to CO hot spots. Since the island of Maui has always been in attainment of the ambient air quality standards, local regulatory agencies did not have a need to conduct research to satisfy the air quality plan requirements. However, mobile source emissions of CO are of particular concern in California, where the South Coast Air Quality Management (SCAQMD) engaged in extensive research to demonstrate how the CO NAAQS could be attained for the region.

Research published in 2003 by the SCAQMD involved air dispersion modeling of mobile CO emissions at some of the busiest intersections in southern California. Results of the CO dispersion modeling exercise determined that an intersection experiencing a peak hour volume of approximately 10,000 vehicles per hour—about twice the maximum within the project area—would generate a maximum 1-hour CO concentration of approximately 4.6 ppm.⁸ The traffic analysis prepared for the proposed project demonstrates that local intersection volumes do not approach 10,000 vehicles per hour. In addition, CO is not a pollutant of concern in the project area as evident by the lack of monitoring in the project area. There is no potential for the proposed project to result in a CO hotspot.

Operational Air Quality Control Measures

AQ10 Land uses sensitive to air pollution (e.g., residences, educational facilities, and hotels) should not be located within 1,000 feet of a distribution center that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week).

GHG Emissions

The CEO has withdrawn its "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act (NEPA) Reviews," for which a Notice of Availability was originally published on August 5, 2016. Therefore, no guidance currently exists for addressing GHG emissions and climate change under NEPA. The USEPA has not issued explicit guidance or methods to conduct project-level GHG emissions analysis.

The State, through Act 234 and SB 559, has acknowledged that GHG emissions are a statewide impact. The proposed project would generate GHG emissions through energy use and new vehicle trips. Although the proposed project includes land use development the project would set aside 30 to 40 acres for open space and include agriculture land shown in **Figure 2.2**. The proposed project would consider ways to incorporate state-of-the-art energy conservation and green practices in the building development. Hawaii is committed to renewable energy production, which does not generate GHG emissions. In 2016, 25.8 percent of energy produced by the Hawaiian Electric Companies was renewable. Hawaii has enacted a law that mandates that all of the State's electricity comes from renewable sources no later than 2045. The project is anticipated to be fully built out in 2038. Project-related indirect emissions would decline as the State moves toward a fully renewable supply of energy. In addition, the proposed project would not interfere with the development of clean energy supplies.

⁸South Coast Air Quality Management District, *Final 2003 AQMP Appendix V: Modeling and Attainment Demonstrations*, August 2003.

7.0 CUMULATIVE EFFECTS

7.1 Federal

NEPA requires that any agency proposing a major federal action, which may significantly affect the environment, consider the environmental impacts of the proposed action, any unavoidable adverse environmental impacts, and the relationship between local short term uses and long-term productivity of the environment (42 U.S.C. 4332(c)). There are three types or categories of effect that must be considered during the NEPA process: direct, indirect, and cumulative (40 CFR 1508.25). A direct effect is one which is caused directly by our activities, at the same time, and in the same place. An indirect effect is a reasonably foreseeable effect caused by the proposed action or alternatives, but that occurs later in time or is further removed from the project site than a direct effect. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate,⁹ and related effects on resources (40 CFR 1508.8(b)).

A cumulative effect is an "impact on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions" (40 CFR 1508.7). Cumulative effects can result from individually minor but collectively significant actions taking place over time (40 CFR 1508.7). A cumulative effects analysis is required whenever an Environmental Assessment or Environmental Impact Statement is prepared. A project must have a direct and/or indirect effect on a specific resource to exert a cumulative influence. If no direct and/or indirect effect to a specific resource is expected, there is no need to consider cumulative effects to that resource. The proposed project would not result in an adverse air quality effect. Therefore, a cumulative effect would not occur under NEPA regulations.

7.2 State

Section 11-200-2 of the HAR contains the definition of a cumulative impact. A cumulative impact is defined as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

By its very nature, air pollution is largely a cumulative impact. Ambient air quality standards are violated or approach nonattainment levels due to past development that has formed the urban fabric, and attainment of standards can be jeopardized by increasing emissions-generating activity in the region. In addition, the proposed site is located in an Attainment/Unclassified area for all NAAQS. The regional air quality in Maui is considered to be healthy. There is no existing cumulative air quality impact, and there is no potential for the project to significantly contribute to a future air quality impact.

The State, through Act 234 and SB 559, has acknowledged that GHG emissions are a statewide impact. Emissions generated by the proposed project in combination with past, present, and reasonably probable future related projects could contribute to this impact. Although climate change is cumulative in nature, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment. Although the proposed project includes land use development the project would set aside 30 to 40 acres for open space and include agriculture land shown in **Figure 2.2**. The proposed project would consider ways to incorporate state-of-the-art energy conservation and green practices in the building development. In addition, the proposed project would not interfere with the development of clean energy supplies.

APPENDIX H

**REVISED TRAFFIC IMPACT
ANALYSIS REPORT**

**TRAFFIC IMPACT ANALYSIS REPORT
DHHL NORTH AND SOUTH PARCELS**

Puunene, Maui, Hawaii

FINAL DRAFT

~~October 24, 2018~~
April 24, 2019

Prepared for:

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H. ROUNDABOUT ANALYSIS



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TRAFFIC IMPACT ANALYSIS REPORT

DHHL PULEHUNUI NORTH AND SOUTH PARCELS

Pulehunui, Maui, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi, and Associates, Inc. (ATA) to evaluate the traffic impacts resulting from the proposed DHHL Pulehunui North and South Parcels (hereinafter collectively referred to as the "Project"). For purposes of long range infrastructure planning, regional traffic impacts generated by the entire Pulehunui Master Planned Subdivision, which collectively includes the Project, DLNR Industrial and Business Park, and Maui Regional Public Safety Complex (MRPSC), is also analyzed in this TIAR.

1.1 Location

The DHHL North Parcel is located on an unoccupied parcel located to the west of Maui Veterans Highway, bound by the Maui Humane Society to the north, Maui Veterans Highway to the east, and Mehamaha Loop to the west and south. The DHHL South Parcel encompasses approximately 646 acres of land, located approximately $\frac{3}{4}$ mile south of the DHHL North Parcel, adjacent and to the east of Maui Veterans Highway.

See Figure 1.1 for the location of the North and South parcels.

1.2 Project Description

The DHHL North Parcel is approximately 184.4 acres of vacant land. Plans for DHHL North Parcel include the following:

- 80 acres of industrial space
- 16 acres of commercial space
- 5 acres for a hotel

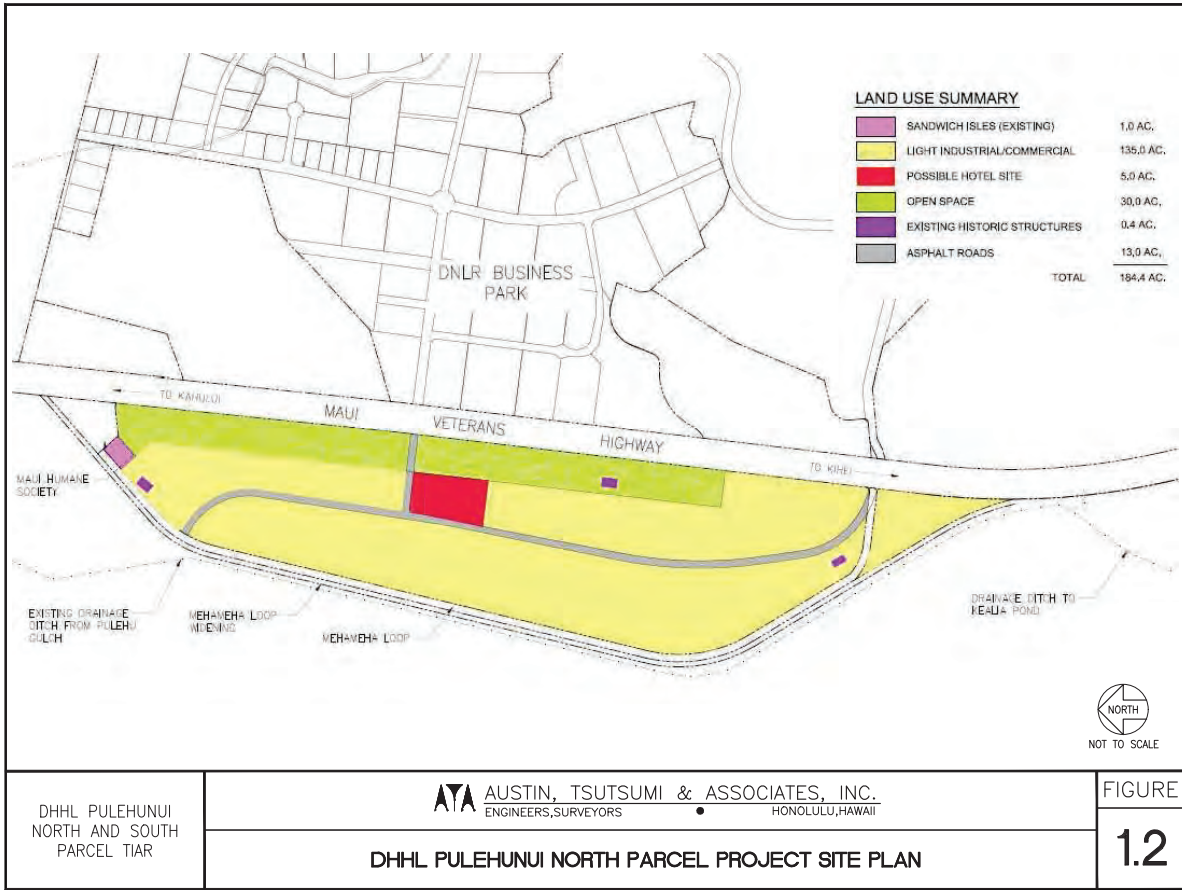
- 40 acres for a cultural center/visitor attraction space
- 43.4 acres for roads, easements, open space and existing structures.

There are two (2) existing accesses to the DHHL North Parcel via Mehamaha Loop (North)/Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access. A new third access is proposed along Maui Veterans Highway, via a new signalized 4-legged intersection between Mehamaha Loop (North)/Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access. This new third access will provide direct access to both the DHHL North Parcel as well as the future DLNR Industrial and Business Park development across Maui Veterans Highway.

The DHHL South Parcel is approximately 646 acres of vacant land. Plans for DHHL South Parcel include the following:

- 173 acres maintained for agricultural use
- 238 acres for Agricultural homesteads, with an estimated 110 homesteads for DHHL beneficiaries
- 33 acres for an education facility
- 18 acres for a cultural & arts center
- 105 acres for industrial/agriculture processing space
- 79 acres for roads, easements and open space

Access to this development would occur via three (3) existing accesses from Maui Veterans Highway fronting the DHHL South Parcel site. Build-out of both DHHL North and South Parcels is anticipated to occur by Year 2035, but for purposes of this TIAR, a forecast Year 2038 was used to analyzing the full impacts of the Pulehunui Master Planned Subdivision. See Figure 1.2 and 1.3 for the DHHL North and South Parcel site plans.



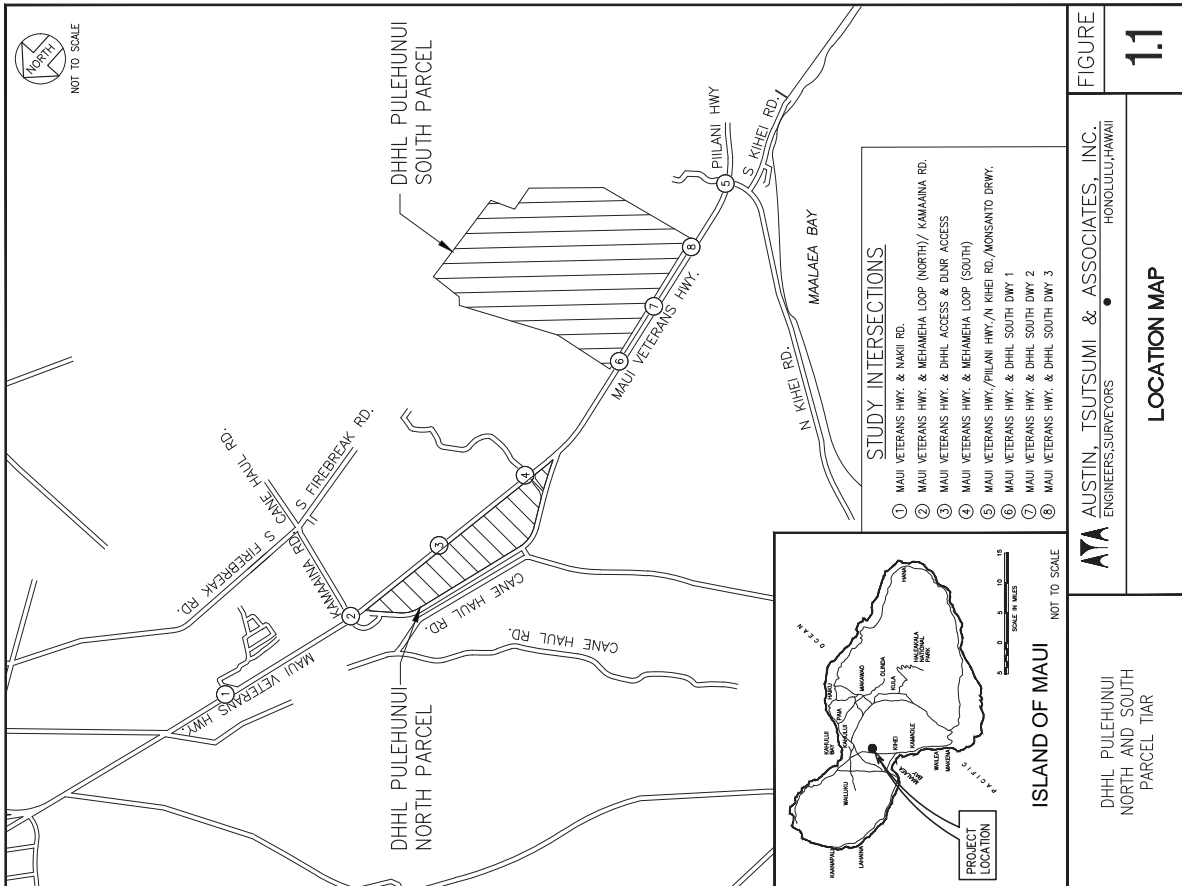
DHHL PULEHUNUI
NORTH AND SOUTH
PARCEL TIAR

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

FIGURE

DHHL PULEHUNUI NORTH PARCEL PROJECT SITE PLAN

1.2



FIGURE

1.1

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

LOCATION MAP

DHHL PULEHUNUI
NORTH AND SOUTH
PARCEL TIAR

2. METHODOLOGY

2.1 Study Methodology

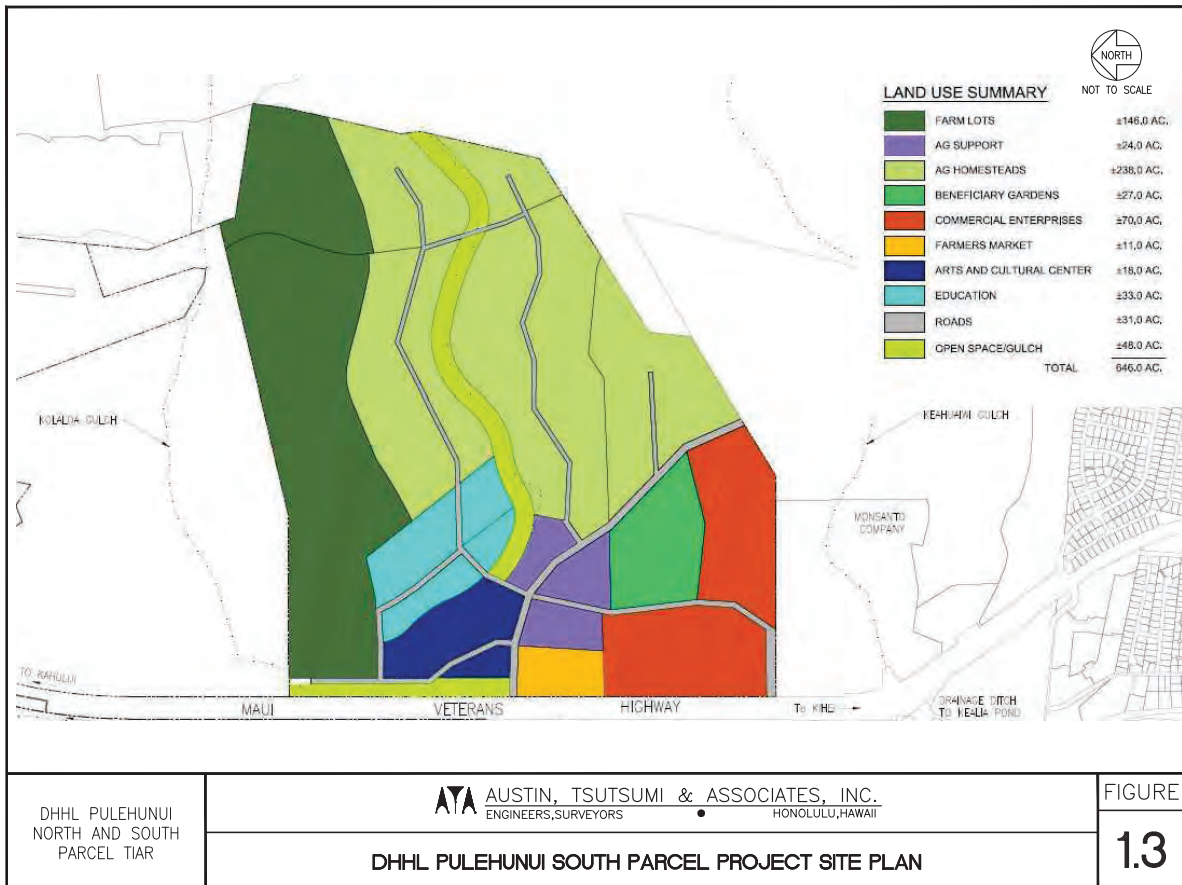
This study will address the following:

- Existing traffic operating conditions at key intersections during the weekday AM and PM and weekend midday (WE) peak hours of traffic within the study area.
- Trip generation and traffic assignment characteristics for the proposed Project.
- Traffic projections for Base Year 2038 (without the Project) including traffic generated by other known developments in the vicinity of the Project in addition to an ambient growth rate.
- Trip generation and traffic assignment characteristics for the DHHL North and South Parcels.
- Traffic projections for Future Year 2038 (with the Project), which collectively reflects the anticipated build-out of the entire Pulehunui Master Planned Subdivision.
- Recommendations for Base Year and Future Year roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by known developments in the region or the Project.

2.2 Intersection Analysis

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), 6th Edition, methods for calculating volume to capacity ratios, delays and corresponding Levels of Service were utilized in this study. LOS definitions for signalized and unsignalized intersections are provided in Appendix B.

Analyses for the study intersections were performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies described in the HCM. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes. Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.



DHHL PULEHUNUI
NORTH AND SOUTH
PARCEL TIAR

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DHHL PULEHUNUI SOUTH PARCEL PROJECT SITE PLAN

FIGURE

1.3

3. EXISTING TRAFFIC CONDITIONS

3.1 Roadway System

The following are brief descriptions of the existing roadways studied within the vicinity of the Project:

Maui Veterans Highway (formerly Mokualele Highway) is a regional, four-lane, two-way divided State highway facility that runs in the north-south direction. This roadway begins to the north transitioning from Puunene Avenue into Maui Veterans Highway at its intersection with Hookele Street and terminates to the south at its intersection with North Kihei Road, where it continues further south as Piliiani Highway. The posted speed limit in the vicinity of the Project is 45 miles per hour (mph).

Nakii Road is a two-lane, two-way roadway that provides access to the Central Maui Baseyard from Maui Veterans Highway. The posted speed limit along this roadway is 15 mph.

Kamaaina Road is a roadway that runs in the east-west direction. Kamaaina Road begins to the west at its intersection with Maui Veterans Highway, and terminates to the east at an intersection with South Firebreak Road. Kamaaina Road primarily services traffic generated by the Hawaiian Cement Baseyard located further south of the roadway. Kamaaina Road is currently unstriped but was observed to provide enough width to service two-way traffic.

Mehameha Loop is a two-lane, two-way private roadway that generally runs parallel and to the west of Maui Veterans Highway. This roadway intersects with Maui Veterans Highway across from Kamaaina Road, forming the west leg of the signalized intersection (Mehameha Loop North) at the northern end. This roadway traverses south, providing access to the Maui Humane Society and is gated further south for private use. Mehameha Loop ultimately terminates across from the Maui Raceway Park Access Road forming the west leg of the unsignalized intersection (Mehameha Loop South) at the southern end. The roadway is gated just west of the unsignalized intersection across Mehameha Loop South. The posted speed limit along this roadway is 15 mph.

Piliiani Highway is generally a four-lane, two-way State highway facility that runs in the north-south direction. This roadway begins to the north transitioning from Maui Veterans Highway at its intersection with North Kihei Road and terminates to the south in Wailea, where it transitions into Wailea Iike Drive. The posted speed limit along this roadway is 45 mph.

North Kihei Road is a two-lane, two-way State roadway that connects Honoapiilani Highway in Maalaea to Maui Veterans Highway/Piliiani Highway in Kihei. The posted speed limit along this roadway is 30 mph.

South Firebreak Road is a local road that facilitates transport for Hawaiian Cement trucks in the north-south direction. South Firebreak Road begins to the south near the Hawaiian Cement Baseyard and travels north to Pulehu Road where it transitions into North Firebreak Road before it terminates about 1.25 miles north of Haleakala Highway. Various intersection approaches along South Firebreak Road are gated and previously provided access to HC&S sugar cane fields. In the vicinity of the Project, the roadway is currently unstriped but was observed to provide enough width to service two-way traffic.

Maui Raceway Park Access Road is an unstriped roadway that provides access to the Maui Raceway Park and Army National Guard Armory. The roadway begins to the west at its connection with Mehameha Loop (South) near the Maui Veterans Highway/Mehameha Loop (South) intersection and terminates as a dead end at the Maui Raceway Park. There is no posted speed limit along this roadway.

3.2 Existing Traffic Volumes

The weekday hourly traffic volume data, utilized in this report were collected on Thursday, September 10 and Tuesday, September 15, 2015 as well as Thursday, January 19, 2017. The weekend hourly traffic volume data was collected on Saturday, August 12, 2017. Weekday PM traffic volumes taken in 2015 were adjusted to generally meet 2017 conditions. See the traffic count data provided in Appendix A for the existing intersections studied and their corresponding traffic count data. Based on the proximity to the proposed Project site, the following intersections were studied in the existing conditions scenario. Note that the Maui Veterans Highway/DHHL North Access/DLNR Access intersection is proposed upon completion of the DHHL and DLNR projects and is not currently built out, and therefore, no traffic data was collected at this intersection. The three (3) proposed accesses for DHHL South was also not included in existing conditions, since no traffic is currently being generated at these permitted accesses. However, the intersection is included here for continuity within this report.

- [1] Maui Veterans Highway/Nakii Road (Signalized)
- [2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road (Signalized)
- [3] Maui Veterans Highway/DHHL North Access/DLNR Access (Future Signalized)
- [4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road (Unsignalized)
- [5] Maui Veterans Highway/Piliiani Highway/North Kihei Road/Monsanto Driveway (Signalized)
- [6-8] Maui Veterans Highway/DHHL South Accesses (Future improved intersections)

Based on the traffic count data, the AM, PM and WE peak hours of traffic were determined to occur between 7:15 AM to 8:15 AM, 3:30 PM to 4:30 PM and 12:00 PM to 1:00 PM, respectively. The turning movement count data may be found in Appendix A.

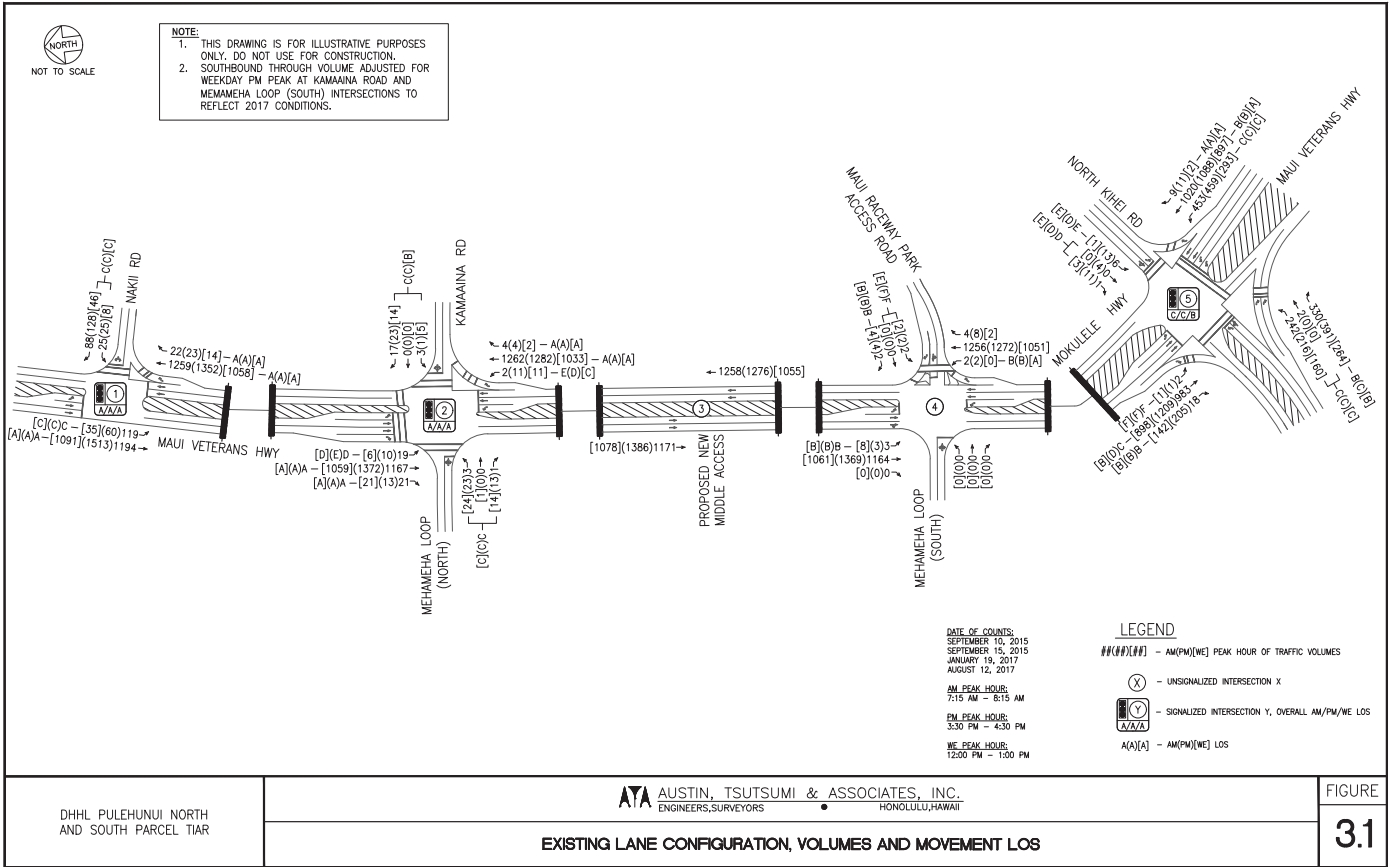
3.3 Existing Traffic Conditions Analysis and Observations

3.3.1 Existing Intersection Analysis

The observations and analysis described below are based on prevailing observations during the time at which the data was collected. Hereinafter, observations that are expressed as ongoing and current shall represent conditions that prevailed at the time at which data was collected. It was observed that a number of vehicles accessing Nakii Road and Kamaaina Road consisted of heavy vehicle (HV) trucks generated by the Central Maui Baseyard and Hawaiian Cement Baseyard, respectively. Due to its potential impact on existing and future projections, HV trucks were accounted for and utilized in this analysis. The following shows the percentages of turning movement HV trucks utilized in the existing conditions analysis:

[1] Maui Veterans Highway/Nakii Road

- AM Peak (Enter Nakii Road) – 5% HV Trucks



- AM Peak (Exit Nakii Road) – 20% HV Trucks
- PM/WE Peak (Enter Nakii Road) – 7% HV Trucks
- PM/WE Peak (Exit Nakii Road) – 4% HV Trucks

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

- AM Peak (Enter Kamaaina Road) – 35% HV Trucks
- AM Peak (Exit Kamaaina Road) – 90% HV Trucks
- PM Peak (Enter Kamaaina Road) – 71% HV Trucks
- PM Peak (Exit Kamaaina Road) – 21% HV Trucks
- WE Peak (Enter Kamaaina Road) – 25% HV Trucks
- WE Peak (Exit Kamaaina Road) – 11% HV Trucks

Traffic volumes along Maui Veterans Highway were generally similar in both directions during all peak hours of traffic. No significant delays or queuing were observed at the study intersections. All intersection movements generally operated adequately at LOS D or better. However, the following intersection movements operated at LOS E/F conditions:

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

This intersection operated at overall LOS A with all movements generally operating at LOS D or better during all peak hours of traffic. However, the AM northbound left-turn and PM southbound left-turn operated at LOS E due to low volumes (10 vehicles) that resulted in lengthier delays.

[4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road

During all peak hours of traffic, the westbound left-turn operated at LOS E/F due to delays from unsignalized conditions, but westbound left-turn movement was low with only two (2) vehicles during each peak hour. However, gaps in through traffic along Maui Veterans Highway help vehicles proceed onto Maui Veterans Highway.

[5] Maui Veterans Highway/Piliani Highway & N Kihei Road/Monsanto Driveway

This intersection operated at overall LOS C or better during all peak hours of traffic. However, the southbound left-turn and various westbound movements operated at LOS E/F during the peak hours due to lengthier delays from low movement volumes of thirteen or fewer vehicles per peak hour.

Figure 3.1 illustrates the existing lane configuration, traffic volumes and LOS for each study intersection. Table 3.1 provides a summary of the existing conditions analysis. LOS worksheets are provided in Appendix C.

TABLE 3.1: LOS SUMMARY TABLE
EXISTING CONDITIONS

| Intersection | Existing Conditions | | | | | | | | | | | |
|--|---------------------|-----------|-----|-----------|-----------|-----|-----------|-----------|-----|-----------|-----------|-----|
| | AM | | | PM | | | HCM | | | WE | | |
| | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS |
| 1. Maui Veterans Hwy & Nakti Rd | | | | | | | | | | | | |
| NB TH | 9.4 | 0.74 | A | 8.6 | 0.74 | A | 7.0 | 0.64 | A | 7.0 | 0.64 | A |
| NB RT | 5.3 | 0.01 | A | 4.6 | 0.02 | A | 4.5 | 0.01 | A | 4.5 | 0.01 | A |
| WB L/THRT | 30.2 | 0.54 | C | 28.2 | 0.49 | C | 30.2 | 0.45 | C | 30.2 | 0.45 | C |
| SB LT | 28.2 | 0.78 | C | 27.9 | 0.65 | C | 23.1 | 0.52 | C | 23.1 | 0.52 | C |
| SB TH | 2.9 | 0.50 | A | 3.5 | 0.64 | A | 2.9 | 0.49 | A | 2.9 | 0.49 | A |
| OVERALL | 7.5 | - | A | 6.5 | - | A | 5.3 | - | A | 5.3 | - | A |
| 2. Maui Veterans Hwy & Mehamaha Ln North/Kamaaina Rd | | | | | | | | | | | | |
| NB LT | 69.3 | 0.40 | E | 36.7 | 0.43 | D | 30.6 | 0.43 | C | 30.6 | 0.43 | C |
| NB TH | 7.0 | 0.66 | A | 6.7 | 0.63 | A | 7.3 | 0.60 | A | 7.3 | 0.60 | A |
| NB RT | 4.1 | 0.00 | A | 3.9 | 0.01 | A | 4.7 | 0.00 | A | 4.7 | 0.00 | A |
| EB L/THRT | 23.7 | 0.03 | C | 26.1 | 0.15 | C | 20.2 | 0.13 | C | 20.2 | 0.13 | C |
| WB L/THRT | 23.8 | 0.03 | C | 25.4 | 0.01 | C | 19.7 | 0.03 | B | 19.7 | 0.03 | B |
| SB LT | 40.8 | 0.63 | D | 76.8 | 0.73 | E | 53.3 | 0.55 | D | 53.3 | 0.55 | D |
| SB TH | 5.9 | 0.58 | A | 7.1 | 0.68 | A | 7.6 | 0.62 | A | 7.6 | 0.62 | A |
| SB RT | 3.6 | 0.02 | A | 3.9 | 0.01 | A | 4.9 | 0.02 | A | 4.9 | 0.02 | A |
| OVERALL | 6.8 | - | A | 7.5 | - | A | 7.8 | - | A | 7.8 | - | A |
| 4. Maui Veterans Hwy & Mehamaha Loop South | | | | | | | | | | | | |
| NB LT | 11.5 | 0.00 | B | 12.9 | 0.01 | B | 0.0 | - | A | 0.0 | - | A |
| WB L/TH | 61.4 | 0.03 | F | 74.4 | 0.04 | F | 42.6 | 0.02 | E | 42.6 | 0.02 | E |
| WB RT | 14.1 | 0.01 | B | 14.3 | 0.01 | B | 12.7 | 0.01 | B | 12.7 | 0.01 | B |
| SB LT | 12.1 | 0.01 | B | 12.2 | 0.01 | B | 10.9 | 0.01 | B | 10.9 | 0.01 | B |
| OVERALL | 0.1 | - | B | 0.1 | - | B | 0.1 | - | B | 0.1 | - | B |
| 5. Piliwai Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy | | | | | | | | | | | | |
| NB LT | 29.3 | 0.76 | C | 33.4 | 0.79 | C | 24.9 | 0.66 | C | 24.9 | 0.66 | C |
| NB TH | 10.5 | 0.56 | B | 11.0 | 0.58 | B | 9.5 | 0.53 | A | 9.5 | 0.53 | A |
| NB RT | 7.1 | 0.01 | A | 7.2 | 0.01 | A | 6.7 | 0.00 | A | 6.7 | 0.00 | A |
| EB LT | 30.7 | 0.60 | C | 33.4 | 0.51 | C | 25.7 | 0.50 | C | 25.7 | 0.50 | C |
| EB RT | 18.2 | 0.23 | C | 21.2 | 0.32 | C | 17.3 | 0.14 | B | 17.3 | 0.14 | B |
| WB LT | 57.6 | 0.48 | E | 49.4 | 0.46 | D | 60.4 | 0.26 | E | 60.4 | 0.26 | E |
| WB TH/RT | 37.5 | 0.08 | D | 41.3 | 0.16 | D | 69.1 | 0.29 | E | 69.1 | 0.29 | E |
| SB LT | 114.5 | 0.52 | F | 142.6 | 0.45 | F | 80.1 | 0.32 | F | 80.1 | 0.32 | F |
| SB TH | 23.0 | 0.81 | C | 35.7 | 0.94 | D | 16.2 | 0.73 | B | 16.2 | 0.73 | B |
| SB RT | 14.2 | 0.01 | B | 15.5 | 0.12 | B | 11.7 | 0.10 | B | 11.7 | 0.10 | B |
| OVERALL | 20.0 | - | C | 25.6 | - | C | 15.4 | - | B | 15.4 | - | B |

4. BASE YEAR 2038 WITHOUT PROJECT TRAFFIC CONDITIONS

The full build-out of the entire Pulehunui Master Planned development, which includes the DHHL North and South Project, DLNR Industrial and Business Park, and Maui Regional Public Safety Complex (MRPSC), is anticipated to occur by Year 2038. The Base Year 2038 scenario represents the traffic conditions within the study area with the build-out of all the above developments with the exception of the DHHL North and South Project. Traffic projections were formulated by applying a defacto growth rate to the existing traffic count volumes as well as trips generated by known future developments in the vicinity of the Project.

Based on discussions with the State of Hawaii Department of Transportation (HDOT), it was requested that an iterative Base Year 2038 scenario be analyzed that excludes the three (3) Pulehunui Master Planned Subdivision developments; DHHL North and South Project, DLNR Industrial and Business Park, and Maui Regional Public Safety Complex (MRPSC). This scenario is described in greater detail in Appendix F.

4.1 Defacto Growth Rate

Projections for Base Year 2038 traffic were based upon a correlation between the existing traffic counts collected by ATA, the Maui Regional Travel Demand Model (MRTDM) growth for forecast years between 2007 and 2035, and nearby developments in the immediate vicinity of the Project. The overall annual growth rate along Maui Veterans Highway was determined to be approximately 2.1 percent per year.

4.2 Traffic Forecasts for Known Developments

By Year 2038, numerous developments are forecast to be completed within the vicinity of the Project and generate additional traffic along Maui Veterans Highway. The associated forecast traffic volumes for each known development traveling through the study intersections were added to the forecast Base Year 2038 traffic volumes. Based on an assessment of the MRTDM, the following developments were not part of the MRTDM model and were therefore included in addition to the ambient growth rate. These known developments are illustrated in Figure 4.1 & 4.2 and described below:

- Department of Land and Natural Resources (DLNR) Industrial and Business Park – This development is part of the overall Pulehunui Master Planned Subdivision. The total DLNR site encompasses approximately 227 acres, exclusive of internal roadways and open space. An additional 26.1 acres is estimated to be allocated for undevelopable drainage and easement space. Therefore, for traffic projection purposes, approximately 200.9 acres was used to forecast traffic based on anticipated available developable land. It was assumed that approximately 70% would be allocated to light industrial use and 30% would be allocated to commercial use. Access to the northern side of the Project will be provided along the existing Kamaaina Road via the Maui Veterans Highway. Additionally, a new signalized intersection is proposed along Maui Veterans Highway, between Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access Road to provide primary access to this development and to be shared with the adjacent DHHL North Parcel. Access will also be provided via the Maui Raceway Park Access Road on the south side of this project, with secondary access provided via South Firebreak Road.

- Maui Regional Public Safety Complex (MRPSC) – This development is part of the overall Pulehunu Master Planned Subdivision. This development is proposed to be located east of Maui Veterans Highway near the Army National Guard Armory and the Maui Raceway Park. Based on the MRPSC Environmental Impact Statement Preparation Notice, dated May 2010, the complex may include up to 843 beds when fully constructed. Although the MRPSC is currently on hold, it was assumed to be completed by Base Year 2038. It's anticipated to generate approximately 85(43)(43) trips during the AM(PM)[WE] peak hours. Primary vehicular access to the Project will be provided via the Maui Raceway Park Access Road at its intersection with Maui Veterans Highway.
- Puunene Heavy Industrial Subdivision – This development is proposed to be located approximately 1.4 miles east of Maui Veterans Highway and will include approximately 65.92 acres of heavy industrial space. This development is anticipated to generate approximately 472(471)(311) trips during the AM(PM)[WE] peak hours, 25 percent of which was anticipated to be heavy vehicle trucks, based on the Puunene Heavy Industrial Subdivision TIAR, dated January, 24, 2012, prepared by Philip Rowell & Associates. Vehicular access to the Project from the main thoroughfare was assumed to occur via the Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road intersection. Internally, South Firebreak Road will be used to get to the site.
- Central Maui Baseyard Expansion – The existing Central Maui Baseyard is currently constructed and occupied. Based on the County of Maui's Long Range Plan, there is potential for expansion of the industrial park for an additional 100 acres. Traffic is anticipated to access the existing Maui Veterans Highway/Nakii Road intersection.
- Piliāni Promenade – This proposed development will be located east of the Piliāni Highway/Kaonoulu Street intersection. Based on the current status of this project, the proposed plan would provide approximately 530,000 square feet of commercial/retail space and 58,000 SF of light industrial space. This report conservatively assumes that the Piliāni Promenade development will be 100 percent complete by the Year 2038.
- Maui Bay Villas (formerly Maui Lu) – This proposed development is located on the corner of the South Kihei Road/Kaonoulu Street intersection. This development proposes to construct 388 residential units and various service-related land uses. This project is assumed to be completed by Year 2038.
- Kihei High School - This proposed project will be located east of the Piliāni Highway/Kulanihako Street intersection. The project is currently proposed to be completed in two phases based on the Kihei High School TIAR, dated September 2011, prepared by Wilson Okamoto Corporation. 704 public school students from the Kihei area currently attend high schools in Kahului and Wailuku; it is anticipated that these students will transfer to the proposed Kihei High School, producing a net increase of only 96 new students during phase 1. Since full enrollment of 1,650 students was expected by Year 2025, this TIAR conservatively assumes Phases 1 and 2 of Kihei High School will be completed by Year 2038.

In addition to the above developments, the following developments were assumed to be included in the ambient growth generated by the MRTDM: Maui Business Park Phase II, Kihei Residential, Kaiwahine Village, Kenolio Apartments, Maui Research & Technology Park, Krausz DOWNTOWN Kihei, Liloa Village, South Maui Community Park, Alahele Subdivision. The County of Maui Department of Parks & Recreation (DPR) is also master planning for a regional park in the area, but since no plans are available this Project was not included in this TIAR.

Table 4.1 shows the various trip rates/formulas used to generate vehicle trips for those newer developments where no TIAR's have previously been completed. Table 4.2 shows the total peak hour traffic volumes forecast to be generated by each of the developments discussed above. Of these known developments assumed to be completed by Base Year 2038, only the DLNR Business & Industrial Park, Puunene Heavy Industrial Subdivision and MRPSC developments are proposed to generate turning movement traffic that will directly impact the Project's adjacent study intersections. All other known developments are located further north and south of the Project and will only generate regional throughput traffic along Maui Veterans Highway.

4.3 Identified Roadway Improvements

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

Based on the mitigation proposed in the Puunene Heavy Industrial Subdivision TIAR, dated January 24, 2012, the following roadway improvements were assumed to be implemented upon completion of the Puunene Heavy Industrial Subdivision and were included in the Base Year 2038 analysis:

- Lengthen southbound left-turn storage lane by an additional 350 feet, in addition to taper.
- Modify/Widen Kamaaina Road to provide a separate channelized westbound right-turn lane.
- Provide an acceleration lane for the westbound right-turns from Kamaaina Road onto Maui Veterans Highway.

Maui Veterans Highway Widening from Kūihelani Highway to Piliāni Highway¹

The State of Hawaii Department of Transportation's (HDOT) Federal Aid Highways-2035 Transportation Plan for the District of Maui (Plan), dated July 2014 (hereinafter referred to as HDOT-2035 Transportation Plan) estimated that by the year 2035, traffic volumes on Maui Veterans Highway will increase by over 80 percent due to nearby population and land development growth in the area. To increase highway capacity and accommodate this traffic growth, the HDOT-2035 Transportation Plan identified the widening of Maui Veterans Highway to construct two (2) additional travel lanes on Maui Veterans Highway from Kūihelani Highway in Kahului to Piliāni Highway in Kihei as a potential need by Year 2035.

Full build-out of the entire Pulehunu Master Planned development is anticipated to occur after the 2035 estimated need for HDOT's Maui Veterans Highway widening improvement. HDOT's Maui Veterans Highway widening improvement is currently not a funded improvement and is not identified on the latest Statewide Transportation Improvement Program (STIP). Due to the uncertainty of HDOT's Maui Veterans Highway widening improvement, DPHL will coordinate with HDOT on its fair share of improvements. For purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for both Base Year 2038 and Future Year 2038 scenarios.

¹ This Maui Veterans Highway Widening improvement is currently not a DOT-funded or approved project and is only an identified roadway capacity solution for long-range planning purposes. This TIAR does not assume the Maui Veterans Highway Widening improvement project will be implemented by Year 2038.

For long range planning purposes, the State of Hawaii Department of Transportation's (HDOT) *Federal Aid Highways 2035 Transportation Plan for the District of Maui* (Plan) dated July 2014 (hereinafter referred to as "HDOT 2035 Transportation Plan") conceptually identified widening of Maui Veterans Highway from a 4-lane to 6-lane facility from Kiihela Highway in Kahului to Pilihi Highway in Kihei. Because it is currently not a funded improvement and is not programmed in the latest Statewide Transportation Improvement Program (STIP), this widening improvement was not included in the TIAR.

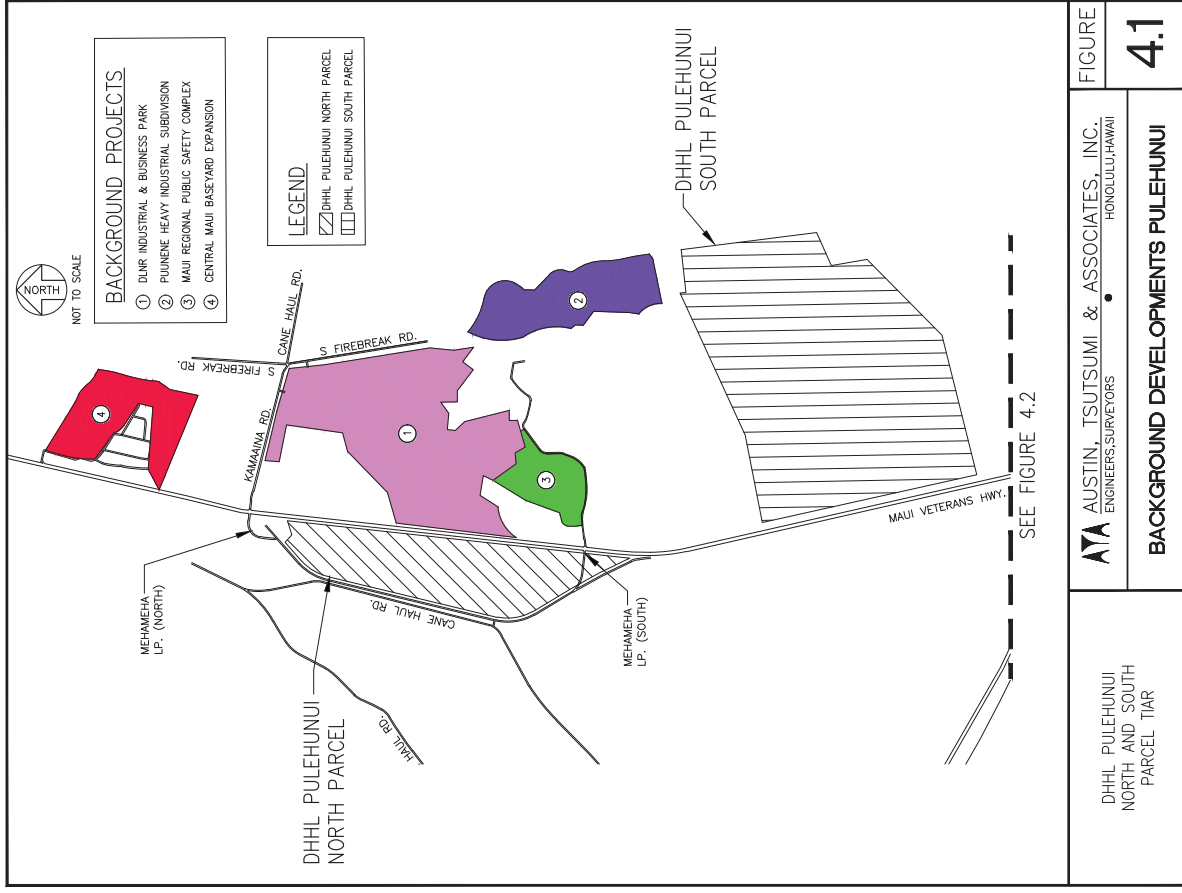
Upcountry-Kihei Corridor

The County of Maui's Maui Island Plan General Plan 2030 prepared by the County of Maui Planning Department Long Range Division dated December 28, 2012 conceptually identifies the Upcountry-Kihei Corridor as a new future bypass road that will provide a more direct connection between Kihei and Upcountry. Plans conceptually identify Kaonoulu Street as the western terminus and Hallimale Road as the eastern terminus. The Upcountry-Kihei Corridor could significantly reduce north-south traffic along the length of Maui Veterans Highway, by allowing vehicles that travel between Upcountry and Kihei to bypass Maui Veterans Highway. To our knowledge, the Upcountry-Kihei Corridor is not a funded improvement on the latest STIP and no design plans have been prepared, so the Upcountry-Kihei Corridor was therefore not included in this TIAR.

Kihei Mauka Bypass Collector Road

The Maui Island Plan General Plan 2030 conceptually identifies the Kihei Mauka Bypass Collector Road as a new future bypass road that will generally run parallel to and mauka of Pilihi Highway. Since this new roadway is currently only in the conceptual stage, the roadway alignment and northern and southern termination points are not defined, but could potentially extend as far south as Keonekai Road and terminate north at some point near the Kealia Pond National Wildlife Refuge. Based on discussions with the County of Maui Department of Public Works, the Kihei Mauka Bypass Collector Road is currently not an active Project being pursued at this time. To our knowledge, the Kihei Mauka Bypass Collector Road is not a funded improvement on the latest STIP and no design plans have been prepared, so the Kihei Mauka Bypass Collector Road was therefore not included in this TIAR.

Right-of-way is one of the biggest challenges facing the Kihei Mauka Bypass Collector Road. Since the alignment of the Kihei Mauka Bypass Collector Road would have to run through multiple landowners throughout the length of the entire path, roadway easements will need to be set aside or right-of-way acquisition will be required. DHHL is willing to work with County and State agencies to allocate right-of-way for the potential northern terminus for the Kihei Mauka Bypass Collector Road.



DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

ATA
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS/SURVEYORS HONOLULU, HAWAII

BACKGROUND DEVELOPMENTS PULEHUNUI

FIGURE 4.1

Table 4.1 Background Developments Trip Rates

| Land Use (ITE Code) | Independent Variable | AM Peak Hour | | PM Peak Hour | | WE Peak Hour | |
|---------------------------|----------------------|--------------|---------|--------------|---------|--------------|---------|
| | | Trip Rate | % Enter | Trip Rate | % Enter | Trip Rate | % Enter |
| Industrial Park (130) | Acres | [a] | 83% | [b] | 21% | 4.71 | 32% |
| Shopping Center (820) | 1,000 SF GLA | [c] | 62% | [d] | 48% | [e] | 52% |
| Prison (571) ¹ | Beds | 0.10 | 54% | 0.05 | 10% | 0.05 | 10% |

Notes:

[a] $LN(T) = 0.78LN(X)+2.82$

[b] $LN(T) = 0.72LN(X)+3.06$

[c] $LN(T) = 0.61LN(X)+2.24$

[d] $LN(T) = 0.67LN(X)+3.31$

[e] $LN(T) = 0.65LN(X)+3.78$

1. Due to a lack of available weekend data, ITE trip generation rates for the PM peak hour was used to estimate WE peak hour.



4.4 Base Year 2038 Without Project Analysis

Base Year 2038 Without Project scenario includes annual default growth rate and all background developments described above in Section 4.2 that includes the DLNR Industrial & Business Park and MRPSC. By Year 2038 without the Project, traffic in the study area is expected to significantly increase due to trips generated by nearby developments and growth along Maui Veterans Highway. As a result of the increase in traffic volumes, several additional roadway improvements are recommended to be completed by Base Year 2038. This improvement and others are as follows, and are also summarized in Appendix D:

- [1] Maui Veterans Highway/Nakii Road
 - Widen Maui Veterans Highway to provide an additional northbound through lane, resulting in three northbound through lanes.
 - Northbound: Three (3) through lanes and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes and two (2) through lanes.
 - Westbound: One (1) left-turn lane and one (1) right-turn lane.
- [2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road
 - Implement planned roadway improvements listed in Section 4.3
 - Provide additional widening improvements, resulting in the following lane configuration:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes, two (2) through and one (1) right-turn lane
 - Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane
 - Westbound: Two (2) left-turn lanes, one (1) through and one (1) right-turn lane with acceleration lane.
- [3] Maui Veterans Highway/DHHL North Access/DLNR Access
 - Provide a new signalized intersection along Maui Veterans Highway to serve the DLNR Business and Industrial Park development with the following lane configuration at the intersection. See Appendix E for signal warrant analysis:
 - Northbound: Three (3) through lanes and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes and two (2) through lanes.
 - Westbound: Two (2) left-turn lanes and one (1) right-turn lane with acceleration lane.
- [4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road
 - Provide a traffic signal with the following lane configuration at the intersection. See Appendix E for signal warrant analysis:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, three (3) through and one (1) shared through/right-turn lane.

Table 4.2 Background Developments Trip Generation

| Land Use | Independent Variable (ITE Code) | Size | AM Peak Hour | | | PM Peak Hour | | | WE Peak Hour | | |
|---|--|---------------------|--------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | | Enter (vph) | Exit (vph) | Total (vph) | Enter (vph) | Exit (vph) | Total (vph) | Enter (vph) | Exit (vph) | Total (vph) |
| DLNR Industrial & Business Park ^{1,2} | Industrial Park (130) | 140.6 acres | 548 | 112 | 661 | 125 | 469 | 594 | 212 | 450 | 662 |
| | Shopping Center (820) | 656.3 kSF GLA | 278 | 171 | 449 | 939 | 1,017 | 1,956 | 1,422 | 1,313 | 2,736 |
| | Pass-by reduction | | | | | -188 | -188 | -376 | -263 | -263 | -526 |
| | DLNR Industrial & Business Park Subtotal | | | 827 | 283 | 1,110 | 876 | 1,298 | 2,174 | 1,371 | 1,501 |
| Maui Regional Public Safety Complex ³ | Prison (571) | 843 beds | 46 | 39 | 85 | 4 | 39 | 43 | 4 | 39 | 43 |
| Puunene Heavy Industrial Subdivision ⁴ | Industrial Park (130) | 65.92 acres | 392 | 80 | 472 | 99 | 372 | 471 | 100 | 211 | 311 |
| Central Maui Baseyard Expansion | Industrial Park (130) | 100 acres | 506 | 104 | 610 | 123 | 465 | 588 | 151 | 320 | 471 |
| Piilani Promenade ⁵ | Retail/Commercial (820) | 530,000 SF | 268 | 164 | 432 | 703 | 777 | 1,480 | 1,096 | 993 | 2,089 |
| | Industrial Park (130) | 58,000 SF (5 Acres) | | | | | | | | | |
| Maui Bay Villas ^{4,5} | Timeshare (265) | 388 Dwelling Units | 210 | 110 | 60 | 319 | 136 | 183 | 319 | 136 | 183 |
| | Beach Park (415) | 12 Stalls | | | | | | | | | |
| Kihei High School ^{4,5} | High School (530) | 946 students | 270 | 127 | 397 | 58 | 65 | 123 | 116 | 66 | 182 |
| Total NEW External Trips | | | 2,519 | 907 | 3,166 | 2,182 | 3,152 | 5,062 | 3,157 | 3,266 | 6,151 |

Notes:

- kSF = 1,000 Square Feet of Gross Leasable Area

1. Due to its close proximity with one another, trips were generated as a single aggregate for the total build-out of the industrial and/or commercial component for the following three (3) developments. Trips generated by each development were then calculated based on a percentage of its size in relation to the derived aggregate total. Commercial SF calculated based on a 25% floor-area-ratio (FAR).

- a. DHHL North Parcel
- b. DHHL South Parcel
- c. DLNR Industrial & Business Park.

2. Table 4.2 shows trip generation for full build-out of the DLNR Industrial & Business Park. Note the total DLNR site encompasses approximately 227 acres, exclusive of internal roadways and open space. An additional 26.1 acres is estimated to be allocated for undevelopable drainage and easement space. Therefore, for traffic projection purposes, approximately 200.9 acres was used to forecast traffic based on anticipated available developable land.

3. Due to a lack of available weekend data, ITE trip generation rates for the PM peak hour was used to estimate WE peak hour.

4. Trip generation taken from TIAR's prepared for each respective development.

There are few triple-lane roundabouts operational throughout the United States due to notable challenges documented by the FHWA including an increased risk of sideswipe crashes due to drivers crossing lanes within the roundabout, and driver confusion in interpreting signage and lane arrows. As previously noted, as double-lane roundabouts are already likely to have a steep learning curve for Hawaii drivers, it follows that triple-lane roundabouts may be infeasible due to the lack of experience that drivers in the state of Hawaii have in navigating challenges associated with multilane roundabouts.

See Appendix H for Level of Service and capacity analysis with double-lane roundabouts for Base Year 2038 scenario.

With the recommended improvements at the study intersections, all intersections are forecast to operate at overall LOS D or better. All movements will also operate under capacity, with vehicle to capacity (v/c) ratios below 1.0. Additionally, all mainline through movements along the highway are expected to operate at LOS D or better during all peak hours. The majority of left-turn and minor street movements are expected to operate at LOS E/F due to the long cycle lengths favoring the through movements along Maui Veterans Highway.

Figure 4.3 and 4.4 illustrate the lane configuration, forecast traffic volumes and movement LOS for Base Year 2038 WITHOUT and WITH the recommended mitigation, respectively. Table 4.3 summarizes the Base Year 2038 LOS at the study intersections compared to existing conditions. LOS worksheets are provided in Appendix C.

- o Eastbound: One (1) shared left-turn/through/right-turn lane.
 - o Westbound: One (1) shared left-turn/through lane and one (1) right-turn lane.
- 151 Maui Veterans Highway/Piliani Highway/North Kihei Road/Monsanto Driveway
- Widen Maui Veterans Highway to provide two (2) additional southbound through lanes and one (1) additional northbound through lane.
 - o Northbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - o Southbound: One (1) left-turn lane, four (4) through and one (1) right-turn lane.
 - o Eastbound: One (1) left-turn lane, one (1) shared left-turn/through lane and two (2) right-turn lanes.
 - o Westbound: One (1) left-turn lane and one (1) shared through/right-turn lane.

In addition to the above improvements, the coordination of traffic signals at Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road, Maui Veterans Highway/DHHL North Access/DLNR Access and Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road intersections should be considered where feasible, and the signal timing plans should be optimized to improve throughput progression along Maui Veterans Highway.

As discussed in Section 4.3, for purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for Base Year 2038.

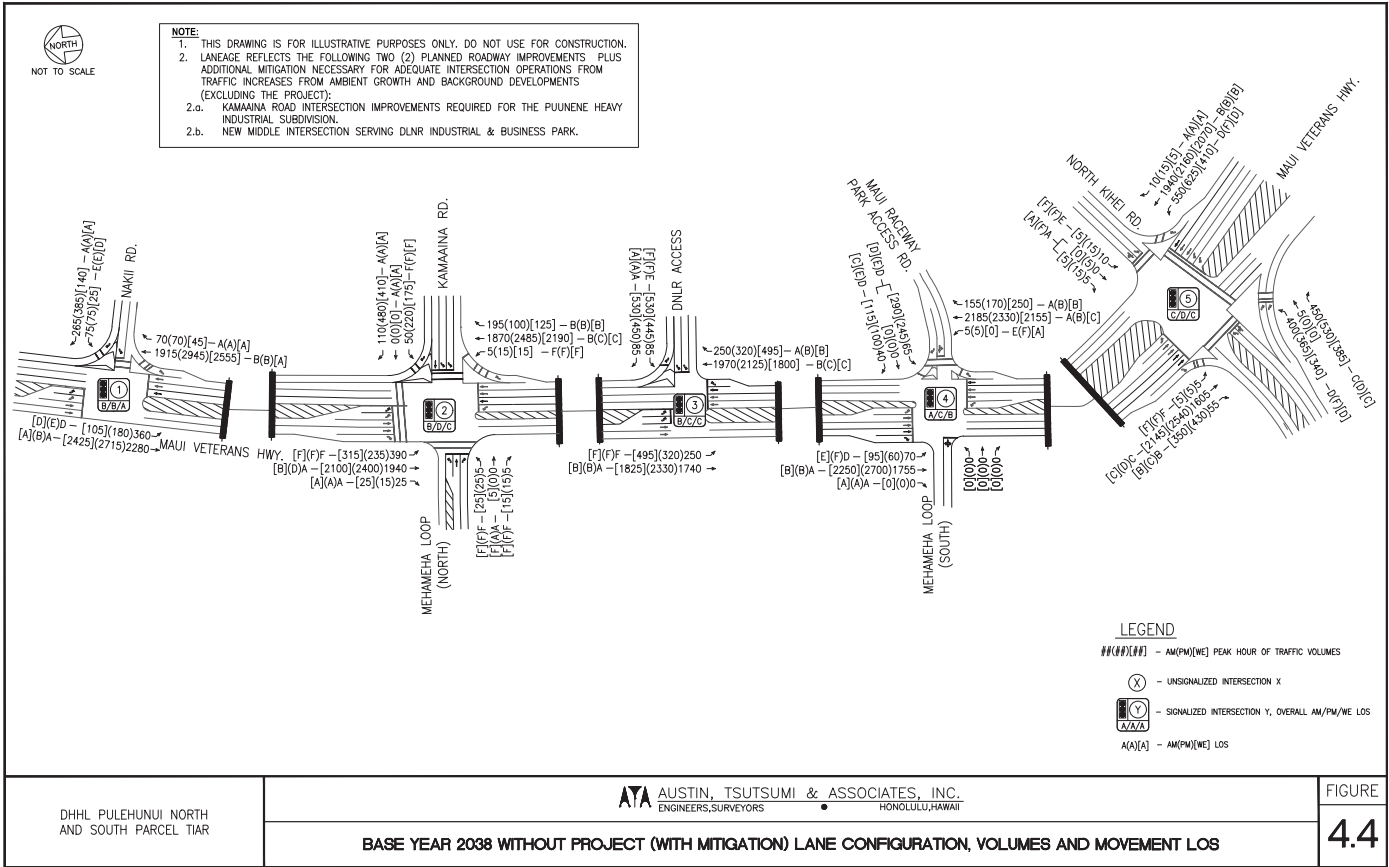
4.4.1 Base Year 2038 Intersection Analysis

The signalization of the new Maui Veterans Highway/DHHL Access/DLNR Access intersection and Maui Veterans Highway/Mehameha Loop South intersection is recommended as the most feasible alternative at these intersections. Based on the mainline through volume along Maui Veterans Highway and turning movement traffic accessing the side streets, a signal would be warranted at each of these intersections.

Traffic control that includes full movement two-way stop control and right-in, right-out (RIRO) access was not considered at these intersections since it would create lengthy delays and capacity issues. Signal warrants are shown in Appendix E.

Based on national guidance, the vehicular capacity for a single-lane roundabout is constrained by the circulating flow within the roundabout and geometric elements of the roundabout, and is generally up to 25,000 vehicles per day. For a single-lane roundabout, Maui Veterans Highway would need to be reduced from its existing four-lane roadway to a two-lane roadway, and the existing demand of 30,000-35,000 vehicles per day would result in overcapacity conditions with lengthy delays and congestion—negatively impacting traffic conditions.

Based on national guidance, the vehicular capacity for a double-lane roundabout is generally up to 45,000 vehicles per day, while forecasted traffic for Year 2038 predicts between 60,000-75,000 vehicles per day. As a result, double-lane roundabouts at Project intersections are likely infeasible as the roundabout cannot provide enough capacity to serve the demand. Also, there are currently no double-lane roundabouts operational in the state of Hawaii, resulting in a potentially steep learning curve for drivers in a relatively high-volume area upon implementation.

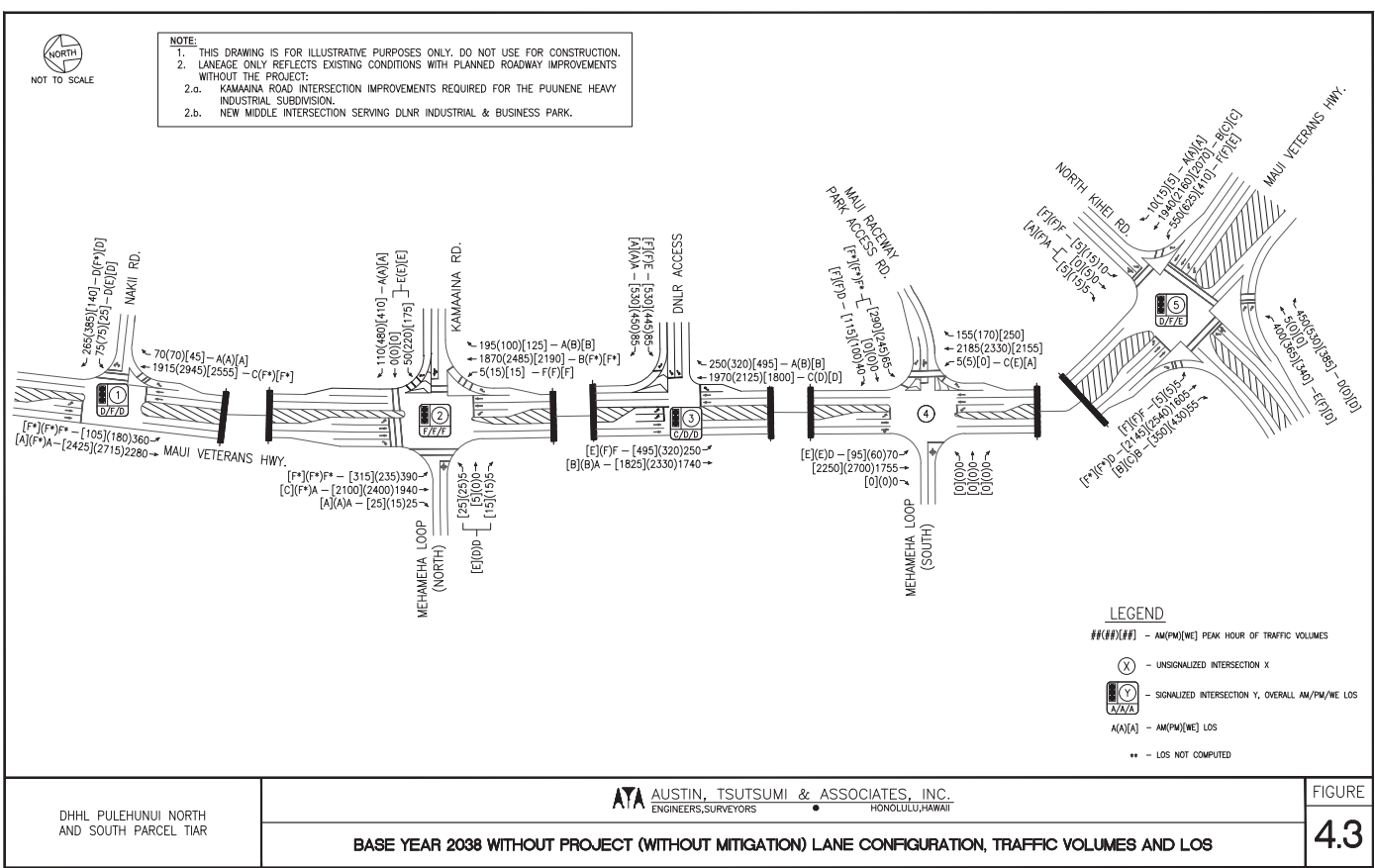


DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

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BASE YEAR 2038 WITHOUT PROJECT (WITH MITIGATION) LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE
4.4



DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

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 ENGINEERS, SURVEYORS HONOLULU, HAWAII

BASE YEAR 2038 WITHOUT PROJECT (WITHOUT MITIGATION) LANE CONFIGURATION, TRAFFIC VOLUMES AND LOS

FIGURE
4.3

5. FUTURE YEAR 2038 TRAFFIC CONDITIONS

5.1 Background

The DHHL North Parcel is approximately 184.4 acres of vacant land. Plans for DHHL North Parcel include the following:

- 80 acres of industrial space
- 16 acres of commercial space
- 5 acres for a hotel
- 40 acres for a cultural center/visitor attraction space
- 43.4 acres for roads, easements, open space, and existing structures

There are two (2) existing accesses to the site via Mehamaha Loop (North)/Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access. A new third access is proposed along Maui Veterans Highway, via a new signalized 4-legged intersection between Mehamaha Loop (North)/Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access. This new third access will provide direct access to both the DHHL North Parcel as well as the future DLNR Industrial and Business Park development across Maui Veterans Highway.

The DHHL South Parcel is approximately 646 acres of vacant land. Plans for DHHL South Parcel include the following:

- 173 acres maintained for agricultural use
- 238 acres for Agricultural homesteads, with an estimated 110 homesteads for DHHL beneficiaries
- 33 acres for an educational center
- 18 acres for a cultural & arts center
- 105 acres for industrial/agriculture processing space
- 79 acres for roads, easements and open space

Access to this DHHL South Parcel would occur via three (3) existing accesses from Maui Veterans Highway fronting the DHHL South Parcel site. Build-out of both DHHL North and South Parcels is anticipated to occur by Year 2035, but for purposes of this TIAR, a forecast Year 2038 was used to analyzing the full impacts of the Pulehuni Master Planned Subdivision, which includes the Project, DLNR Industrial and Business Park, and Maui Regional Public Safety Complex (MRPSC). The following scenario looks at roadway improvements to mitigate total impacts from the entire Pulehuni Master Planned Subdivision.

5.1.1 Travel Demand Estimations

The State of Hawaii Department of Transportation (HDOT) and Maui County provide various Transportation Demand Management (TDM) programs that promote the use of transit, walking, biking and alternative modes of transportation to reduce the use of single-occupant vehicles on roadways. These TDM measures have only been identified and conservatively assumed to yield NO vehicular reductions for Project generated traffic.

Maui County currently provides a bus system that offers several routes that connect the major areas in Maui. The Kihei Islander Route 10 provides transportation between Kihei and Kahului via Maui Veterans Highway. However, no stops are currently provided in the study area. HDOT currently provides the Bike Plan Hawaii Master Plan, which identifies existing and proposed bicycle routes that could potentially be implemented in the future. Within the Project area, a shared use path and a signed shared roadway are currently provided along Maui Veterans Highway.

Based on discussions with HDOT, DHHL will work with the department in the future to prepare a Traffic Management Plan (TMP) that will identify TDM measures, various modes of transportation, all future local and regional traffic improvements and when available, phasing of implementation of these roadway improvements.

5.1.2 Trip Generation

The Institute of Transportation Engineers (ITE) publishes a book based upon empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled *Trip Generation Manual*, 9th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables. The independent variables can range from Dwelling Units (DU) for single-family attached homes to Gross Floor Area (GFA) or Acres for commercial or industrial development. These trip rates/formulae and their associated directional distributions were used to estimate the increase in the number of vehicular trips generated by the proposed Project. The rates selected were based on the land use description.

Since the ITE *Trip Generation Manual*, 9th Edition does not provide rates for the Agricultural land use, a trip rate from the *Trip Generation Manual* for the City of San Diego was used as a guideline to estimate the trip generation for the Agricultural land uses within the South Parcel development. Similarly, the manual does not provide rates for the Cultural Center land use. As such, a trip rate was derived based on traffic counts conducted at the existing Oahu Polynesian Cultural Center during the AM, PM and WE peak hours of traffic, which is of a similar use to the Project.

Pass-by trip reductions were applied to the Project-generated trips based upon information within the ITE *Trip Generation Handbook*. As a conservative measure, a pass-by rate of 20% was applied to the retail component for the PM and WE peak hours of traffic. No pass-by reductions were applied to the AM peak hour. See Tables 5.1 and 5.2 for Trip Generation formulae/rates and projections for the Project.

5.1.3 Trip Distribution & Assignment

Trips generated by the Project were assigned throughout the study area generally based upon existing travel patterns and the proximity and convenience of access. The traffic generated by the Project was added to the forecast Base Year 2038 traffic volumes within the vicinity of the Project to constitute the traffic volumes for the Future Year 2038 traffic conditions. Figure 5.1 to 5.2 illustrates the Project-generated trip distribution.

Table 5.1: Trip Generation Rates

| Land Use (ITE Code) | Independent Variable | AM Peak Hour | | PM Peak Hour | | WE Peak Hour | |
|--|----------------------|--------------|---------|--------------|---------|--------------|---------|
| | | Trip Rate | % Enter | Trip Rate | % Enter | Trip Rate | % Enter |
| Industrial Park (130) | Acres | [a] | 83% | [b] | 21% | 4.71 | 32% |
| Shopping Center (820) | 1,000 SF GLA | [c] | 62% | [d] | 48% | [e] | 52% |
| Agriculture Lands ¹ | Acres | 0.16 | 83% | 0.16 | 21% | 0.16 | 32% |
| Hotel | Rooms | 0.47 | 59% | 0.60 | 51% | [f] | 56% |
| Single-Family Residential | Dwelling Units | [g] | 25% | [h] | 63% | [i] | 54% |
| Private K-12 School | Students | [j] | 50% | 0.17 | 43% | - | - |
| Recreational Community Center | 1,000 SF GLA | 2.05 | 66% | [k] | 49% | 1.07 | 54% |
| Pulehunui Cultural Center ² | Acres | 0.13 | 59% | 3.68 | 48% | 5.55 | 55% |

Notes:

- [a] $LN(T) = 0.78LN(X)+2.82$
- [b] $LN(T) = 0.72LN(X)+3.06$
- [c] $LN(T) = 0.61LN(X)+2.24$
- [d] $LN(T) = 0.67LN(X)+3.31$
- [e] $LN(T) = 0.65LN(X)+3.78$
- [f] $T = 0.69(X)+4.32$
- [g] $T = 0.7(X)+9.74$
- [h] $LN(T) = 0.90LN(X)+0.51$
- [i] $T = 0.89(X)+8.77$
- [j] $T = 0.77(X)+19.92$
- [k] $LN(T) = 0.58(X)+2.21$

1. ITE does not provide trip rates for Agriculture land use. Trip generation rates from the San Diego Municipal Code, Land Development Code, Trip Generation Manual, dated May 2003 was used in lieu of ITE trip generation rates. Assumes peak hour trip rates are approximately 8% of total weekday daily trip rate of 2 trips/acre. Percent enter values taken from ITE 130 Industrial Park distribution.

2. ITE does not provide trip rates for Cultural Center land use. Peak hour trip rates were determined based on the highest traffic counts at the existing Oahu Polynesian Cultural Center (PCC), collected on two separate days. Trips rates account for a 50% reduction based on lower anticipated annual visitors per year in comparison to PCC. Trip rates also account for increased vehicular volumes with conversion of 1 bus per 10 vehicles.

Table 5.2: Project Trips

| Land Use (ITE Code) | Independent Variable | AM Peak Hour | | | PM Peak Hour | | | WE Peak Hour | | |
|-------------------------------------|----------------------|--------------|------------|-------------|--------------|-------------|-------------|--------------|-------------|-------------|
| | | Enter (vph) | Exit (vph) | Total (vph) | Enter (vph) | Exit (vph) | Total (vph) | Enter (vph) | Exit (vph) | Total (vph) |
| DHHL North - Industrial Park (130) | 80 Acres | 312 | 64 | 376 | 71 | 267 | 338 | 121 | 256 | 377 |
| DHHL North - Shopping Center (820) | 174,200 SF | 74 | 45 | 119 | 249 | 270 | 519 | 378 | 349 | 726 |
| DHHL North - Hotel (310) | 200 Rooms | 63 | 43 | 106 | 61 | 59 | 120 | 80 | 63 | 143 |
| DHHL North - Cultural Center | 40 Acres | 3 | 2 | 6 | 74 | 81 | 155 | 127 | 106 | 233 |
| DHHL North Parcel Pass-by (Retail) | | - | - | - | -65 | -65 | -130 | -91 | -91 | -182 |
| DHHL North Subtotal | | 452 | 154 | 606 | 390 | 612 | 1002 | 615 | 683 | 1298 |
| DHHL South - Industrial Park (130) | 35 Acres | 410 | 84 | 493 | 93 | 350 | 443 | 158 | 336 | 495 |
| DHHL South - Agricultural | 579 Acres | 23 | 5 | 28 | 6 | 22 | 28 | 9 | 19 | 28 |
| Single-Family Residential (210) | 210 Dwelling Units | 22 | 65 | 87 | 72 | 43 | 115 | 58 | 49 | 107 |
| Private K-12 School (536) | 400 Students | 164 | 164 | 328 | 29 | 39 | 68 | - | - | - |
| Recreational Community Center (495) | 495 SF | 53 | 27 | 80 | 38 | 39 | 77 | 23 | 19 | 42 |
| DHHL South Subtotal | | 672 | 345 | 1017 | 238 | 493 | 731 | 248 | 423 | 671 |
| Total NEW External Trips | | 1124 | 499 | 1623 | 628 | 1105 | 1733 | 863 | 1106 | 1969 |

Notes:

- SF = Square Feet of Gross Floor Area

1. Due to its close proximity with one another, trips were generated as a single aggregate for the total build-out of the industrial and/or commercial component for the following three (3) developments. Trips generated by each development were then calculated based on a percentage of its size in relation to the derived aggregate total. Commercial SF calculated based on a 25% floor-area-ratio (FAR).

- a. DHHL North Parcel
- b. DHHL South Parcel
- c. DLNR Industrial & Business Park.

5.2 Future Year 2038 Analysis

By Year 2038 with the entire Pulehunui Master Planned Subdivision, traffic in the study area is expected to increase over Base Year 2038 conditions. As a result of the increase in traffic volumes, the following roadway improvements are recommended with the Project and are summarized in Appendix D:

[1] Maui Veterans Highway/Nakii Road

- Widen Maui Veterans Highway to provide an additional southbound through lane, resulting in three southbound through lanes.
 - Northbound: Three (3) through lanes and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes and three (3) through lanes.
 - Westbound: One (1) left-turn lane and one (1) right-turn lane.

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

- Provide the following lane configuration consistent with the Base Year 2038 scenario:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.
 - Westbound: Two (2) left-turn lanes, one (1) through and one (1) right-turn lane with acceleration lane.

[3] Maui Veterans Highway/DHHL North Access/DLNR Access

- Widen Maui Veterans Highway to provide an additional northbound through lane and provide additional widening improvements with the following lane configuration:
 - Northbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Eastbound: Two (2) left-turn lanes, one (1) through and one (1) right-turn lane.
 - Westbound: Two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane with an acceleration lane.

[4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road

- Widen Maui Veterans Highway to provide an additional northbound through lane and widening along Mehameha Loop (South) and Maui Raceway Park Access Road. Provide the following lane configuration:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane with an acceleration lane.
 - Westbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.

[5] Maui Veterans Highway/Piilani Highway/North Kihei Road/Monsanto Driveway

- Maintain Base Year 2038 laneage:
 - Northbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, four (4) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) shared left-turn/through lane and two (2) right-turn lanes.
 - Westbound: One (1) left-turn lane and one (1) shared through/right-turn lane.

Kamaaina Road, South Firebreak Road & Maui Raceway Park Access Road

- Upgrade roadway to Maui County standards.

The signal timing plans at Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road, Maui Veterans Highway/DHHL North Access/DLNR Access and Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road intersections should be optimized to provide favorable throughput progression along Maui Veterans Highway.

As discussed in Section 4.3, for purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for Future Year 2038.

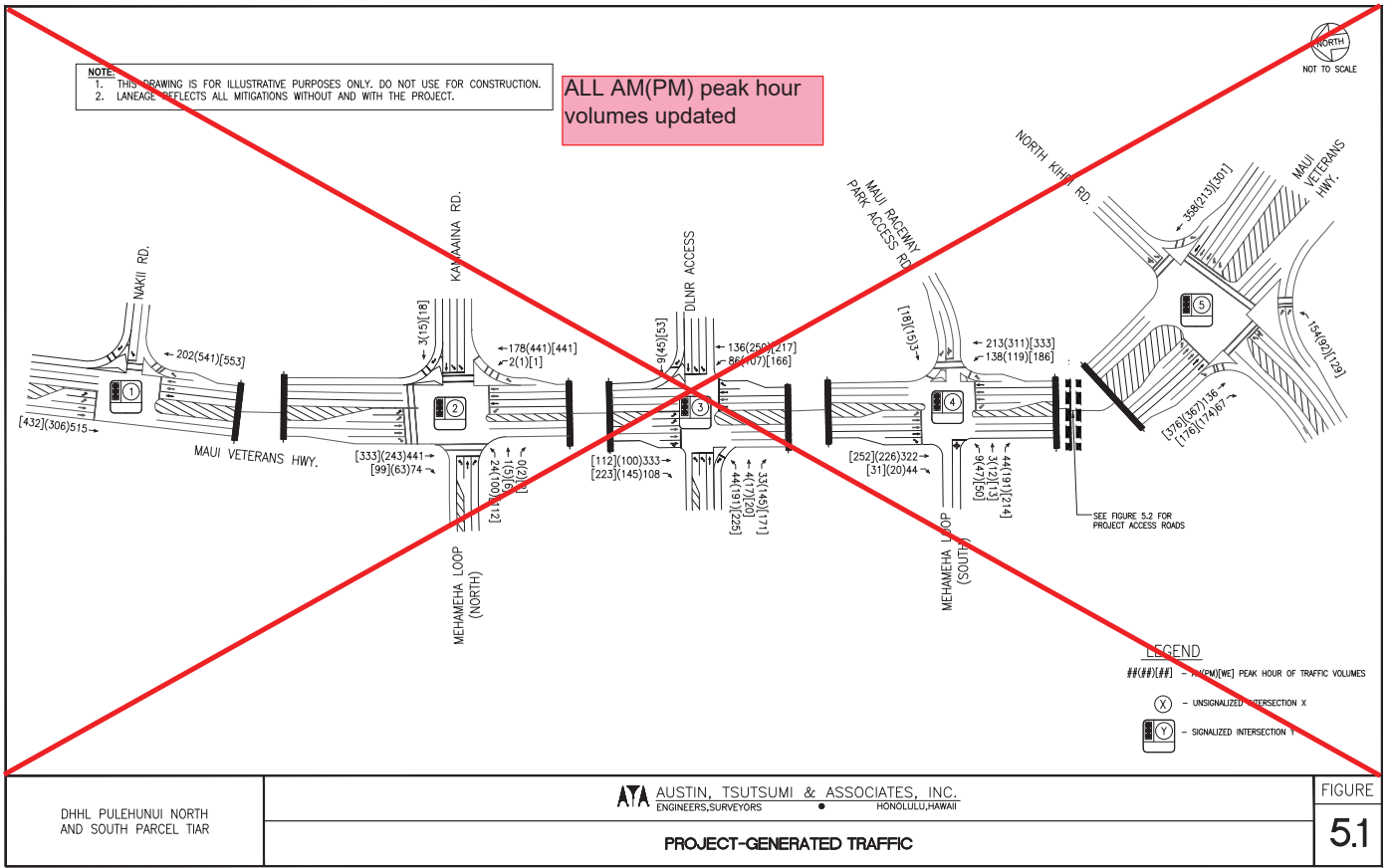
~~Full build-out of the entire Pulehunui Master Planned Subdivision is anticipated to occur after the 2035 estimated need for HDOT's Maui Veterans Highway widening improvement. HDOT's Maui Veterans Highway widening improvement is currently not a funded improvement and is not identified on the latest Statewide Transportation Improvement Program (STIP). Due to the uncertainty of HDOT's Maui Veterans Highway widening improvement, DHHL will coordinate with HDOT on its fair share of improvements. Based on a comparison of the Project traffic increase to total Future Year 2038 forecast traffic, the Project will constitute approximately 14% of all traffic, based on its composite average increase for the AM, PM and Saturday AM all peak hours of traffic.~~

5.2.1 Future Year 2038 Intersection Analysis

~~As described in Section 4.4.1, the signalization of the new Maui Veterans Highway/DHHL Access/DLNR Access is recommended as the most feasible alternative over a roundabout, full movement two-way stop control and right-in, right-out (RIRO) access in order to produce adequate levels for both the main and minor street movements at the intersection.~~

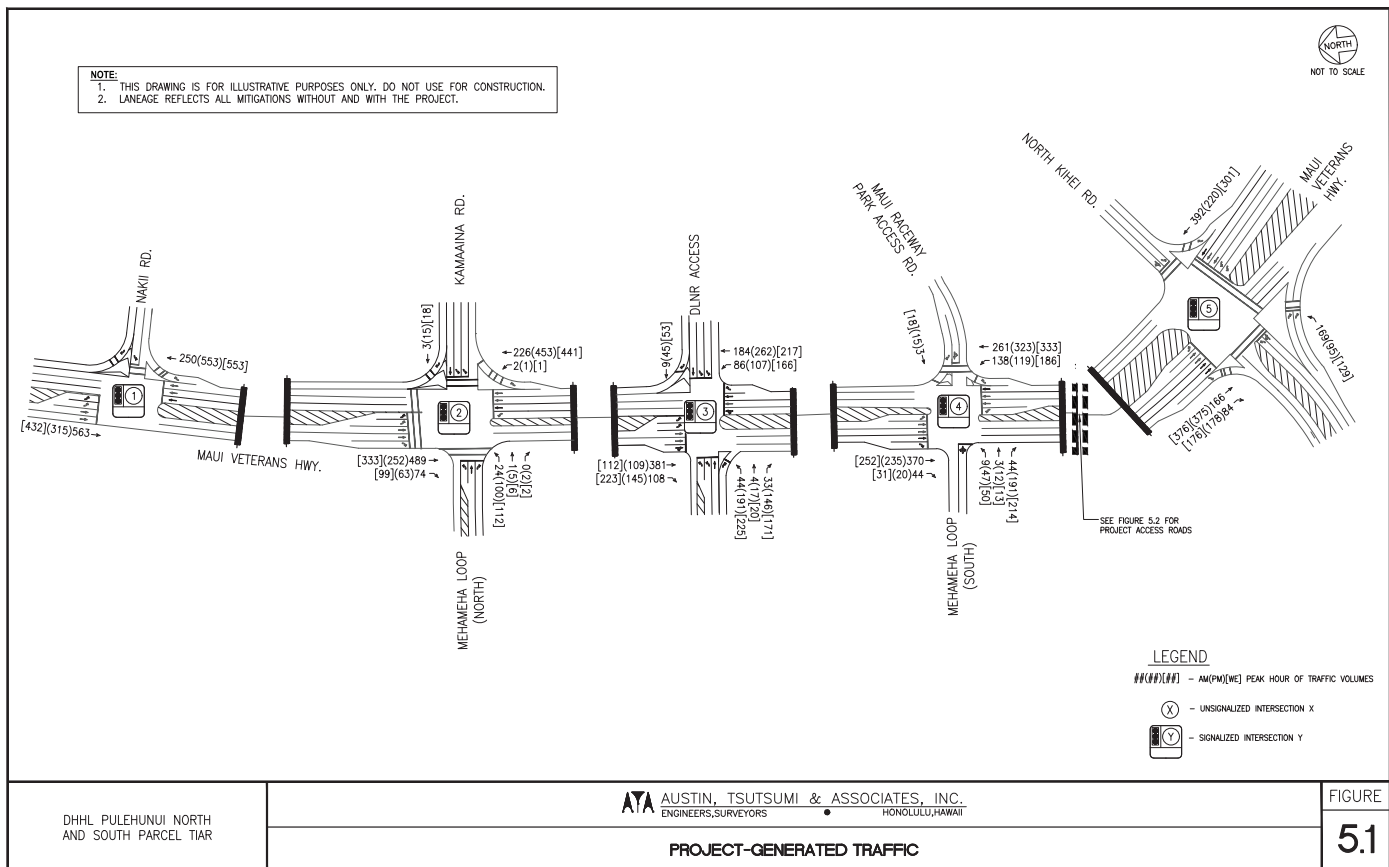
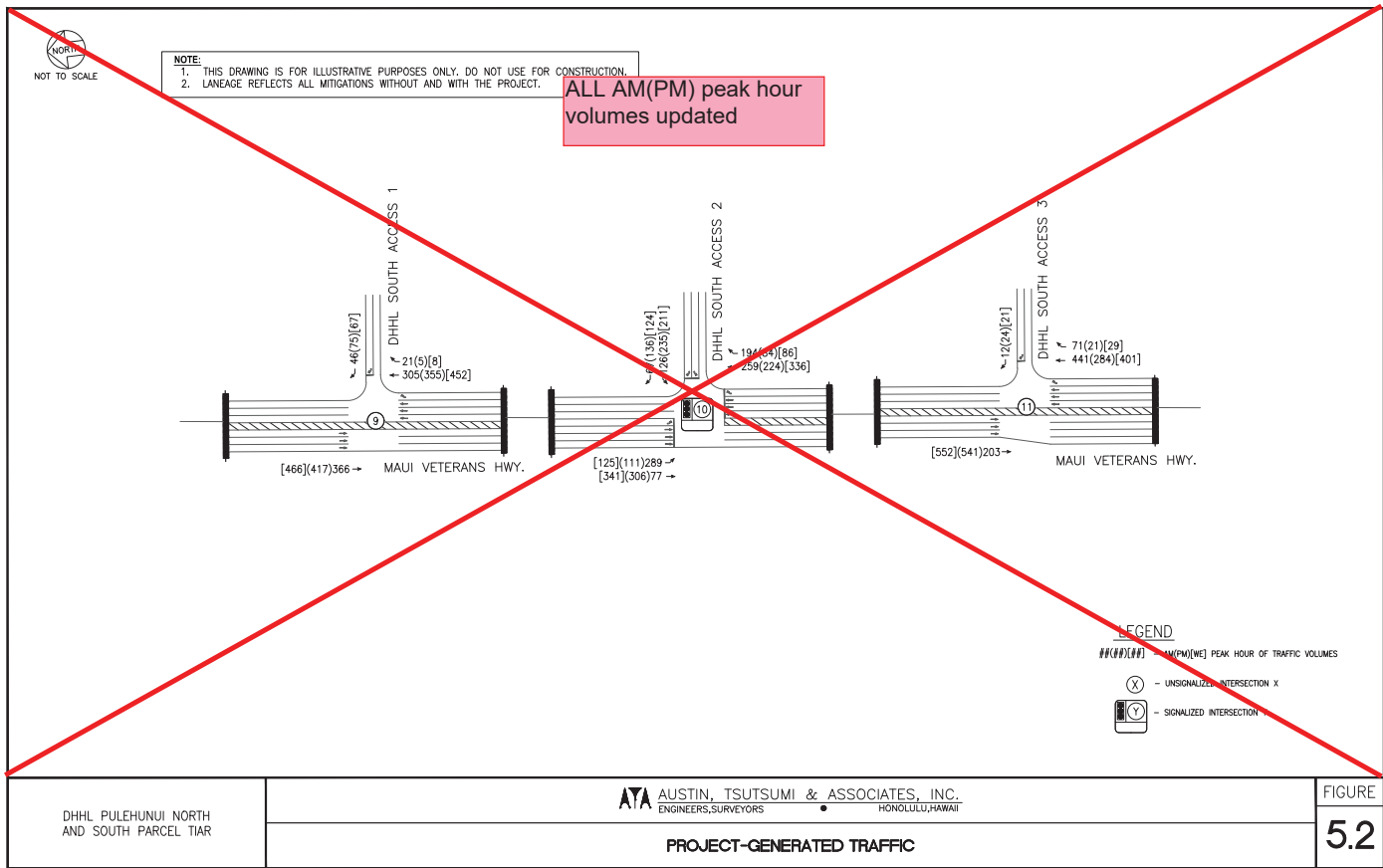
With the recommended improvements at the study intersections, all intersections are forecast to operate at overall LOS D or better. All movements will also operate under capacity, with vehicle to capacity (v/c) ratios below 1.0. Additionally, all mainline through movements along the highway are expected to operate at LOS D or better during all peak hours. The majority of left-turn and minor street movements are expected to operate at LOS E/F due to the long cycle lengths favoring the through movements along Maui Veterans Highway.

Based on A Policy on Geometric Design of Highways and Streets, by the American Association of State Highway and Transportation Officials, dated 2011 (hereinafter referred to as the "AASHTO Green Book"), left-turn storage lane lengths were determined for all intersections accessing the Project. Tables 5.3 to 5.6 ~~5.7~~ show recommended storage lane lengths along



Maui Veterans Highway at its four (4) intersections with Kamaaina Road, DHHL North/DLNR Access, Melemele Loop South/Maui Raceway Park Road and DHHL South Driveway 2, respectively.

Figures 5.3 to 5.4 and Figures 5.5 to 5.6 illustrate the lane configuration, forecast traffic volumes and movement LOS for Future Year 2038 **WITHOUT** and **WITH** the recommended mitigation, respectively. Table 5.8 summarizes the Future Year 2038 LOS at the study intersections **compared to Base Year 2038 with mitigation conditions**. LOS worksheets are provided in Appendix C. **At the request of HDOT, an additional scenario was analyzed to assume no highway widening and is discussed in Appendix G.**

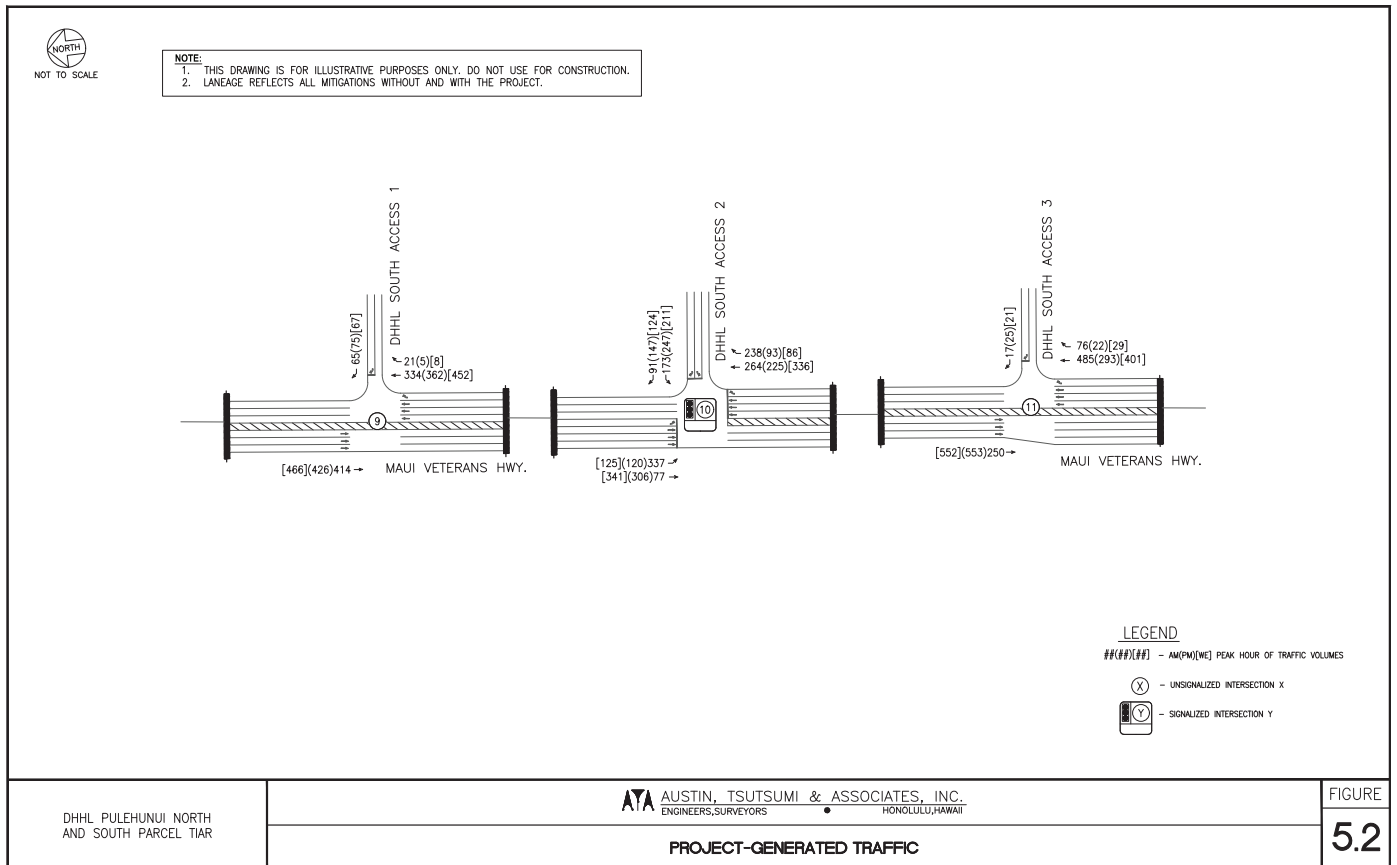


**Table 5.3 Future Year 2038
Left-Turn Storage Lane Length Calculations**

| Maui Veterans Highway & Nakii Road Intersection | | | | | | | | | | |
|---|-----------|----------------------------|----------------------------------|--------------------|-----------------|---------------------------------|--|--|------------|---|
| Movement ¹ | Peak Hour | Passenger Car Volume (veh) | Heavy Vehicle Truck Volume (veh) | AASHTO | | | | | | Recommended storage length ⁴ |
| | | | | Cycle Length (sec) | Cycles per Hour | Average Veh. per Cycle per lane | Average HV per Cycle per lane ² | Minimum Storage Length (1.5 Factor) ³ | | |
| | | | | | | | | Vehicle Equivalent | Ft | |
| Southbound Left-turn lane | AM | 360 | 20 | 180 | 20 | 9 | 1 | 18 | 450 | 450 ft. |
| | PM | 180 | 15 | 130 | 28 | 4 | 1 | 11 | 275 | |
| | WE | 105 | 10 | 180 | 20 | 3 | 1 | 9 | 225 | |
| Westbound Left-turn lane | AM | 75 | 20 | 180 | 20 | 4 | 1 | 11 | 275 | 275 ft. |
| | PM | 75 | 5 | 180 | 20 | 4 | 1 | 11 | 275 | |
| | WE | 25 | 5 | 180 | 20 | 2 | 1 | 8 | 200 | |

Notes:

1. For double left-turns, assumes a 50/50 split between turning lanes when determining design volume per lane.
2. Includes heavy vehicle trucks; Assume 1 HV truck = 3 passenger car vehicles.
3. Minimum storage length is 1.5 times the average number of passenger car vehicles per cycle; assume 1 vehicle length = 25 ft.
4. Recommended storage length is exclusive of taper length or deceleration length. To be verified upon design.



**Table 5.5: Future Year 2038
Left-Turn Storage Lane Length Calculations**

| Maui Veterans Highway & DHHL Access & DLNR Access Intersection | | | | | | | | | | |
|--|-----------|----------------------------|----------------------------------|--------------------|-----------------|---------------------------------|--|--|------------|---|
| Movement ¹ | Peak Hour | Passenger Car Volume (veh) | Heavy Vehicle Truck Volume (veh) | AASHTO | | | | | | Recommended storage length ⁴ |
| | | | | Cycle Length (sec) | Cycles per Hour | Average Veh. per Cycle per lane | Average HV per Cycle per lane ² | Minimum Storage Length (1.5 Factor) ³ | | |
| | | | | | | | | Vehicle Equivalent | Ft | |
| Northbound Left-turn lane | AM | 90 | 5 | 180 | 20 | 3 | 1 | 9 | 225 | 300 ft. |
| | PM | 110 | 5 | 180 | 20 | 3 | 1 | 9 | 225 | |
| | WE | 170 | 5 | 180 | 20 | 5 | 1 | 12 | 300 | |
| Southbound Left-turn lane | AM | 250 | 10 | 180 | 20 | 7 | 1 | 15 | 375 | 600 ft. |
| | PM | 320 | 5 | 180 | 20 | 8 | 1 | 17 | 425 | |
| | WE | 495 | 5 | 180 | 20 | 13 | 1 | 24 | 600 | |
| Eastbound Left-turn lane | AM | 45 | 5 | 180 | 20 | 2 | 1 | 8 | 200 | 350 ft. |
| | PM | 195 | 5 | 180 | 20 | 5 | 1 | 12 | 300 | |
| | WE | 225 | 5 | 180 | 20 | 6 | 1 | 14 | 350 | |
| Westbound Left-turn lane | AM | 85 | 10 | 180 | 20 | 3 | 1 | 9 | 225 | 650 ft. |
| | PM | 445 | 10 | 180 | 20 | 12 | 1 | 23 | 575 | |
| | WE | 530 | 5 | 180 | 20 | 14 | 1 | 26 | 650 | |

Notes:

1. For double left-turns, assumes a 50/50 split between turning lanes when determining design volume per lane.
2. Includes heavy vehicle trucks; Assume 1 HV truck = 3 passenger car vehicles.
3. Minimum storage length is 1.5 times the average number of passenger car vehicles per cycle; assume 1 vehicle length = 25 ft.
4. Recommended storage length is exclusive of taper length or deceleration length. To be verified upon design.

**Table 5.4: Future Year 2038
Left-Turn Storage Lane Length Calculations**

| Maui Veterans Highway & Kamaaina Road & Mehamaha Loop (North) Intersection | | | | | | | | | | |
|--|-----------|----------------------------|----------------------------------|--------------------|-----------------|---------------------------------|--|--|------------|---|
| Movement ¹ | Peak Hour | Passenger Car Volume (veh) | Heavy Vehicle Truck Volume (veh) | AASHTO | | | | | | Recommended storage length ⁴ |
| | | | | Cycle Length (sec) | Cycles per Hour | Average Veh. per Cycle per lane | Average HV per Cycle per lane ² | Minimum Storage Length (1.5 Factor) ³ | | |
| | | | | | | | | Vehicle Equivalent | Ft | |
| Northbound Left-turn lane | AM | 5 | 0 | 180 | 20 | 1 | 0 | 2 | 50 | 50 ft. |
| | PM | 15 | 0 | 180 | 20 | 1 | 0 | 2 | 50 | |
| | WE | 15 | 0 | 180 | 20 | 1 | 0 | 2 | 50 | |
| Southbound Left-turn lane | AM | 390 | 95 | 180 | 20 | 10 | 3 | 29 | 725 | 725 ft. |
| | PM | 235 | 25 | 180 | 20 | 6 | 1 | 14 | 350 | |
| | WE | 315 | 20 | 180 | 20 | 8 | 1 | 17 | 425 | |
| Eastbound Left-turn lane | AM | 30 | 5 | 180 | 20 | 2 | 1 | 8 | 200 | 375 ft. |
| | PM | 125 | 5 | 180 | 20 | 7 | 1 | 15 | 375 | |
| | WE | 140 | 5 | 180 | 20 | 7 | 1 | 15 | 375 | |
| Westbound Left-turn lane | AM | 50 | 15 | 180 | 20 | 2 | 1 | 8 | 200 | 350 ft. |
| | PM | 220 | 40 | 180 | 20 | 6 | 1 | 14 | 350 | |
| | WE | 175 | 15 | 180 | 20 | 5 | 1 | 12 | 300 | |

Notes:

1. For double left-turns, assumes a 50/50 split between turning lanes when determining design volume per lane.
2. Includes heavy vehicle trucks; Assume 1 HV truck = 3 passenger car vehicles.
3. Minimum storage length is 1.5 times the average number of passenger car vehicles per cycle; assume 1 vehicle length = 25 ft.
4. Recommended storage length is exclusive of taper length or deceleration length. To be verified upon design.

Table 5.7 updated

**Table 5.7: Future Year 2038
Left-Turn Storage Lane Length Calculations**

| Maui Veterans Highway & DHHL South Driveway 2 Intersection | | | | | | | | | | |
|---|-----------|----------------------------|----------------------------------|--------------------|-----------------|---------------------------------|--|--|------------|---|
| | | | | AASHTO | | | | | | Recommended storage length ⁴ |
| Movement ¹ | Peak Hour | Passenger Car Volume (veh) | Heavy Vehicle Truck Volume (veh) | Cycle Length (sec) | Cycles per Hour | Average Veh. per Cycle per lane | Average HV per Cycle per lane ² | Minimum Storage Length (1.5 Factor) ³ | | |
| | | | | | | | | Vehicle Equivalent | Ft | |
| Southbound Left-turn lane | AM | 290 | 15 | 180 | 20 | 15 | 1 | 27 | 675 | 675 ft |
| | PM | 115 | 5 | 180 | 20 | 6 | 1 | 14 | 350 | |
| | WE | 125 | 10 | 180 | 20 | 7 | 1 | 15 | 375 | |
| Westbound Left-turn lane | AM | 130 | 10 | 180 | 20 | 7 | 1 | 15 | 475 | 575 ft |
| | PM | 235 | 10 | 180 | 20 | 12 | 1 | 23 | 575 | |
| | WE | 215 | 10 | 180 | 20 | 11 | 1 | 21 | 525 | |

Notes:

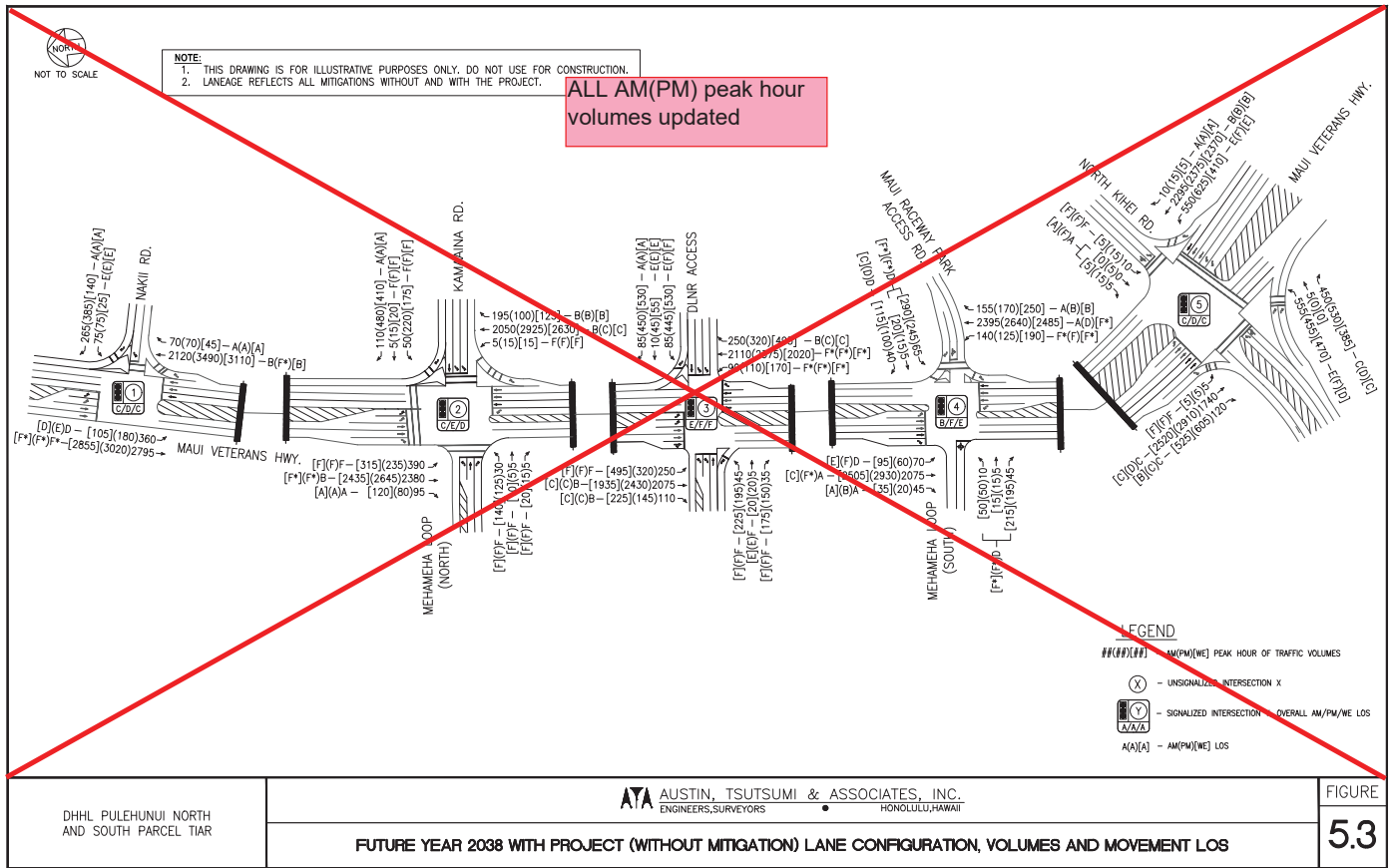
1. Includes heavy vehicle trucks; Assume 1 HV truck = 3 passenger car vehicles.
2. Minimum storage length is 1.5 times the average number of passenger car vehicles per cycle; assume 1 vehicle length = 25 ft.
3. Recommended storage length is exclusive of taper length or deceleration length. To be verified upon design.

**Table 5.6: Future Year 2038
Left-Turn Storage Lane Length Calculations**

| Maui Veterans Highway & Mehamaha Loop (South) Intersection | | | | | | | | | | |
|---|-----------|----------------------------|----------------------------------|--------------------|-----------------|---------------------------------|--|--|------------|---|
| | | | | AASHTO | | | | | | Recommended storage length ⁴ |
| Movement ¹ | Peak Hour | Passenger Car Volume (veh) | Heavy Vehicle Truck Volume (veh) | Cycle Length (sec) | Cycles per Hour | Average Veh. per Cycle per lane | Average HV per Cycle per lane ² | Minimum Storage Length (1.5 Factor) ³ | | |
| | | | | | | | | Vehicle Equivalent | Ft | |
| Northbound Left-turn lane | AM | 140 | 5 | 180 | 20 | 7 | 1 | 15 | 375 | 500 ft |
| | PM | 125 | 5 | 180 | 20 | 7 | 1 | 15 | 375 | |
| | WE | 190 | 5 | 180 | 20 | 10 | 1 | 20 | 500 | |
| Southbound Left-turn lane | AM | 70 | 5 | 180 | 20 | 4 | 1 | 11 | 275 | 300 ft |
| | PM | 60 | 0 | 180 | 20 | 3 | 0 | 5 | 125 | |
| | WE | 95 | 5 | 180 | 20 | 5 | 1 | 12 | 300 | |
| Eastbound Left-turn lane | AM | 10 | 5 | 180 | 20 | 1 | 1 | 6 | 150 | 225 ft |
| | PM | 50 | 5 | 180 | 20 | 3 | 1 | 9 | 225 | |
| | WE | 50 | 5 | 180 | 20 | 3 | 1 | 9 | 225 | |
| Westbound Left-turn lane | AM | 65 | 5 | 180 | 20 | 4 | 1 | 11 | 275 | 675 ft |
| | PM | 245 | 5 | 180 | 20 | 13 | 1 | 24 | 600 | |
| | WE | 290 | 5 | 180 | 20 | 15 | 1 | 27 | 675 | |

Notes:

1. For double left-turns, assumes a 50/50 split between turning lanes when determining design volume per lane.
2. Includes heavy vehicle trucks; Assume 1 HV truck = 3 passenger car vehicles.
3. Minimum storage length is 1.5 times the average number of passenger car vehicles per cycle; assume 1 vehicle length = 25 ft.
4. Recommended storage length is exclusive of taper length or deceleration length. To be verified upon design.

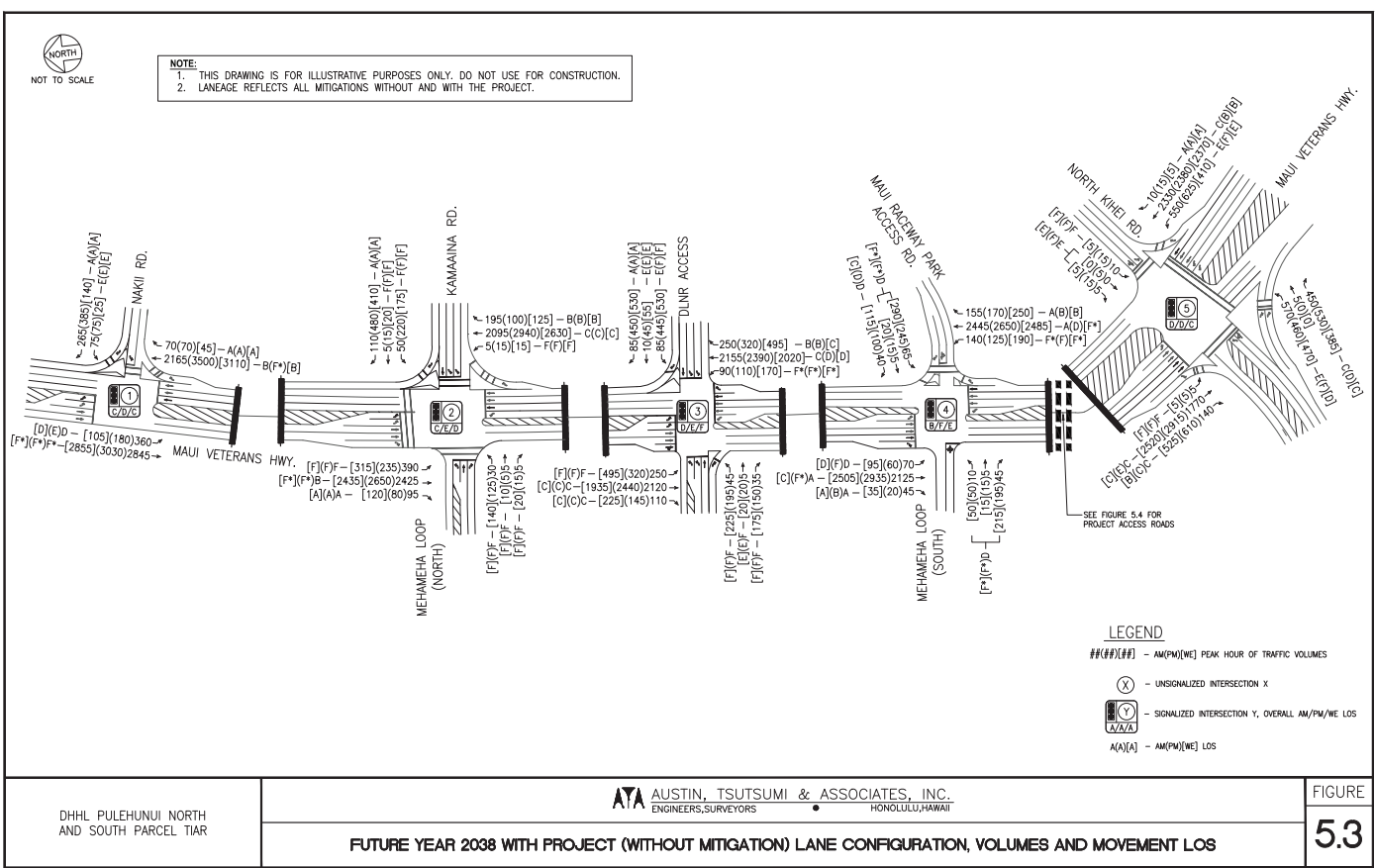
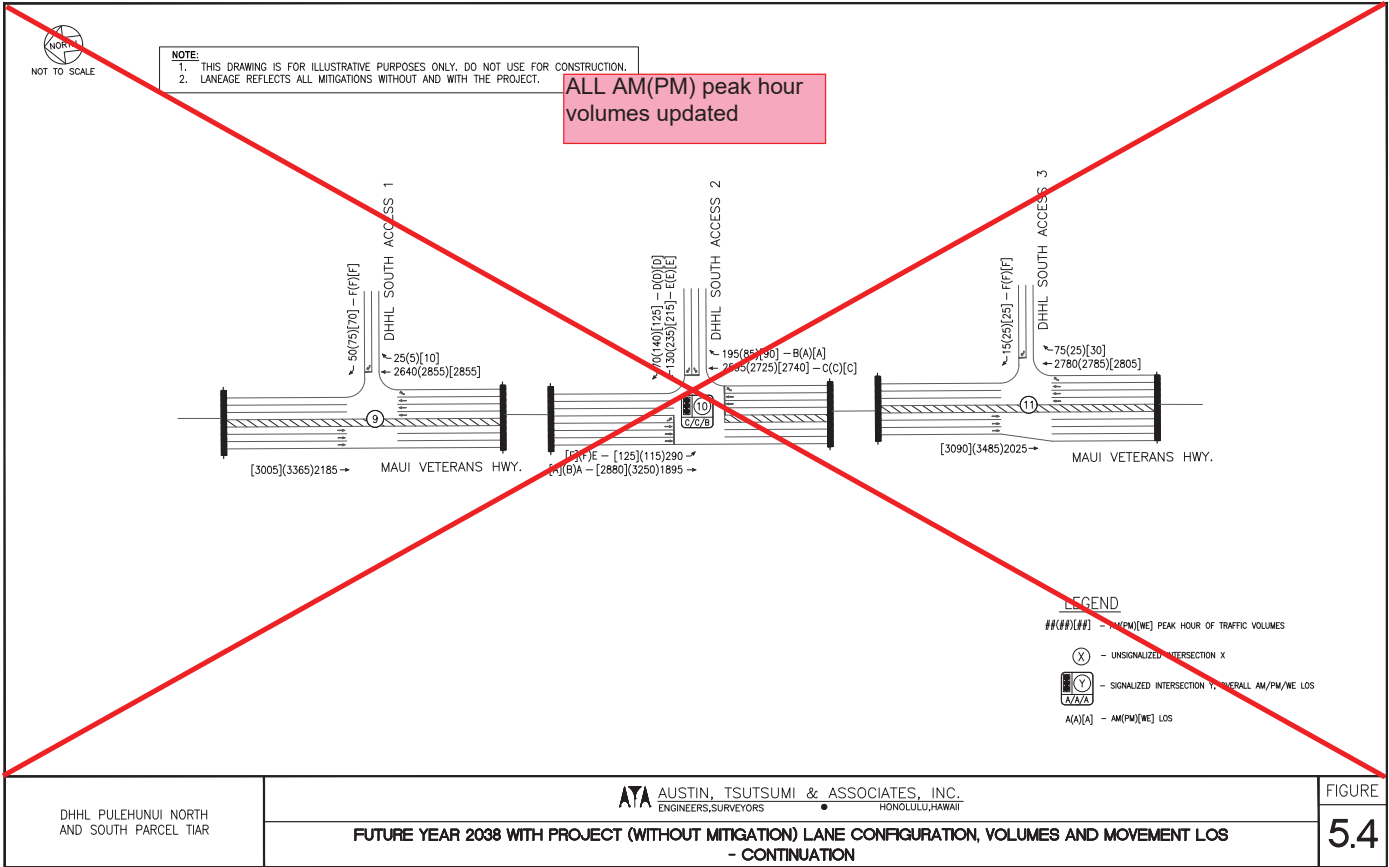


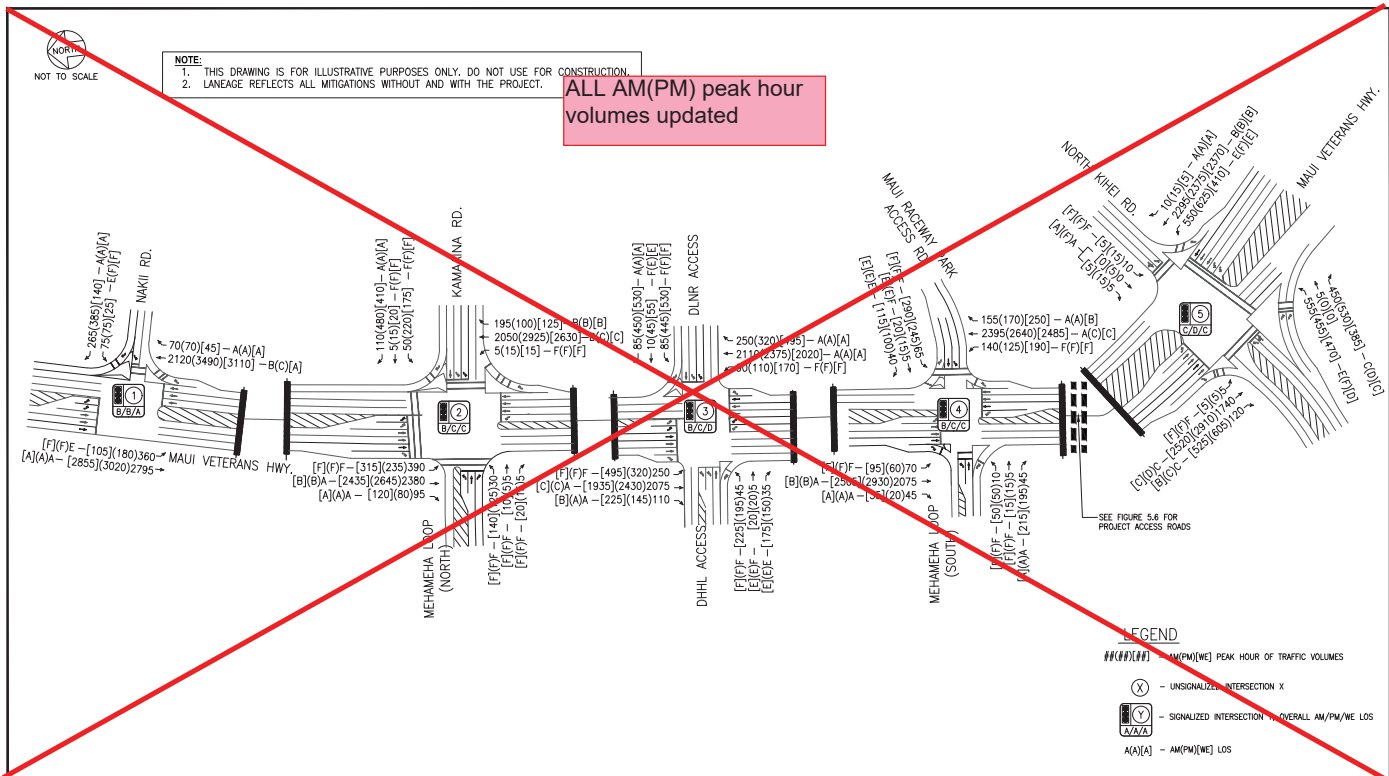
**Table 5.7: Future Year 2038
 Left-Turn Storage Lane Length Calculations**

| Maui Veterans Highway & DHHL South Driveway 2 Intersection | | | | | | | | | | |
|--|-----------|----------------------------|----------------------------------|--------------------|-----------------|---------------------------------|--|--|------------|---|
| Movement ¹ | Peak Hour | Passenger Car Volume (veh) | Heavy Vehicle Truck Volume (veh) | AASHTO | | | | | | Recommended storage length ⁴ |
| | | | | Cycle Length (sec) | Cycles per Hour | Average Veh. per Cycle per lane | Average HV per Cycle per lane ² | Minimum Storage Length (1.5 Factor) ³ | | |
| | | | | | | | | Vehicle Equivalent | Ft | |
| Southbound Left-turn lane | AM | 340 | 15 | 180 | 20 | 17 | 1 | 30 | 750 | 750 ft |
| | PM | 120 | 5 | 180 | 20 | 6 | 1 | 14 | 350 | |
| | WE | 125 | 10 | 180 | 20 | 7 | 1 | 15 | 375 | |
| Westbound Left-turn lane | AM | 175 | 10 | 180 | 20 | 9 | 1 | 18 | 450 | 600 ft |
| | PM | 250 | 10 | 180 | 20 | 13 | 1 | 24 | 600 | |
| | WE | 215 | 10 | 180 | 20 | 11 | 1 | 21 | 525 | |

Notes:

- Includes heavy vehicle trucks; Assume 1 HV truck = 3 passenger car vehicles.
- Minimum storage length is 1.5 times the average number of passenger car vehicles per cycle; assume 1 vehicle length = 25 ft.
- Recommended storage length is exclusive of taper length or deceleration length. To be verified upon design.



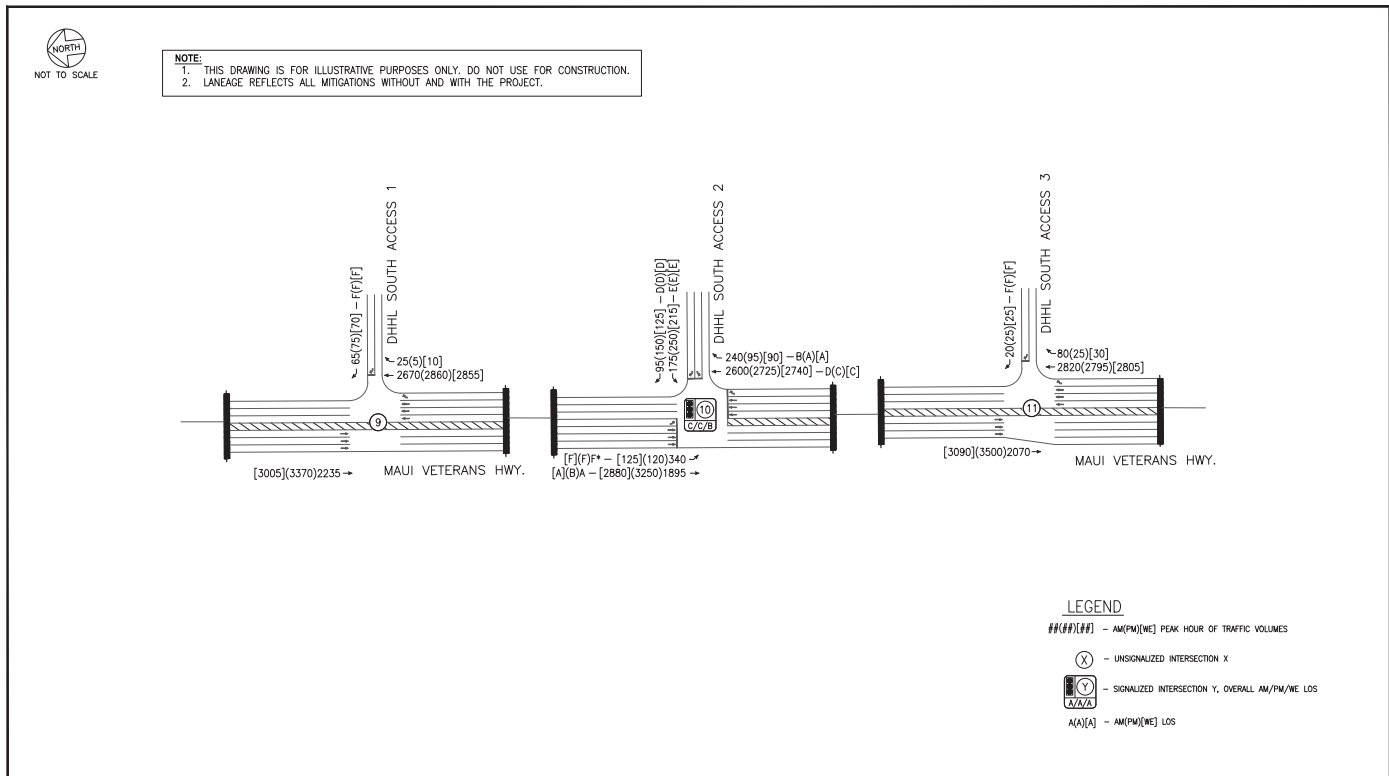


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 ENGINEERS, SURVEYORS HONOLULU, HAWAII

DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

FUTURE YEAR 2038 WITH PROJECT (WITH MITIGATION) LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE **5.5**



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DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

FUTURE YEAR 2038 WITH PROJECT (WITHOUT MITIGATION) LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS - CONTINUATION

FIGURE **5.4**

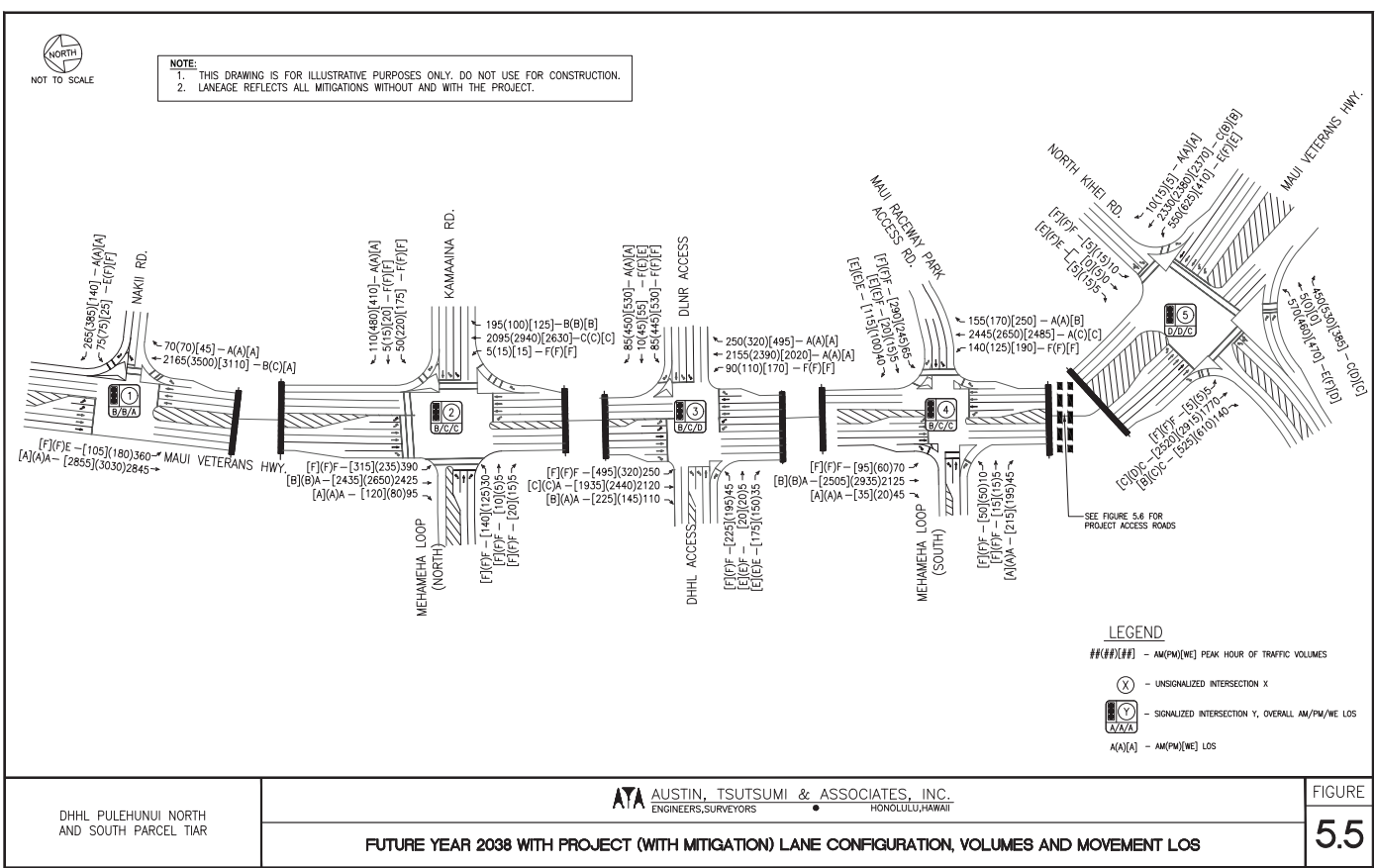
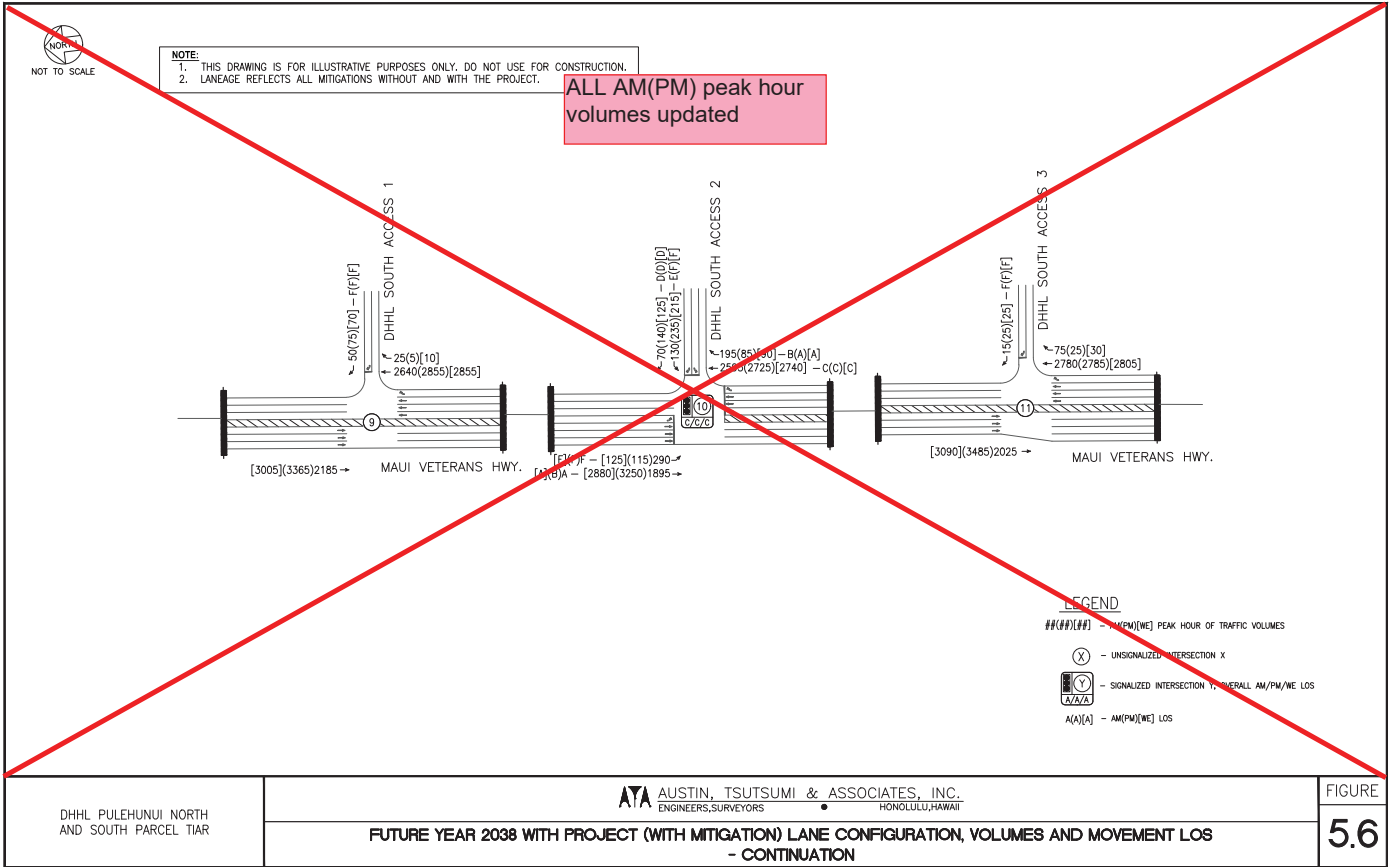
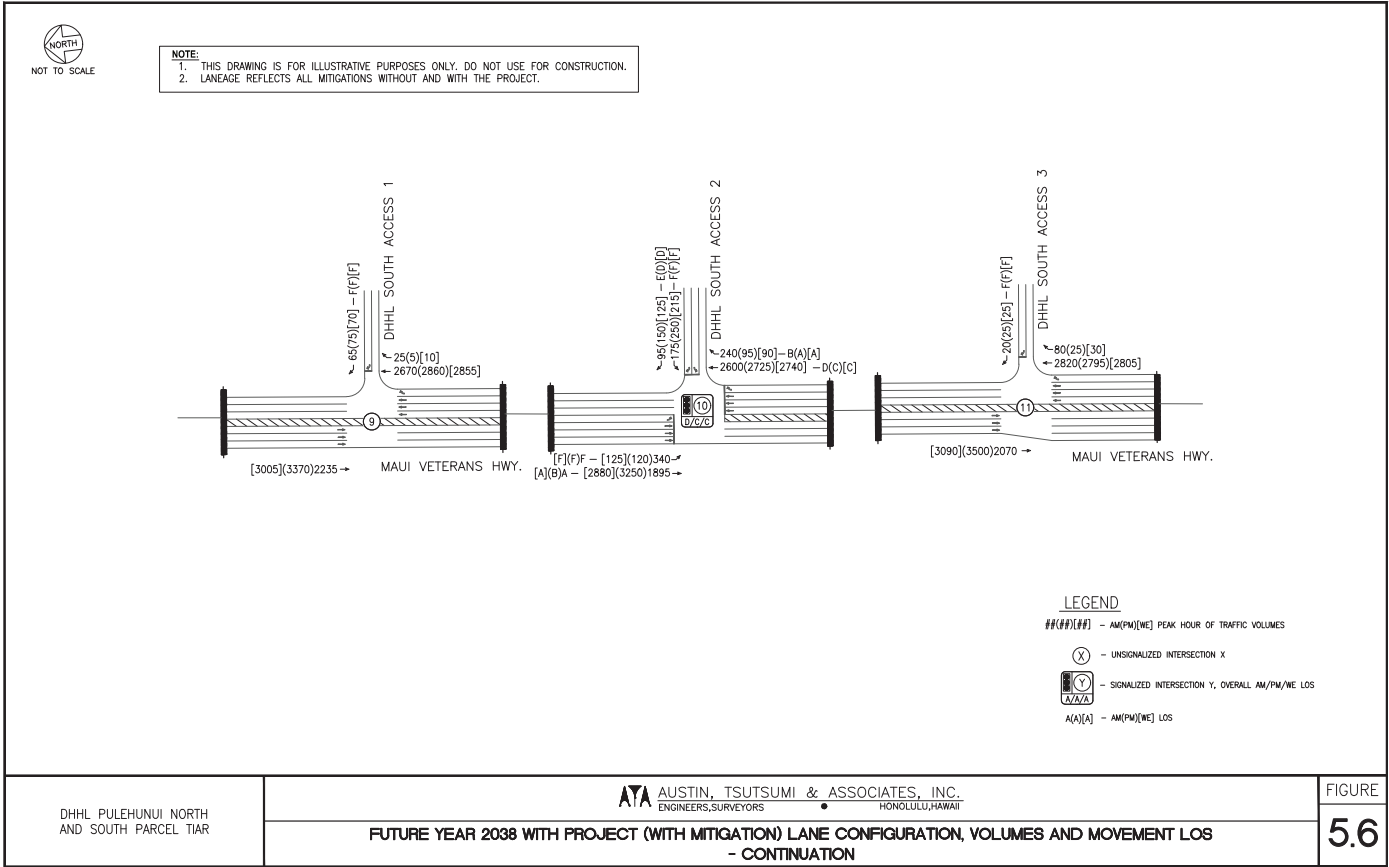


Table 5.8 updated

TABLE 5.8: LOS SUMMARY TABLE
BASE YEAR 2038 WITH MITIGATION, FUTURE YEAR 2038 AND FUTURE YEAR 2038 WITH MITIGATION CONDITIONS

| Intersection | Base Year 2038 with Mitigation Conditions | | | | | | | | | Future Year 2038 Conditions | | | | | | | | | Future Year 2038 with Mitigation Conditions | | | | | | | | |
|---|---|-----------|-----|-----------|-----------|-----|-----------|-----------|-----|-----------------------------|-----------|-----|-----------|-----------|-----|-----------|-----------|-----|---|-----------|-----|-----------|-----------|-----|-------|------|---|
| | AM | | | PM | | | WE | | | AM | | | PM | | | WE | | | AM | | | PM | | | WE | | |
| | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | | | |
| 1. Maui Veterans Hwy & Nakii Rd | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NB TH | 12.2 | 0.68 | B | 13.3 | 0.84 | B | 7.8 | 0.75 | A | 13.4 | 0.73 | B | 26.3 | 1.02 | F* | 12.2 | 0.90 | B | 14.0 | 0.69 | B | 22.5 | 0.94 | C | 8.2 | 0.81 | A |
| NB RT | 7.1 | 0.04 | A | 4.5 | 0.04 | A | 3.3 | 0.03 | A | 7.1 | 0.04 | A | 4.5 | 0.05 | A | 3.1 | 0.03 | A | 7.6 | 0.05 | A | 4.7 | 0.05 | A | 2.5 | 0.03 | A |
| WB LT | 56.4 | 0.83 | E | 76.8 | 0.79 | E | 51.6 | 0.59 | D | 59.7 | 0.83 | E | 70.5 | 0.79 | E | 55.0 | 0.61 | E | 74.0 | 0.84 | E | 111.1 | 0.83 | F | 92.8 | 0.72 | F |
| WB RT | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A |
| SB LT | 46.4 | 0.83 | D | 77.5 | 0.81 | E | 41.8 | 0.62 | D | 52.7 | 0.85 | D | 68.8 | 0.79 | E | 45.5 | 0.65 | D | 56.6 | 0.83 | E | 101.9 | 0.84 | F | 82.8 | 0.73 | F |
| SB TH | 8.7 | 0.87 | A | 17.1 | 0.96 | B | 7.2 | 0.88 | A | 43.4 | 1.06 | F* | 56.1 | 1.09 | F* | 31.2 | 1.03 | F* | 4.4 | 0.71 | B | 4.5 | 0.72 | A | 2.2 | 0.57 | A |
| OVERALL | 13.9 | - | B | 17.7 | - | B | 9.4 | - | C | 32.2 | - | C | 46.1 | - | D | 21.8 | - | C | 12.7 | - | B | 17.5 | - | B | 7.0 | - | A |
| 2. Maui Veterans Hwy & Mehamaha Ln North/Kamaaina Rd | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NB LT | 115.0 | 0.45 | F | 105.7 | 0.58 | F | 105.7 | 0.58 | F | 115.0 | 0.45 | F | 105.7 | 0.58 | F | 105.7 | 0.58 | F | 116.1 | 0.46 | F | 105.7 | 0.58 | F | 106.5 | 0.59 | F |
| NB TH | 16.6 | 0.59 | B | 22.6 | 0.79 | C | 20.1 | 0.70 | C | 19.8 | 0.66 | B | 33.3 | 0.94 | C | 30.7 | 0.88 | C | 19.8 | 0.66 | B | 33.3 | 0.94 | C | 31.0 | 0.88 | C |
| NB RT | 10.9 | 0.15 | B | 10.3 | 0.07 | B | 10.8 | 0.08 | B | 12.8 | 0.16 | B | 10.8 | 0.07 | B | 12.7 | 0.08 | B | 12.2 | 0.16 | B | 10.8 | 0.07 | B | 12.7 | 0.08 | B |
| EB LT | 115.0 | 0.45 | F | 110.8 | 0.73 | F | 110.8 | 0.73 | F | 111.5 | 0.77 | F | 100.9 | 0.87 | F | 113.3 | 0.89 | F | 114.5 | 0.79 | F | 110.3 | 0.88 | F | 114.3 | 0.89 | F |
| EB TH | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 87.4 | 0.12 | F | 86.8 | 0.11 | F | 86.1 | 0.09 | F | 82.0 | 0.11 | F | 86.9 | 0.11 | F | 86.1 | 0.10 | F | 81.7 | 0.11 | F |
| EB RT | 91.9 | 0.09 | F | 86.7 | 0.03 | F | 86.4 | 0.03 | F | 85.9 | 0.03 | F | 85.3 | 0.02 | F | 81.1 | 0.01 | F | 85.9 | 0.03 | F | 85.3 | 0.02 | F | 80.9 | 0.01 | F |
| WB LT | 95.2 | 0.66 | F | 87.2 | 0.85 | F | 88.8 | 0.81 | F | 95.2 | 0.88 | F | 87.2 | 0.85 | F | 88.8 | 0.81 | F | 95.2 | 0.66 | F | 87.2 | 0.85 | F | 88.8 | 0.81 | F |
| WB TH | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 85.7 | 0.09 | F | 86.5 | 0.24 | F | 91.5 | 0.42 | F | 86.0 | 0.10 | F | 86.9 | 0.26 | F | 91.5 | 0.42 | F |
| WB RT | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A |
| SB LT | 84.8 | 0.90 | F | 105.0 | 0.88 | F | 91.3 | 0.88 | F | 84.8 | 0.90 | F | 105.0 | 0.88 | F | 91.3 | 0.88 | F | 84.9 | 0.90 | F | 105.0 | 0.88 | F | 91.3 | 0.88 | F |
| SB TH | 7.6 | 0.71 | A | 36.0 | 0.98 | D | 17.0 | 0.84 | B | 15.9 | 0.89 | B | 72.9 | 1.09 | F* | 13.8 | 1.01 | F* | 6.9 | 0.82 | A | 15.5 | 0.76 | B | 14.1 | 0.70 | B |
| SB RT | 2.8 | 0.02 | A | 5.9 | 0.01 | D | 5.0 | 0.01 | A | 3.3 | 0.06 | A | 6.4 | 0.05 | A | 8.7 | 0.08 | A | 3.3 | 0.06 | A | 8.4 | 0.05 | A | 8.8 | 0.08 | A |
| OVERALL | 19.6 | - | B | 35.1 | - | D | 26.4 | - | C | 24.0 | - | C | 55.9 | - | D | 43.0 | - | D | 19.8 | - | B | 31.8 | - | C | 30.9 | - | C |
| 3. Maui Veterans Hwy & DLNR Access | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NB LT | - | - | - | - | - | - | - | - | - | 264.0 | 1.47 | F* | 1205.5 | 3.55 | F* | 843.5 | 2.72 | F* | 87.1 | 0.73 | F | 84.7 | 0.76 | F | 86.1 | 0.83 | F |
| NB TH | 15.3 | 0.61 | B | 20.1 | 0.69 | C | 25.9 | 0.66 | C | 58.2 | 1.02 | F* | 122.5 | 1.18 | F* | 234.8 | 1.41 | F* | 0.5 | 0.61 | A | 2.8 | 0.90 | A | 8.8 | 0.92 | A |
| NB RT | 9.9 | 0.16 | A | 19.3 | 0.19 | B | 19.6 | 0.31 | B | 16.7 | 0.18 | B | 20.3 | 0.21 | C | 31.7 | 0.38 | C | 0.2 | 0.47 | A | 0.2 | 0.22 | A | 2.1 | 0.38 | A |
| EB LT | - | - | - | - | - | - | - | - | - | 92.2 | 0.56 | F | 88.1 | 0.81 | F | 87.1 | 0.83 | F | 91.4 | 0.55 | F | 86.0 | 0.81 | F | 87.0 | 0.83 | F |
| EB TH | - | - | - | - | - | - | - | - | - | 86.3 | 0.10 | F | 77.9 | 0.15 | E | 75.3 | 0.13 | E | 86.3 | 0.10 | F | 79.0 | 0.16 | E | 76.2 | 0.13 | E |
| EB RT | - | - | - | - | - | - | - | - | - | 85.5 | 0.02 | F | 86.3 | 0.85 | F | 99.1 | 0.87 | F | 78.5 | 0.01 | E | 77.4 | 0.53 | E | 72.3 | 0.53 | E |
| WB LT | 66.2 | 0.20 | E | 85.8 | 0.90 | F | 97.4 | 0.95 | F | 81.9 | 0.15 | E | 89.4 | 0.91 | F | 93.2 | 0.93 | F | 92.0 | 0.70 | F | 89.4 | 0.91 | F | 93.6 | 0.94 | F |
| WB TH | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 59.8 | 0.03 | E | 65.9 | 0.17 | E | 62.1 | 0.17 | E | 84.6 | 0.15 | F | 66.8 | 0.17 | E | 62.7 | 0.18 | E |
| WB RT | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A |
| SB LT | 93.3 | 0.86 | F | 98.5 | 0.90 | F | 91.3 | 0.92 | F | 90.3 | 0.86 | F | 98.5 | 0.90 | F | 91.3 | 0.92 | F | 93.3 | 0.86 | F | 98.5 | 0.90 | F | 91.7 | 0.92 | F |
| SB TH | 8.3 | 0.66 | A | 18.4 | 0.90 | B | 12.0 | 0.72 | B | 14.9 | 0.64 | B | 20.6 | 0.77 | C | 21.1 | 0.68 | C | 7.4 | 0.56 | A | 26.4 | 0.82 | C | 29.9 | 0.72 | C |
| SB RT | - | - | - | - | - | - | - | - | - | 18.2 | 0.64 | B | 23.6 | 0.78 | C | 23.2 | 0.70 | C | 3.2 | 0.07 | A | 8.7 | 0.10 | A | 12.3 | 0.16 | B |
| OVERALL | 17.9 | - | B | 29.2 | - | C | 34.7 | - | C | 59.6 | - | E | 178.9 | - | F | 149.0 | - | F | 12.4 | - | B | 29.3 | - | C | 38.3 | - | D |



6. CONCLUSIONS

The DHHL North Parcel is approximately 184.4 acres of vacant land. Plans for DHHL North Parcel include the following:

- 80 acres of industrial space
- 16 acres of commercial space
- 5 acres for a hotel
- 40 acres for a cultural center/visitor attraction space
- 43.4 acres for roads, easements, open space and existing structures.

There are two (2) existing accesses to the site via Mehamaha Loop (North)/Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access. A new third access is proposed along Maui Veterans Highway, via a new signalized 4-legged intersection between Mehamaha Loop (North)/Kamaaina Road and Mehamaha Loop (South)/Maui Raceway Park Access. This new third access will provide direct access to both the DHHL North Parcel as well as the future DLNR Industrial and Business Park development across Maui Veterans Highway.

The DHHL South Parcel is approximately 646 acres of vacant land. Plans for DHHL South Parcel include the following:

- 173 acres maintained for agricultural use
- 238 acres for Agricultural homesteads, with an estimated 110 homesteads for DHHL beneficiaries
- 33 acres for a Hawaiian cultural/immersion school
- 18 acres for a recreational community center
- 105 acres for industrial/agriculture processing space
- 79 acres for roads, easements and open space

Access to this development would occur via three (3) existing accesses from Maui Veterans Highway fronting the DHHL South Parcel site. Build-out of both DHHL North and South Parcels is anticipated to occur by Year 2035, but for purposes of this TIAR, a forecast Year 2038 was used to analyzing the full impacts of the Pulehunu Regional subdivision.

6.1 Existing Conditions

No significant delays or queuing were observed at the study intersections. All intersection movements generally operated adequately at LOS D or better. However, various left-turn and minor street movements operated at LOS E/F during the peak hours of traffic due to low movement volumes of 10 or fewer vehicles per peak hour.

6.2 Base Year 2038

Projections for Base Year 2038 traffic included increases generated by a 2.1 percent annual growth rate along Maui Veterans Highway and numerous developments forecast to be completed within the vicinity of the Project. These nearby developments include the DLNR Industrial and Business Park, Maui Regional Public Safety Complex (MRPSC), Puunene Heavy

TABLE 5.8: LOS SUMMARY TABLE
FUTURE YEAR 2038 WITHOUT MITIGATION WITH MITIGATION CONDITIONS (CONTINUED)

| Intersection | Future Year 2038 no Mitigation Conditions (Base Year 2038 mitigation only) | | | | | | | | | Future Year 2038 with Mitigation Conditions | | | | | | | | |
|--|---|-----------|-----|-----------|-----------|-----|-----------|-----------|-----|---|-----------|-----|-----------|-----------|-----|-----------|-----------|-----|
| | AM | | | PM | | | WE | | | AM | | | PM | | | WE | | |
| | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS |
| 4: Maui Veterans Hwy & Mehamaha Loop South | | | | | | | | | | | | | | | | | | |
| NB LT | 266.9 | 1.40 | F* | 94.6 | 0.87 | F | 480.3 | 1.90 | F* | 93.4 | 0.88 | F | 94.6 | 0.87 | F | 107.4 | 0.91 | F |
| NB TH | 7.7 | 0.71 | A | 49.2 | 0.98 | D | 39.1 | 1.00 | B | 10.0 | 0.67 | A | 20.3 | 0.80 | C | 25.7 | 0.81 | C |
| NB RT | 3.5 | 0.09 | A | 17.7 | 0.13 | B | 11.4 | 0.16 | B | 4.9 | 0.10 | A | 8.9 | 0.11 | A | 12.7 | 0.17 | B |
| EB LT | - | - | - | - | - | - | - | - | - | 86.0 | 0.14 | F | 82.6 | 0.37 | F | 82.6 | 0.37 | F |
| EB TH | - | - | - | - | - | - | - | - | - | 88.6 | 0.14 | F | 89.2 | 0.31 | F | 89.2 | 0.31 | F |
| EB TH/RT | 40.9 | 0.15 | D | 845.1 | 2.68 | F* | 233.1 | 1.37 | F* | - | - | - | - | - | - | - | - | - |
| EB RT | - | - | - | - | - | - | - | - | - | 0.0 | 0.00 | A | 0.0 | 0.00 | A | 0.0 | 0.00 | A |
| WB LT | - | - | - | - | - | - | - | - | - | 81.9 | 0.48 | F | 105.6 | 0.91 | F | 95.1 | 0.90 | F |
| WB TH | - | - | - | - | - | - | - | - | - | 80.5 | 0.05 | F | 71.4 | 0.07 | E | 66.3 | 0.08 | E |
| WB LT/TH | 43.3 | 0.43 | D | 316.9 | 1.50 | F* | 280.0 | 1.49 | F* | - | - | - | - | - | - | - | - | - |
| WB RT | 39.9 | 0.01 | D | 45.6 | 0.13 | D | 26.2 | 0.11 | C | 71.7 | 0.01 | E | 64.0 | 0.04 | E | 56.6 | 0.05 | E |
| SB LT | 48.2 | 0.77 | D | 90.6 | 0.80 | F | 54.5 | 0.80 | D | 105.5 | 0.82 | F | 96.2 | 0.80 | F | 122.1 | 0.91 | F |
| SB TH | 6.4 | 0.62 | A | 118.8 | 1.17 | F* | 29.2 | 0.99 | C | 0.6 | 0.62 | A | 12.7 | 0.95 | B | 19.5 | 0.91 | B |
| SB RT | 3.4 | 0.03 | A | 19.6 | 0.01 | B | 9.7 | 0.02 | A | 0.0 | 0.03 | A | 3.8 | 0.01 | A | 8.2 | 0.02 | A |
| OVERALL | 15.5 | - | B | 117.3 | - | F | 67.4 | - | E | 10.7 | - | B | 22.9 | - | C | 31.2 | - | C |
| 5: Piihoni Hwy/Maui Veterans Hwy & N Kihei Rd/Monsanto Drwy | | | | | | | | | | | | | | | | | | |
| NB LT | 70.3 | 0.89 | E | 107.5 | 0.96 | F | 60.3 | 0.86 | E | 70.3 | 0.89 | E | 107.2 | 0.96 | F | 60.3 | 0.86 | E |
| NB TH | 20.1 | 0.77 | C | 18.1 | 0.71 | B | 18.1 | 0.79 | B | 20.1 | 0.77 | C | 17.5 | 0.71 | B | 18.1 | 0.79 | B |
| NB RT | 9.8 | 0.01 | A | 8.4 | 0.01 | A | 8.4 | 0.00 | A | 9.8 | 0.01 | A | 8.4 | 0.01 | A | 8.4 | 0.00 | A |
| EB LT | 72.0 | 0.89 | E | 100.0 | 0.89 | F | 52.5 | 0.80 | D | 72.0 | 0.89 | E | 99.8 | 0.89 | F | 52.5 | 0.80 | D |
| EB RT | 33.0 | 0.30 | C | 51.9 | 0.48 | D | 32.3 | 0.34 | C | 33.0 | 0.30 | C | 51.8 | 0.48 | D | 32.3 | 0.34 | C |
| WB LT | 104.1 | 0.59 | F | 128.7 | 0.65 | F | 91.0 | 0.47 | F | 104.1 | 0.59 | F | 128.5 | 0.65 | F | 91.0 | 0.47 | F |
| WB TH/RT | 78.3 | 0.06 | E | 107.4 | 0.24 | F | 67.1 | 0.10 | E | 78.3 | 0.06 | E | 107.2 | 0.24 | F | 67.1 | 0.10 | E |
| SB LT | 123.4 | 0.56 | F | 154.3 | 0.58 | F | 105.9 | 0.55 | F | 123.4 | 0.56 | F | 154.1 | 0.58 | F | 105.9 | 0.55 | F |
| SB TH | 33.1 | 0.65 | C | 55.5 | 0.95 | E | 31.2 | 0.87 | C | 33.1 | 0.65 | C | 55.0 | 0.95 | D | 31.2 | 0.87 | C |
| SB RT | 23.9 | 0.08 | C | 34.5 | 0.48 | C | 19.6 | 0.32 | B | 23.9 | 0.08 | C | 32.2 | 0.45 | C | 19.6 | 0.32 | B |
| OVERALL | 35.4 | - | D | 49.4 | - | D | 29.5 | - | C | 35.4 | - | D | 48.9 | - | D | 29.5 | - | C |
| 9: Maui Veterans Hwy & DHHL South Dwy 1 | | | | | | | | | | | | | | | | | | |
| WB RT | 94.9 | 0.69 | F | 165.1 | 0.94 | F | 145.2 | 0.87 | F | 100.7 | 0.71 | F | 173.7 | 0.96 | F | 156.5 | 0.90 | F |
| OVERALL | 1.2 | - | - | 2.0 | - | - | 1.7 | - | - | 1.3 | - | - | 2.1 | - | - | 1.8 | - | - |
| 10: Maui Veterans Hwy & DLNR Drwy 2 | | | | | | | | | | | | | | | | | | |
| NB TH | 36.7 | 0.97 | D | 24.0 | 0.91 | C | 21.2 | 0.88 | C | 50.3 | 0.98 | D | 27.5 | 0.93 | C | 23.3 | 0.90 | C |
| NB RT | 13.1 | 0.18 | B | 8.6 | 0.06 | A | 8.0 | 0.07 | A | 18.8 | 0.18 | B | 9.6 | 0.06 | A | 8.6 | 0.06 | A |
| WB LT | 78.4 | 0.87 | E | 75.7 | 0.91 | E | 78.0 | 0.90 | E | 120.3 | 0.93 | F | 84.0 | 0.93 | F | 83.7 | 0.91 | F |
| WB RT | 50.3 | 0.16 | D | 44.9 | 0.15 | D | 48.1 | 0.05 | D | 69.2 | 0.02 | E | 44.3 | 0.15 | D | 48.3 | 0.05 | D |
| SB LT | 107.5 | 1.03 | F* | 86.1 | 0.84 | F | 82.0 | 0.84 | F | 99.1 | 0.96 | F | 90.3 | 0.85 | F | 88.5 | 0.86 | F |
| SB TH | 4.4 | 0.50 | A | 15.4 | 0.91 | B | 8.8 | 0.78 | A | 4.3 | 0.49 | A | 18.1 | 0.93 | B | 9.5 | 0.79 | A |
| OVERALL | 30.4 | - | C | 22.8 | - | C | 18.5 | - | B | 38.2 | - | D | 26.1 | - | C | 20.2 | - | C |
| 11: Maui Veterans Hwy & DLNR Drwy 3 | | | | | | | | | | | | | | | | | | |
| WB RT | 57.3 | 0.24 | F | 59.8 | 0.30 | F | 60.6 | 0.30 | F | 55.8 | 0.24 | F | 61.4 | 0.30 | F | 62.3 | 0.31 | F |
| OVERALL | 0.2 | - | - | 0.2 | - | - | 0.3 | - | - | 0.2 | - | - | 0.2 | - | - | 0.3 | - | - |

* Denotes overcapacity condition, v/c ≥ 1.

Industrial Subdivision, Central Maui Baseyard Expansion, Piliāni Promenade, Maui Bay Villas (formerly Maui Lu), Kīhei High School, Maui Business Park Phase II, Kīhei Residential, Kawahine Village, Kenolio Apartments, Maui Research & Technology Park, Krausz Downtown Kīhei, Līloa Village, South Maui Community Park and Alahele Subdivision.

Various widening improvements are proposed at the Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road intersection as part of the development of the Puunene Heavy Industrial Subdivision. ~~The Upcountry-Kīhei Corridor, Kīhei Mauka Bypass Collector Road and Maui Veterans Highway widening in the HDOT 2035 Transportation Plan are all long range improvements that are currently not funded or programmed in the latest STIP and therefore were not included in this TIAR. The State of Hawaii Department of Transportation's (HDOT) Federal Aid Highways 2035 Transportation Plan for the District of Maui (Plan) dated July 2014 (hereinafter referred to as "HDOT 2035 Transportation Plan") estimated that by the year 2035, traffic volumes on Maui Veterans Highway will increase by over 80 percent due to nearby population and land development growth in the area. To increase highway capacity and accommodate this traffic growth, the HDOT 2035 Transportation Plan identified the widening of Maui Veterans Highway to construct two (2) additional travel lanes on Maui Veterans Highway from Kūhelaan Highway in Kahului to Piliāni Highway in Kīhei as a potential need by Year 2035. It should be noted that this Maui Veterans Highway Widening improvement is currently not a DOT-funded or approved project and is only an identified roadway capacity solution for long range planning purposes.~~

This TIAR does not assume the Maui Veterans Highway Widening improvement project will be implemented by Year 2038. For purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for both Base Year and Future Year scenarios.

By Base Year 2038 without the Project, traffic in the study area is expected to increase due to trips generated by nearby developments and growth along Maui Veterans Highway. As a result of the increase in traffic volumes, several roadway improvements are recommended to be completed by Base Year 2038 and are summarized in Appendix D.

The signalization of the new Maui Veterans Highway/DLNR Access intersection and Maui Veterans Highway/Mehameha Loop South intersection is recommended as the most feasible alternative at these intersections. Based on the mainline through volume along Maui Veterans Highway and turning movement traffic accessing the side streets, a signal would be warranted at each of these intersections. Traffic control that includes roundabouts and two-way stop control was not considered at these intersections since it would create lengthy delays and capacity issues.

The coordination of traffic signals at Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road and Maui Veterans Highway/DHHL North Access/DLNR Access intersections should be considered if feasible, and the signal timing plans should be optimized to improve throughput progression along Maui Veterans Highway

With the recommended improvements at the study intersections, all intersections are forecast to operate at overall LOS D or better. All movements will also operate under capacity, with vehicle to capacity (v/c) ratios below 1.0. Additionally, all mainline through movements along the highway are expected to operate at LOS D or better during all peak hours. The majority of left-turn and minor street movements are expected to operate at LOS E/F due to the long cycle lengths favoring the through movements along Maui Veterans Highway.

6.3 Future Year 2038

The DHHL North Parcel proposes to develop a mix of industrial space, commercial space, a hotel and a cultural center/visitor attraction on approximately 184.4 acres of vacant land. The DHHL South Parcel proposes to develop a mix of agricultural use, agricultural homesteads, a Hawaiian cultural/immersion school, recreational community facility and industrial/agricultural processing space on approximately 646 acres of vacant land. Build-out of both DHHL North and South Parcels is anticipated to occur by Year 2035, but for purposes of this TIAR, a forecast Year 2038 was used to analyzing the full impacts of the Pūlehuunui Master Planned Subdivision, which includes the Project, DLNR Industrial and Business Park, and Maui Regional Public Safety Complex (MRPSC).

Upon completion of the Project, traffic in the study area is expected to increase over Base Year 2038 conditions. The Project is anticipated to generate approximately 1,623(1,733)[1,969] trips during the AM(PM)[WE] peak hours of traffic, respectively. As discussed in Section 4.3, for purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for Future Year 2038. As a result of the increase in traffic volumes, several roadway improvements are recommended with the Project and described in greater detail in Section 7 and Appendix D. Left-turn storage lane lengths for the Project accesses are also shown in Tables 5.3 to 5.7. ~~All the request of HDOT, an additional scenario was analyzed to assume no highway widening and is discussed in Appendix G.~~

The signal timing plans at Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road, Maui Veterans Highway/DHHL North Access/DLNR Access and Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road intersections should be optimized to provide favorable throughput progression along Maui Veterans Highway.

~~Full build-out of the entire Pūlehuunui Master Planned Subdivision is anticipated to occur after the 2035 estimated need for HDOT's Maui Veterans Highway widening improvement and is not identified on the latest Statewide Transportation Improvement Program (STIP). Due to the uncertainty of HDOT's Maui Veterans Highway widening improvement, DHHL will coordinate with HDOT on its fair share of improvements. Based on a comparison of the Project traffic increase to total Future Year 2038 forecast traffic, the Project will constitute approximately 14% of all traffic, based on its composite average increase for the AM, PM and Saturday MD peak hours of traffic.~~

7. RECOMMENDATIONS

Full Base Year 2038 and Future Year 2038 roadway improvements are summarized in Appendix D and discussed in more detail below.

In addition to the improvements discussed below, the coordination of traffic signals at Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road and Maui Veterans Highway/DHHL North Access/DLNR Access intersections should be considered if feasible, and the signal timing plans should be optimized to improve throughput progression along Maui Veterans Highway for each scenario.

7.1 Planned Roadway Improvements

The following roadway improvements are based on the mitigation proposed in the Puunene Heavy Industrial Subdivision TIAR, dated January 24, 2012, and were assumed to be implemented upon completion of the Puunene Heavy Industrial Subdivision:

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

- Lengthen the southbound left-turn storage lane by an additional 350 feet, in addition to taper.
- Modify/Widen Kamaaina Road to provide a separate channelized westbound right-turn lane.
- Provide an acceleration lane for the westbound right-turns from Kamaaina Road onto Maui Veterans Highway.

7.2 Base Year 2038

The following roadway improvements are proposed for Base Year 2038. For purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for Base Year 2038.

[1] Maui Veterans Highway/Nakii Road

- Widen Maui Veterans Highway to provide an additional northbound through lane, resulting in three northbound through lanes.
 - Northbound: Three (3) through lanes and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes and two (2) through lanes.
 - Westbound: One (1) left-turn lane and one (1) right-turn lane.

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

- Implement planned roadway improvements listed in Section 4.3
- Provide additional widening improvements, resulting in the following lane configuration:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes, two (2) through and one (1) right-turn lane
 - Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.
 - Westbound: Two (2) left-turn lanes, one (1) through and one (1) right-turn lane with acceleration lane.

[3] Maui Veterans Highway/DHHL North Access/DLNR Access

- Provide a new signalized intersection along Maui Veterans Highway to serve the DLNR Business and Industrial Park development with the following lane configuration at the intersection:
 - Northbound: Three (3) through lanes and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes and two (2) through lanes.
 - Westbound: Two (2) left-turn lanes and one (1) right-turn lane with acceleration lane.

[4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road

- Provide a traffic signal with the following lane configuration at the intersection:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, two (2) through and one (1) shared through/right-turn lane.
 - Eastbound: One (1) shared left-turn/through/right-turn lane.
 - Westbound: One (1) shared left-turn/through lane and one (1) right-turn lane.

[5] Maui Veterans Highway/Piilani Highway/North Kihei Road/Monsanto Driveway

- Widen Maui Veterans Highway to provide two (2) additional southbound through lanes and one (1) additional northbound through lane.
 - Northbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, four (4) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) shared left-turn/through lane and two (2) right-turn lanes.
 - Westbound: One (1) left-turn lane and one (1) shared through/right-turn lane.

7.3 Future Year 2038

The following roadway improvements are proposed for Future Year 2038. **Due to the uncertainty of HDOT's Maui Veterans Highway widening improvement, DLNR, DHHL** will coordinate with HDOT on its fair share of improvements. For purposes of this TIAR, widening improvements along Maui Veterans Highway were recommended on the need at each study intersection based on LOS analysis for Future Year 2038 scenarios.

[1] Maui Veterans Highway/Nakii Road

- Widen Maui Veterans Highway to provide an additional southbound through lane, resulting in three southbound through lanes.
 - Northbound: Three (3) through lanes and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes and three (3) through lanes.
 - Westbound: One (1) left-turn lane and one (1) right-turn lane.

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

- Provide the following lane configuration consistent with the Base Year 2038 scenario:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.
 - Westbound: Two (2) left-turn lanes, one (1) through and one (1) right-turn lane with acceleration lane.

[3] Maui Veterans Highway/DHHL North Access/DLNR Access

- Widen Maui Veterans Highway to provide an additional northbound through lane and provide additional widening improvements with the following lane configuration:
 - Northbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Southbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Eastbound: Two (2) left-turn lanes, one (1) through and one (1) right-turn lane.
 - Westbound: Two (2) left-turn lanes, one (1) through lane and one (1) right-turn lane with an acceleration lane.

[4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road

- Widen Maui Veterans Highway to provide an additional northbound through lane and widening along Mehameha Loop (South) and Maui Raceway Park Access Road. Provide the following lane configuration:
 - Northbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, three (3) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane with an acceleration lane.

- Westbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.
- Maui Veterans Highway/Piliamei Highway/North Kihei Road/Monsanto Driveway
 - Maintain Base Year 2038 laneage:
 - Northbound: Two (2) left-turn lanes, three (3) through and one (1) right-turn lane.
 - Southbound: One (1) left-turn lane, four (4) through and one (1) right-turn lane.
 - Eastbound: One (1) left-turn lane, one (1) shared left-turn/through lane and two (2) right-turn lanes.
 - Westbound: One (1) left-turn lane and one (1) shared through/right-turn lane.

8. REFERENCES

1. American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highway and Streets, 2011.
2. City of San Diego, Trip Generation Manual, 2003.
3. Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.
4. Phillip Rowell & Associates, Pilani Promenade TIAR, June, 6, 2014.
5. Phillip Rowell & Associates, Puunene Heavy Industrial Subdivision TIAR, January, 24, 2012.
6. Transportation Research Board, Highway Capacity Manual, 2010.
7. Wilson Okamoto Corporation, Kihai High School TIAR, September 2011.
8. Wilson Okamoto Corporation, MRPSC Environmental Impact Statement Preparation Notice, May 2010.

APPENDICES

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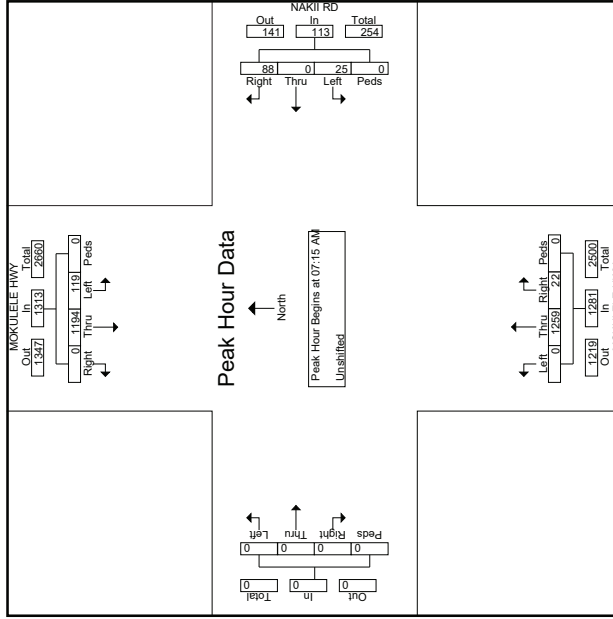
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File Name : AM_Mokulele Hwy - Mehamaha Lp_Kamaaina Rd (N)
Site Code : 00000000
Start Date : 9/15/2015
Page No : 1

File Name : AM_Mokulele Hwy - Nakii Rd
Site Code : 00000000
Start Date : 1/19/2017
Page No : 2

| Start Time | MOKULELE HWY Southbound | | | | NAKII RD Westbound | | | | MOKULELE HWY Northbound | | | | FAKESOUND Eastbound | | | | In Total | |
|--------------|-------------------------|------|-------|------------|--------------------|------|-------|------------|-------------------------|------|-------|------------|---------------------|------|-------|------------|----------|------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | | |
| 07:15 AM | 28 | 267 | 0 | 295 | 8 | 0 | 26 | 34 | 0 | 350 | 9 | 0 | 359 | 0 | 0 | 0 | 0 | 688 |
| 07:30 AM | 26 | 280 | 0 | 306 | 3 | 0 | 20 | 23 | 0 | 371 | 4 | 0 | 375 | 0 | 0 | 0 | 0 | 704 |
| 07:45 AM | 31 | 316 | 0 | 347 | 12 | 0 | 23 | 35 | 0 | 290 | 4 | 0 | 294 | 0 | 0 | 0 | 0 | 676 |
| 08:00 AM | 34 | 331 | 0 | 365 | 2 | 0 | 19 | 21 | 0 | 248 | 5 | 0 | 253 | 0 | 0 | 0 | 0 | 639 |
| Total Volume | 119 | 1194 | 0 | 1313 | 25 | 0 | 68 | 113 | 0 | 1259 | 22 | 0 | 1281 | 0 | 0 | 0 | 0 | 2707 |
| % App. Total | 9.1 | 90.9 | 0 | 100 | 22.1 | 0 | 77.9 | 100 | 0 | 99.3 | 1.7 | 0 | 100 | 0 | 0 | 0 | 0 | 961 |
| PHF | .875 | .902 | .000 | .899 | .571 | .000 | .896 | .000 | .807 | .000 | .848 | .611 | .000 | .854 | .000 | .000 | .000 | .961 |

| Start Time | MEHAMEHA LP Eastbound | | | | KAMAAINA RD Westbound | | | | MOKULELE HWY Northbound | | | | MOKULELE HWY Southbound | | | | In Total | |
|-------------|-----------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------------|------|-------|------------|-------------------------|------|-------|------------|----------|------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | | |
| 06:30 AM | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 06:45 AM | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 3 | 1 | 267 | 0 | 0 | 0 | 0 | 268 | 0 | 236 |
| Total | 1 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 3 | 1 | 267 | 0 | 0 | 0 | 268 | 0 | 236 | 510 |
| 07:00 AM | 1 | 0 | 1 | 2 | 4 | 0 | 1 | 5 | 0 | 300 | 6 | 0 | 306 | 3 | 268 | 1 | 0 | 575 |
| 07:15 AM | 2 | 0 | 0 | 2 | 1 | 0 | 4 | 5 | 0 | 336 | 0 | 0 | 336 | 3 | 273 | 5 | 0 | 651 |
| 07:30 AM | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 3 | 1 | 273 | 3 | 0 | 283 | 5 | 0 | 0 | 764 |
| 07:45 AM | 1 | 0 | 0 | 1 | 2 | 0 | 7 | 2 | 11 | 1 | 273 | 3 | 0 | 283 | 5 | 0 | 0 | 597 |
| Total | 4 | 0 | 2 | 6 | 7 | 0 | 14 | 3 | 24 | 2 | 1288 | 9 | 0 | 1299 | 19 | 1188 | 12 | 2489 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 | 0 | 274 | 1 | 0 | 275 | 3 | 286 | 10 | 578 |
| 08:15 AM | 2 | 0 | 1 | 3 | 2 | 1 | 2 | 0 | 5 | 3 | 255 | 3 | 0 | 261 | 6 | 272 | 3 | 550 |
| 08:30 AM | 2 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 3 | 2 | 260 | 2 | 0 | 264 | 2 | 246 | 6 | 523 |
| Grand Total | 9 | 1 | 4 | 14 | 9 | 1 | 25 | 4 | 39 | 8 | 2344 | 15 | 0 | 2367 | 39 | 2166 | 35 | 4660 |
| Approach % | 64.3 | 7.1 | 28.6 | 100 | 23.1 | 2.6 | 64.1 | 100 | 0.3 | 99 | 0.6 | 0 | 0 | 50.8 | 0.8 | 46.5 | 0.8 | 48.1 |
| Total % | 0.2 | 0 | 0.1 | 0 | 0.3 | 0.2 | 0 | 0.1 | 0.8 | 0.2 | 50.3 | 0.3 | 0 | 50.8 | 0.8 | 46.5 | 0.8 | 48.1 |



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Site Code : 00000000
Start Date : 9/15/2015
Page No : 2

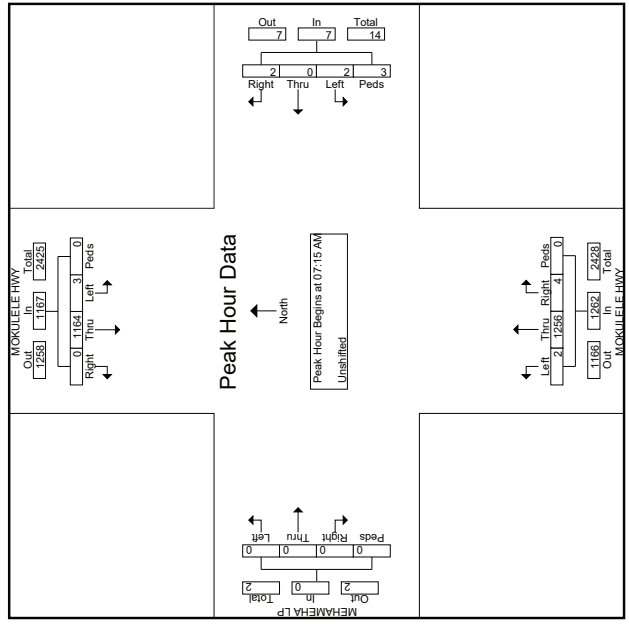
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File Name : AM_Mokulele_Piilani Hwy - Kihei Rd
Site Code : 00000000
Start Date : 1/19/2017
Page No : 1

| Start Time | MEHAMEHA LP Eastbound | | | Westbound | | | MOKULELE HWY Northbound | | | MOKULELE HWY Southbound | | |
|--------------|-----------------------|-------|-------|-----------|-------|-------|-------------------------|-------|-------|-------------------------|-------|-------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| 06:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % App. Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |



| Start Time | MOKULELE HWY Southbound | | | KIHEI RD Westbound | | | PIILANI HWY Northbound | | | KIHEI RD Eastbound | | |
|-------------|-------------------------|------|-------|--------------------|------|-------|------------------------|------|-------|--------------------|------|-------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| 06:30 AM | 2 | 164 | 29 | 0 | 0 | 0 | 74 | 154 | 0 | 3 | 33 | 1 |
| 06:45 AM | 3 | 157 | 23 | 0 | 0 | 0 | 88 | 235 | 6 | 0 | 40 | 4 |
| Total | 5 | 321 | 52 | 0 | 0 | 0 | 162 | 389 | 6 | 3 | 75 | 5 |
| 07:00 AM | 1 | 214 | 15 | 0 | 0 | 0 | 103 | 248 | 15 | 0 | 39 | 2 |
| 07:15 AM | 0 | 222 | 21 | 0 | 0 | 0 | 134 | 292 | 5 | 0 | 51 | 0 |
| 07:30 AM | 0 | 235 | 25 | 0 | 0 | 0 | 96 | 296 | 3 | 3 | 80 | 1 |
| 07:45 AM | 2 | 268 | 41 | 0 | 0 | 0 | 132 | 242 | 0 | 0 | 47 | 1 |
| Total | 3 | 939 | 102 | 0 | 0 | 0 | 465 | 1078 | 23 | 3 | 217 | 4 |
| 08:00 AM | 0 | 258 | 31 | 0 | 0 | 0 | 91 | 190 | 1 | 0 | 64 | 0 |
| 08:15 AM | 1 | 309 | 30 | 0 | 0 | 0 | 76 | 217 | 4 | 0 | 55 | 0 |
| Grand Total | 9 | 1827 | 215 | 0 | 0 | 0 | 26 | 794 | 1874 | 34 | 6 | 411 |
| Approach % | 0.4 | 89.1 | 10.5 | 0 | 0 | 0 | 38.3 | 29.3 | 69.2 | 1.3 | 0.2 | 42.2 |
| Total % | 0.2 | 31.6 | 3.7 | 0 | 0 | 0 | 13.7 | 32.4 | 0.6 | 0.1 | 7.1 | 0.2 |

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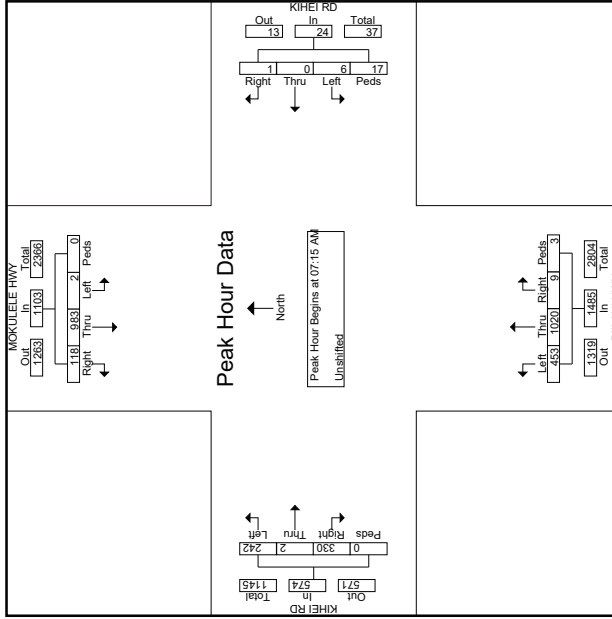
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Site Code : 00000000

Start Date : 1/19/2017

Page No : 2

| Start Time | MOKULELE HWY Southbound | | | | KIHEI RD Westbound | | | | PIILANI HWY Northbound | | | | KIHEI RD Eastbound | | | | Int. Total | | | | |
|---------------|-------------------------|-------|-------|-------|--------------------|-------|-------|-------|------------------------|----------|-------|-------|--------------------|-------|----------|-------|------------|-------|-------|-------|----------|
| | Left | Thru | Right | Peds | App. Tot | Left | Thru | Right | Peds | App. Tot | Left | Thru | Right | Peds | App. Tot | Left | | Thru | Right | Peds | App. Tot |
| 07:15 AM | 0 | 222 | 21 | 0 | 243 | 3 | 0 | 1 | 5 | 134 | 292 | 6 | 0 | 431 | 51 | 0 | 72 | 0 | 123 | 802 | |
| 07:30 AM | 0 | 235 | 25 | 0 | 260 | 2 | 0 | 0 | 9 | 11 | 96 | 3 | 3 | 398 | 80 | 1 | 81 | 0 | 162 | 831 | |
| 07:45 AM | 2 | 268 | 41 | 0 | 311 | 0 | 0 | 0 | 3 | 132 | 242 | 0 | 0 | 374 | 47 | 1 | 96 | 0 | 143 | 831 | |
| 08:00 AM | 0 | 258 | 31 | 0 | 289 | 1 | 0 | 0 | 4 | 51 | 190 | 1 | 0 | 282 | 64 | 0 | 82 | 0 | 146 | 722 | |
| Total Volumes | 2 | 983 | 118 | 0 | 1103 | 6 | 0 | 1 | 17 | 24 | 453 | 1020 | 9 | 3 | 1485 | 242 | 2 | 330 | 0 | 574 | 3186 |
| % App. Total | 0.2 | 89.1 | 10.7 | 0 | 90.0 | 0.5 | 0 | 0.1 | 0.7 | 2.1 | 40.5 | 68.7 | 0.6 | 0.2 | 42.2 | 0.3 | 57.5 | 0 | 0 | 958 | |
| PHF | 0.250 | 0.917 | 0.200 | 0.000 | 0.887 | 0.500 | 0.000 | 0.250 | 0.472 | 0.545 | 0.845 | 0.861 | 0.450 | 0.250 | 0.861 | 0.756 | 0.500 | 0.868 | 0.000 | 0.886 | 958 |



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Site Code : 00000000

Start Date : 1/19/2017

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| Start Time | MOKULELE HWY Southbound | | | | NAKII RD Westbound | | | | MOKULELE HWY Northbound | | | | Eastbound | | | | Int. Total | |
|-------------|-------------------------|------|-------|------|--------------------|------|-------|------|-------------------------|------|-------|------|-----------|------|-------|------|------------|------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | | |
| 03:00 PM | 16 | 384 | 0 | 0 | 4 | 0 | 29 | 0 | 4 | 301 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 728 |
| 03:15 PM | 22 | 346 | 0 | 0 | 4 | 0 | 19 | 0 | 0 | 320 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 717 |
| 03:30 PM | 17 | 396 | 0 | 0 | 6 | 0 | 32 | 0 | 0 | 365 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 818 |
| 03:45 PM | 17 | 356 | 0 | 0 | 4 | 0 | 31 | 0 | 0 | 343 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 762 |
| Total | 72 | 1462 | 0 | 0 | 18 | 0 | 111 | 0 | 4 | 1329 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 3025 |
| 04:00 PM | 17 | 365 | 0 | 0 | 11 | 0 | 35 | 0 | 0 | 324 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 757 |
| 04:15 PM | 9 | 396 | 0 | 0 | 4 | 0 | 30 | 0 | 0 | 320 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 764 |
| 04:30 PM | 10 | 355 | 0 | 0 | 2 | 0 | 13 | 0 | 0 | 339 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 724 |
| 04:45 PM | 11 | 340 | 0 | 0 | 3 | 0 | 21 | 0 | 0 | 367 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 745 |
| Total | 47 | 1456 | 0 | 0 | 20 | 0 | 99 | 0 | 0 | 1350 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 2990 |
| Grand Total | 119 | 2918 | 0 | 0 | 38 | 0 | 210 | 0 | 4 | 2679 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 6015 |
| Approch % | 3.9 | 96.1 | 0 | 0 | 15.3 | 0 | 84.7 | 0 | 0.1 | 98.1 | 1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total % | 2 | 48.5 | 0 | 0 | 0.6 | 0 | 3.5 | 0 | 0.1 | 44.5 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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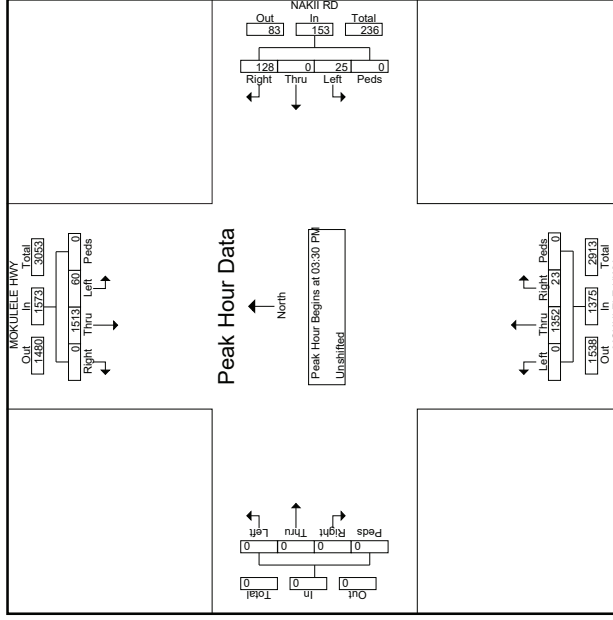
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File Name : PM Mokulele Hwy - Mehamaha Lp_Kamaaina Rd (N)
Site Code : 00000000
Start Date : 9/10/2015
Page No : 1

| Start Time | MOKULELE HWY Southbound | | | | NAKII RD Westbound | | | | MOKULELE HWY Northbound | | | | FAKESOUND Eastbound | | | | In Total | | |
|---------------|-------------------------|------|-------|------------|--------------------|------|-------|------------|-------------------------|------|-------|------------|---------------------|------|-------|------------|----------|------|------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | | | |
| 03:30 PM | 17 | 396 | 0 | 413 | 6 | 0 | 32 | 0 | 38 | 0 | 365 | 2 | 0 | 367 | 0 | 0 | 0 | 0 | 818 |
| 03:45 PM | 17 | 356 | 0 | 373 | 4 | 0 | 31 | 0 | 35 | 0 | 343 | 11 | 0 | 354 | 0 | 0 | 0 | 0 | 762 |
| 04:00 PM | 17 | 365 | 0 | 382 | 11 | 0 | 35 | 0 | 46 | 0 | 324 | 5 | 0 | 329 | 0 | 0 | 0 | 0 | 757 |
| 04:15 PM | 9 | 396 | 0 | 405 | 4 | 0 | 30 | 0 | 34 | 0 | 320 | 5 | 0 | 325 | 0 | 0 | 0 | 0 | 764 |
| Total Volumes | 60 | 1513 | 0 | 1573 | 25 | 0 | 128 | 0 | 153 | 0 | 1352 | 23 | 0 | 1375 | 0 | 0 | 0 | 0 | 3101 |
| % App. Total | 3.8 | 96.2 | 0 | 99.9 | 1.6 | 0 | 8.2 | 0 | 9.7 | 0 | 85.3 | 1.7 | 0 | 9.0 | 0 | 0 | 0 | 0 | 948 |
| PHF | .882 | .955 | .000 | .952 | .368 | .000 | .914 | .000 | .832 | .000 | .926 | .523 | .000 | .937 | .000 | .000 | .000 | .000 | .948 |

| Start Time | MEHAMEHA LP Eastbound | | | | KAMAAINA RD Westbound | | | | MOKULELE HWY Northbound | | | | MOKULELE HWY Southbound | | | | In Total | | |
|-------------|-----------------------|------|-------|------------|-----------------------|------|-------|------------|-------------------------|------|-------|------------|-------------------------|------|-------|------------|----------|---|------|
| | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | | | |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:45 PM | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 |
| Total | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 27 |
| 03:00 PM | 4 | 0 | 1 | 5 | 1 | 0 | 17 | 0 | 19 | 1 | 270 | 1 | 0 | 272 | 5 | 324 | 2 | 0 | 331 |
| 03:15 PM | 0 | 0 | 2 | 2 | 2 | 1 | 4 | 0 | 7 | 5 | 294 | 1 | 0 | 300 | 2 | 307 | 2 | 0 | 310 |
| 03:30 PM | 6 | 0 | 1 | 7 | 1 | 0 | 7 | 0 | 8 | 2 | 327 | 2 | 0 | 331 | 4 | 274 | 5 | 0 | 340 |
| 03:45 PM | 6 | 0 | 2 | 8 | 1 | 0 | 7 | 0 | 8 | 2 | 327 | 2 | 0 | 331 | 4 | 274 | 5 | 0 | 340 |
| Total | 16 | 0 | 6 | 22 | 4 | 1 | 32 | 1 | 38 | 12 | 1291 | 5 | 0 | 1298 | 12 | 1263 | 13 | 0 | 1288 |
| 04:00 PM | 6 | 0 | 7 | 13 | 0 | 0 | 9 | 0 | 9 | 0 | 267 | 0 | 0 | 267 | 4 | 304 | 2 | 0 | 310 |
| 04:15 PM | 5 | 1 | 3 | 9 | 0 | 0 | 3 | 0 | 3 | 4 | 378 | 1 | 0 | 383 | 1 | 306 | 2 | 0 | 309 |
| 04:30 PM | 5 | 0 | 2 | 7 | 1 | 0 | 3 | 0 | 4 | 0 | 351 | 1 | 0 | 352 | 1 | 287 | 2 | 0 | 290 |
| 04:45 PM | 0 | 0 | 1 | 1 | 1 | 0 | 5 | 0 | 6 | 0 | 284 | 1 | 0 | 285 | 2 | 300 | 1 | 0 | 303 |
| Total | 16 | 1 | 13 | 30 | 2 | 0 | 20 | 0 | 22 | 4 | 1280 | 3 | 0 | 1287 | 8 | 1197 | 7 | 0 | 1212 |
| Grand Total | 33 | 1 | 19 | 53 | 7 | 1 | 53 | 1 | 62 | 16 | 2494 | 8 | 0 | 2518 | 20 | 2457 | 20 | 0 | 2497 |
| Approach % | 62.3 | 1.9 | 35.8 | 66.0 | 11.3 | 1.6 | 85.5 | 1.6 | 11.3 | 0.6 | 99.0 | 0.3 | 0 | 0.8 | 98.4 | 0.8 | 0 | 0 | 48.7 |
| Total % | 0.6 | 0 | 0.4 | 0.7 | 0.1 | 0 | 1 | 0 | 1.2 | 0.3 | 48.6 | 0.2 | 0 | 0.4 | 47.9 | 0.4 | 0 | 0 | 48.7 |



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Site Code : 00000000

Start Date : 9/10/2015

Page No : 2

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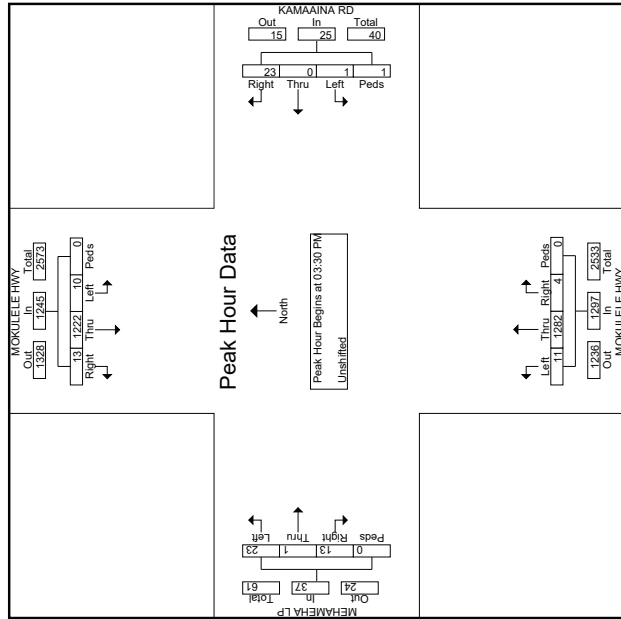
File Name : PM_Mokulele Hwy - Mehamaha Lp (S)

Site Code : 00000000

Start Date : 9/10/2015

Page No : 1

| Start Time | MEHAMEHA LP Eastbound | | | | | KAMAAINA RD Westbound | | | | | MOKULELE HWY Northbound | | | | | MOKULELE HWY Southbound | | | | | | |
|--------------|-----------------------|------|-------|------|------------|-----------------------|------|-------|------|------------|-------------------------|------|-------|------|------------|-------------------------|------|-------|------|------------|---|------|
| | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | | |
| 03:30 PM | 0 | 0 | 1 | 0 | 7 | 0 | 4 | 1 | 0 | 316 | 5 | 310 | 1 | 0 | 316 | 4 | 338 | 4 | 0 | 346 | | |
| 03:45 PM | 6 | 0 | 2 | 0 | 8 | 0 | 7 | 0 | 0 | 331 | 2 | 327 | 2 | 0 | 331 | 1 | 274 | 5 | 0 | 280 | | |
| 04:00 PM | 6 | 0 | 7 | 0 | 13 | 0 | 9 | 0 | 0 | 267 | 4 | 304 | 2 | 0 | 310 | 2 | 304 | 2 | 0 | 310 | | |
| 04:15 PM | 5 | 1 | 3 | 0 | 9 | 0 | 3 | 0 | 3 | 383 | 4 | 378 | 1 | 0 | 383 | 1 | 306 | 2 | 0 | 309 | | |
| Total Volume | 23 | 1 | 13 | 0 | 37 | 0 | 23 | 1 | 0 | 1282 | 11 | 1282 | 4 | 0 | 1287 | 10 | 1222 | 13 | 0 | 1245 | | |
| % App. Total | 62.2 | 2.7 | 35.1 | 0 | 4 | 0 | 92 | 4 | 0 | 98.8 | 0.3 | 0.8 | 98.8 | 0.3 | 0.8 | 98.2 | 1 | 0.8 | 98.2 | 1 | 0 | 92.5 |
| PHF | .958 | .250 | .464 | .000 | .712 | .250 | .000 | .639 | .250 | .694 | .550 | .848 | .500 | .000 | .847 | .625 | .904 | .650 | .000 | .900 | | |



| Start Time | MEHAMEHA LP Eastbound | | | | | Westbound | | | | | MOKULELE HWY Northbound | | | | | MOKULELE HWY Southbound | | | | |
|-------------|-----------------------|------|-------|------|------------|-----------|------|-------|------|------------|-------------------------|------|-------|------|------------|-------------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 13 | 0 | 27 | 0 | 0 | 27 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 13 | 0 | 27 | 0 | 0 | 27 |
| 03:00 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 269 | 0 | 0 | 270 | 1 | 323 | 0 | 0 | 324 |
| 03:15 PM | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 263 | 0 | 0 | 263 | 2 | 398 | 0 | 0 | 398 |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 326 | 2 | 0 | 328 | 0 | 326 | 0 | 0 | 326 |
| 03:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 324 | 2 | 0 | 327 | 0 | 273 | 0 | 0 | 274 |
| Total | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 1194 | 4 | 0 | 1201 | 4 | 1229 | 0 | 0 | 1233 |
| 04:00 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 1 | 265 | 1 | 0 | 267 | 1 | 303 | 0 | 0 | 304 |
| 04:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 375 | 3 | 0 | 378 | 1 | 305 | 0 | 0 | 306 |
| 04:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 1 | 349 | 1 | 0 | 351 | 0 | 287 | 0 | 0 | 287 |
| 04:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 282 | 2 | 0 | 284 | 2 | 298 | 0 | 0 | 300 |
| Total | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 8 | 0 | 10 | 2 | 1271 | 7 | 0 | 1280 | 4 | 1183 | 0 | 0 | 1187 |
| Grand Total | 0 | 5 | 0 | 0 | 5 | 2 | 0 | 8 | 0 | 10 | 5 | 2478 | 11 | 0 | 2494 | 8 | 2449 | 0 | 0 | 2457 |
| Approach % | 0 | 100 | 0 | 0 | 0.1 | 20 | 0 | 80 | 0 | 0.2 | 0.2 | 99.4 | 0.4 | 0 | 50.2 | 0.3 | 99.7 | 0 | 0 | 49.5 |
| Total % | 0 | 0 | 0.1 | 0 | 0.1 | 0 | 0 | 0.2 | 0 | 0.2 | 0.1 | 49.9 | 0.2 | 0 | 50.2 | 0.2 | 49.3 | 0 | 0 | 49.5 |

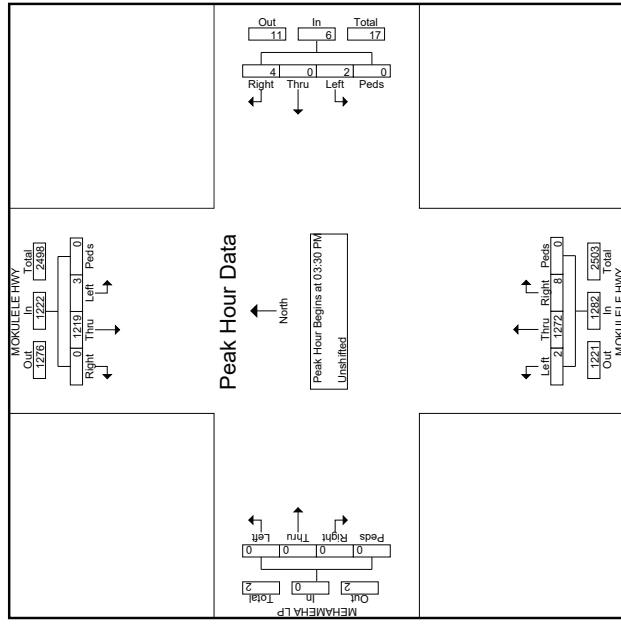
Austin Toutsumi & Associates

501 Summer Street, Suite 521
Honolulu, HI 96817-5031

Phone: (808) 533-3646 Fax: (808) 526-1267

File Name : PM_Mokulele Hwy - Mehamaha Lp (S)
Site Code : 00000000
Start Date : 9/10/2015
Page No : 2

| Start Time | MEHAMEHA LP Eastbound | | | Westbound | | | MOKULELE HWY Northbound | | | MOKULELE HWY Southbound | | | | | | | |
|--------------|-----------------------|-------|-------|-----------|-------|-------|-------------------------|---------|---------|-------------------------|---------|---------|---------|---------|---------|---------|------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 308 | 2 | 0 | 310 | 0 | 338 | 0 | 0 | 338 | 648 |
| 03:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 324 | 2 | 0 | 327 | 1 | 273 | 0 | 0 | 274 | 601 |
| 04:00 PM | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 265 | 1 | 0 | 267 | 1 | 303 | 0 | 0 | 304 | 575 |
| 04:15 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 375 | 3 | 0 | 378 | 1 | 305 | 0 | 0 | 306 | 686 |
| Total Volume | 0 | 0 | 0 | 0 | 2 | 0 | 6 | 1272 | 8 | 0 | 1282 | 3 | 1219 | 0 | 0 | 1222 | 2510 |
| % App. Total | 0.000 | 0.000 | 0.000 | 33.3 | 0.667 | 0.000 | 0.250 | 500.000 | 375.000 | 500.000 | 848.000 | 667.000 | 750.000 | 900.000 | 904.000 | 915.000 | |



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File Name : PM_Mokulele_Piilani Hwy - Kihei Rd
Site Code : 00000000
Start Date : 1/19/2017
Page No : 1

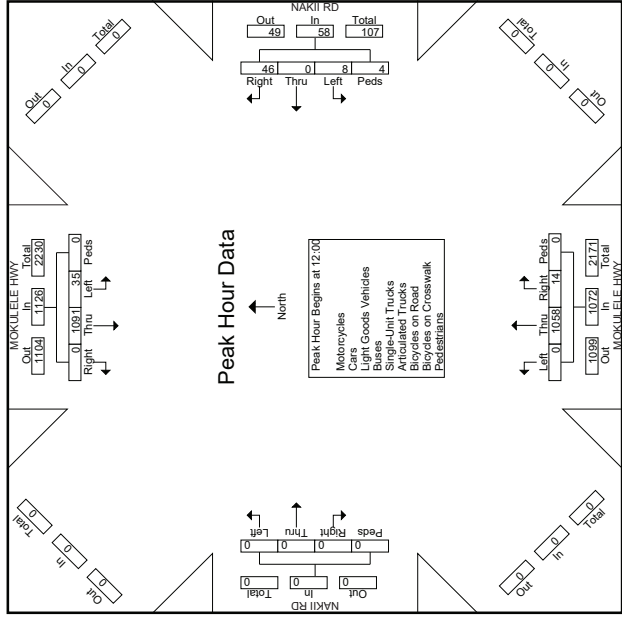
| Start Time | MOKULELE HWY Southbound | | | KIHEI RD Westbound | | | PIILANI HWY Northbound | | | KIHEI RD Eastbound | | |
|-------------|-------------------------|------|-------|--------------------|------|-------|------------------------|------|-------|--------------------|------|-------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| 03:00 PM | 0 | 323 | 52 | 2 | 1 | 3 | 0 | 111 | 233 | 2 | 0 | 49 |
| 03:15 PM | 0 | 313 | 54 | 3 | 0 | 1 | 0 | 95 | 273 | 2 | 0 | 55 |
| 03:30 PM | 0 | 268 | 51 | 0 | 7 | 0 | 0 | 132 | 294 | 2 | 0 | 60 |
| 03:45 PM | 1 | 305 | 48 | 1 | 3 | 2 | 1 | 121 | 288 | 5 | 0 | 52 |
| Total | 1 | 1209 | 205 | 0 | 13 | 4 | 11 | 459 | 1088 | 11 | 0 | 216 |
| 04:00 PM | 0 | 351 | 61 | 0 | 2 | 0 | 0 | 96 | 227 | 1 | 0 | 33 |
| 04:15 PM | 2 | 265 | 49 | 0 | 1 | 1 | 0 | 99 | 273 | 2 | 0 | 41 |
| 04:30 PM | 1 | 310 | 49 | 0 | 1 | 1 | 5 | 112 | 287 | 1 | 0 | 39 |
| 04:45 PM | 0 | 289 | 50 | 0 | 3 | 0 | 0 | 83 | 267 | 0 | 0 | 45 |
| Total | 3 | 1215 | 209 | 0 | 7 | 2 | 6 | 390 | 1054 | 4 | 0 | 158 |
| Grand Total | 4 | 2424 | 414 | 0 | 20 | 6 | 17 | 849 | 2142 | 15 | 0 | 374 |
| Approach % | 0.1 | 85.3 | 14.6 | 0 | 44.4 | 13.3 | 37.8 | 4.4 | 28.2 | 71.3 | 0.5 | 32.5 |
| Total % | 0.1 | 34.4 | 5.9 | 0 | 0.3 | 0.1 | 0.2 | 0 | 12.1 | 30.4 | 0.2 | 5.3 |

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File Name : WE_Mokulele Hwy - Naki Rd
Site Code : 15-554 DLNR Kakamilua Business Park
Start Date : 8/12/2017
Page No : 2

| Start Time | MOKULELE HWY SOUTHBOUND | | | NAKII RD WESTBOUND | | | MOKULELE HWY NORTHBOUND | | | NAKII RD EASTBOUND | | | | | | | | | |
|--------------|-------------------------|-------|-------|--------------------|-------|-------|-------------------------|-------|-------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | | | |
| 12:00 | 7 | 257 | 0 | 2 | 0 | 7 | 1 | 10 | 0 | 226 | 3 | 0 | 229 | 0 | 0 | 0 | 0 | 0 | 503 |
| 12:15 | 7 | 278 | 0 | 1 | 0 | 6 | 2 | 9 | 0 | 275 | 6 | 0 | 281 | 0 | 0 | 0 | 0 | 0 | 575 |
| 12:30 | 10 | 275 | 0 | 0 | 0 | 14 | 0 | 17 | 0 | 280 | 3 | 0 | 283 | 0 | 0 | 0 | 0 | 0 | 585 |
| 12:45 | 11 | 281 | 0 | 0 | 0 | 19 | 1 | 22 | 0 | 277 | 2 | 0 | 279 | 0 | 0 | 0 | 0 | 0 | 583 |
| Total Volume | 35 | 1091 | 0 | 0 | 0 | 46 | 4 | 58 | 0 | 1058 | 14 | 0 | 1072 | 0 | 0 | 0 | 0 | 0 | 2256 |
| % App. Total | 3.1 | 96.9 | 0 | 0 | 0 | 79.3 | 0 | 80.7 | 0 | 94.3 | 0 | 0 | 94.7 | 0 | 0 | 0 | 0 | 0 | 95.1 |
| PHF | 0.785 | 0.871 | 0.000 | 0.000 | 0.000 | 0.659 | 0.500 | 0.659 | 0.000 | 0.943 | 0.563 | 0.000 | 0.947 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.951 |



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Phone: 533-3646 Fax: 526-1267

File Name : WE_Mokulele Hwy - Kamaaina Rd
Site Code : 15-554 DLNR Kakamilua Business Park
Start Date : 8/12/2017
Page No : 1

| Start Time | MOKULELE HWY SOUTHBOUND | | | KAMAAINA RD WESTBOUND | | | MOKULELE HWY NORTHBOUND | | | KAMAAINA RD EASTBOUND | | |
|-------------|-------------------------|------|-------|-----------------------|------|-------|-------------------------|------|-------|-----------------------|------|-------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| 11:00 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:15 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:30 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 2 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:00 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:15 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:45 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 2 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grand Total | 4 | 11 | 0 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Approch % | 26.7 | 73.3 | 0 | 60 | 0 | 40 | 0 | 86.7 | 13.3 | 0 | 0 | 0 |
| Total % | 8 | 22 | 0 | 6 | 0 | 4 | 0 | 52 | 8 | 0 | 0 | 0 |

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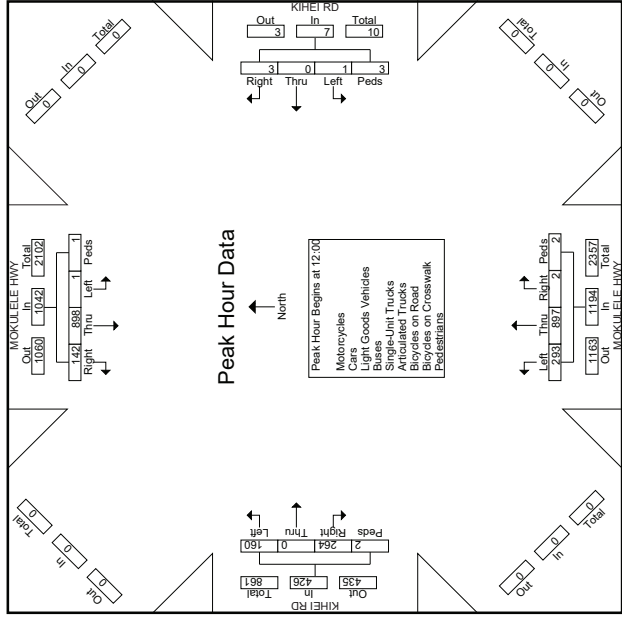


AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX B LEVEL OF SERVICE CRITERIA

File Name : WE_Mokulele Hwy - Kihei Rd
Site Code : 15-554 DLNR Kakanilua Business Park
Start Date : 8/12/2017
Page No : 2

| Start Time | MOKULELE HWY SOUTHBOUND | | | KIHEI RD WESTBOUND | | | MOKULELE HWY NORTHBOUND | | | KIHEI RD EASTBOUND | | | | | | | | |
|--------------|-------------------------|-------|-------|--------------------|-------|-------|-------------------------|-------|-------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | | | | | |
| 12:00 | 0 | 209 | 29 | 0 | 2 | 70 | 201 | 0 | 0 | 271 | 42 | 0 | 69 | 0 | 111 | 622 | | |
| 12:15 | 1 | 216 | 31 | 0 | 2 | 3 | 74 | 235 | 1 | 0 | 310 | 39 | 0 | 61 | 0 | 100 | 661 | |
| 12:30 | 0 | 235 | 39 | 0 | 2 | 2 | 81 | 224 | 1 | 2 | 308 | 41 | 0 | 72 | 2 | 115 | 689 | |
| 12:45 | 0 | 238 | 43 | 1 | 0 | 0 | 68 | 237 | 0 | 0 | 305 | 38 | 0 | 62 | 0 | 100 | 657 | |
| Total Volume | 1 | 888 | 142 | 1 | 0 | 3 | 7 | 233 | 897 | 2 | 2 | 1194 | 160 | 0 | 264 | 2 | 426 | 2669 |
| % App. Total | 0.1 | 86.2 | 13.6 | 0.1 | 44.3 | 0 | 42.9 | 75.1 | 0.2 | 0.2 | 37.6 | 0 | 0.62 | 0.5 | 0 | 0.2 | 95.5 | |
| PHF | 0.250 | 0.343 | 0.268 | 0.250 | 0.000 | 0.373 | 0.375 | 0.583 | 0.504 | 0.346 | 0.500 | 0.250 | 0.863 | 0.502 | 0.000 | 0.917 | 0.250 | 0.926 |



APPENDIX B – LEVEL OF SERVICE (LOS) CRITERIA

VEHICULAR LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS (HCM 6th EDITION)

Level of service for vehicles at signalized intersections is directly related to delay values and is assigned on that basis. Level of Service is a measure of the acceptability of delay values to motorists at a given intersection. The criteria are given in the table below.

Level-of-Service Criteria for Signalized Intersections

| Level of Service | Control Delay per Vehicle (sec./veh.) |
|------------------|---------------------------------------|
| A | < 10.0 |
| B | >10.0 and 20.0 |
| C | >20.0 and 35.0 |
| D | >35.0 and 55.0 |
| E | >55.0 and 80.0 |
| F | > 80.0 |

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

VEHICULAR LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 6th EDITION)

The level of service criteria for vehicles at unsignalized intersections is defined as the average control delay, in seconds per vehicle.

LOS delay threshold values are lower for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections than those of signalized intersections. This is because more vehicles pass through signalized intersections, and therefore, drivers expect and tolerate greater delays. While the criteria for level of service for TWSC and AWSC intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

| Level of Service | Average Control Delay (sec/veh) |
|------------------|---------------------------------|
| A | 10 |
| B | >10 and 15 |
| C | >15 and 25 |
| D | >25 and 35 |
| E | >35 and 50 |
| F | > 50 |

APPENDIX C

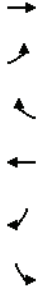
LEVEL OF SERVICE CALCULATIONS

- Existing AM Peak

HCM 6th Signalized Intersection Summary

1: Maui Veterans Hwy & Nakii Rd

DHHH Pulehunui TIAR
07/26/2018



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|--|------|------|------|------|------|
| Lane Configurations | W | W | ↑↑ | ↑ | ↑ | ↑↑ |
| Traffic Volume (veh/h) | 25 | 88 | 1259 | 22 | 119 | 1194 |
| Future Volume (veh/h) | 25 | 88 | 1259 | 22 | 119 | 1194 |
| Initial Q (Ob.) veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1870 | 1826 | 1826 | 1870 |
| Adj Flow Rate, veh/h | 27 | 0 | 1368 | 12 | 129 | 1298 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 2 | 5 | 5 | 2 |
| Cap. veh/h | 57 | 0 | 1856 | 808 | 165 | 2582 |
| Arrive On Green | 0.03 | 0.00 | 0.52 | 0.52 | 0.09 | 0.73 |
| Sat Flow, veh/h | 1748 | 0 | 3647 | 1547 | 1739 | 3647 |
| Grp Volume(v), veh/h | 28 | 0 | 1368 | 12 | 129 | 1298 |
| Grp Sat Flow(s),veh/h | 1813 | 0 | 1777 | 1547 | 1739 | 1777 |
| Q Serve(g.s), s | 0.7 | 0.0 | 13.7 | 0.2 | 3.3 | 7.2 |
| Cycle Q Clear(g.c), s | 0.7 | 0.0 | 13.7 | 0.2 | 3.3 | 7.2 |
| Prop In Lane | 0.96 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 59 | 0 | 1856 | 808 | 165 | 2582 |
| V/C Ratio(X) | 0.47 | 0.00 | 0.74 | 0.01 | 0.78 | 0.50 |
| Avail Cap(c.a), veh/h | 198 | 0 | 2411 | 1050 | 304 | 3422 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.7 | 0.0 | 8.5 | 5.3 | 20.2 | 2.7 |
| Incr Delay (d2), s/veh | 5.7 | 0.0 | 0.9 | 0.0 | 7.8 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%) veh/h | 0.4 | 0.0 | 3.0 | 0.0 | 1.5 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 27.4 | 0.0 | 9.3 | 5.3 | 28.0 | 2.8 |
| LnGrp LOS | C | A | A | A | C | A |
| Approach Vol, veh/h | 28 | 1380 | | | 1427 | |
| Approach Delay, s/veh | 27.4 | 9.3 | | | 5.1 | |
| Approach LOS | C | A | | | A | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 9.3 | 29.9 | | | 39.2 | 6.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 8.0 | 31.0 | | | 44.0 | 5.0 |
| Max Q Clear Time (g_c+I1), s | 5.3 | 15.7 | | | 9.2 | 2.7 |
| Green Ext Time (g_e), s | 0.1 | 8.2 | | | 11.2 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 7.4 | | | |
| HCM 6th LOS | | | A | | | |
| Notes | User approved volume balancing among the lanes for turning movement. | | | | | |

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 07/26/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 3 | 0 | 1 | 3 | 0 | 17 | 2 | 1262 | 4 | 19 | 1167 | 21 |
| Future Volume (veh/h) | 3 | 0 | 1 | 3 | 0 | 17 | 2 | 1262 | 4 | 19 | 1167 | 21 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1870 | 1530 | 1352 | 1870 | 1900 | 1900 |
| Adj Flow Rate, veh/h | 3 | 0 | 3 | 0 | 3 | 0 | 2 | 1372 | 3 | 21 | 1268 | 15 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2100 | 766 | 33 | 2180 |
| Cap, veh/h | 162 | 0 | 162 | 0 | 162 | 0 | 5 | 2100 | 766 | 33 | 2180 | 988 |
| Arrive On Green | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.59 | 0.03 | 0.61 | 0.61 | 0.61 |
| Sat Flow, veh/h | 1516 | 0 | 1516 | 0 | 1516 | 0 | 1810 | 3554 | 1296 | 1287 | 3554 | 1610 |
| Grp Volume(v), veh/h | 3 | 0 | 3 | 0 | 3 | 0 | 2 | 1372 | 3 | 21 | 1268 | 15 |
| Grp Sat Flow(s), veh/hln | 1516 | 0 | 1516 | 0 | 1516 | 0 | 1810 | 1777 | 1296 | 1287 | 1777 | 1610 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 12.3 | 0.0 | 0.8 | 10.3 | 0.2 |
| Cycle Q Clear(g.c), s | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 12.3 | 0.0 | 0.8 | 10.3 | 0.2 | 0.2 |
| Prop In Lane | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 162 | 0 | 162 | 0 | 162 | 0 | 5 | 2100 | 766 | 33 | 2180 | 988 |
| V/C Ratio(X) | 0.02 | 0.00 | 0.02 | 0.00 | 0.02 | 0.00 | 0.40 | 0.65 | 0.00 | 0.64 | 0.58 | 0.02 |
| Avail Cap(c), veh/h | 1143 | 0 | 1143 | 0 | 1143 | 0 | 529 | 6972 | 2543 | 376 | 6972 | 3159 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 23.6 | 0.0 | 23.6 | 0.0 | 23.6 | 0.0 | 23.9 | 6.5 | 4.0 | 23.1 | 5.6 | 3.6 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 45.3 | 0.3 | 0.0 | 19.0 | 0.2 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/ln.Q | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 2.2 | 0.0 | 0.4 | 1.6 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 23.7 | 0.0 | 23.7 | 0.0 | 23.7 | 0.0 | 69.2 | 6.9 | 4.0 | 42.1 | 5.8 | 3.6 |
| LnGrp LOS | C | A | A | C | A | A | E | A | A | D | A | A |
| Approach Vol, veh/h | 3 | | | 3 | | | 1377 | | | 1304 | | |
| Approach Delay, s/veh | 23.7 | | | 23.7 | | | 7.0 | | | 6.4 | | |
| Approach LOS | C | | | C | | | A | | | A | | |
| Timer - Assigned PHS | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 34.3 | 6.4 | 6.1 | 35.4 | 6.4 | | | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | | | | |
| Max Green Setting (Gmax) & | 94.0 | 33.0 | 14.0 | 94.0 | 33.0 | | | | | | | |
| Max Q Clear Time (g_c+I2), s | 14.3 | 2.1 | 2.1 | 12.3 | 2.1 | | | | | | | |
| Green Ext Time (g_c), s | 0.0 | 14.0 | 0.0 | 0.0 | 12.2 | 0.0 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |

HCM 6th TWSC
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 07/26/2018

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|--------|--------|--------|----------------|--------|--------|------|-------|------|------|------|------|
| Int Delay, s/veh | | | | | | | | | | | | |
| Int Delay, s/veh | 0.1 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 1256 | 4 | 3 | 1164 | 0 |
| Future Vol, veh/h | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 1256 | 4 | 3 | 1164 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | - | - | - | - | Stop | Yield | - | - | - | None |
| Storage Length | - | - | - | - | - | - | 100 | 525 | - | 425 | 625 | - |
| Veh in Median Storage, # | - | - | - | - | - | - | 0 | 0 | 0 | 0 | 0 | - |
| Grade, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Mvmt Flow | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 1365 | 4 | 3 | 1265 | 0 |
| Major/Minor | Minor2 | Minor2 | Minor1 | Major1 | Major1 | Major2 | | | | | | |
| Conflicting Flow All | 1958 | 2640 | 633 | 2008 | 2640 | 683 | 1265 | 0 | 0 | 1365 | 0 | 0 |
| Stage 1 | 1271 | 1271 | - | 1369 | 1369 | - | - | - | - | - | - | - |
| Stage 2 | 687 | 1369 | - | 639 | 1271 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 | 4.1 | - | - | 4.1 | - | - |
| Critical Hdwy Stg 1 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 | 2.2 | - | - | 2.2 | - | - |
| Pd Cap-1 Maneuver | 39 | 24 | 427 | 36 | 24 | 396 | 556 | - | - | 510 | - | - |
| Stage 1 | 181 | 241 | - | 157 | 216 | - | - | - | - | - | - | - |
| Stage 2 | 408 | 216 | - | 436 | 241 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | | | | | |
| Mov Cap-1 Maneuver | 38 | 24 | 427 | 36 | 24 | 396 | 556 | - | - | 510 | - | - |
| Mov Cap-2 Maneuver | 38 | 24 | - | 36 | 24 | - | - | - | - | - | - | - |
| Stage 1 | 180 | 240 | - | 156 | 215 | - | - | - | - | - | - | - |
| Stage 2 | 404 | 215 | - | 433 | 240 | - | - | - | - | - | - | - |
| Approach | EB | WB | NB | NB | NB | SB | | | | | | |
| HCM Control Delay, s | 0 | 62.7 | 0 | 0 | 0 | 0 | | | | | | |
| HCM LOS | A | F | | | | | | | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLmTWBLmWBLn2 | SBL | SBT | SBR | | | | | |
| Capacity (veh/h) | 556 | - | - | 36 | 396 | 510 | - | - | - | - | - | - |
| HCM Lane V/C Ratio | 0.004 | - | - | 0.06 | 0.005 | 0.006 | - | - | - | - | - | - |
| HCM Control Delay (s) | 11.5 | - | - | 0 | 111.3 | 14.1 | 12.1 | - | - | - | - | - |
| HCM Lane LOS | B | - | - | A | F | B | B | - | - | - | - | - |
| HCM 95th %ile Q(veh) | 0 | - | - | 0.2 | 0 | 0 | - | - | - | - | - | - |

HCM 6th Signalized Intersection Summary
5: Piliiani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
07/26/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | ← | ← | ← | ← | ← | ← | ← | ← | ← | ← | ← | ← |
| Traffic Volume (veh/h) | 242 | 2 | 330 | 6 | 0 | 1 | 453 | 1020 | 9 | 2 | 983 | 18 |
| Future Volume (veh/h) | 242 | 2 | 330 | 6 | 0 | 1 | 453 | 1020 | 9 | 2 | 983 | 18 |
| Initial Q (Qsb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 264 | 0 | 224 | 7 | 0 | 1 | 492 | 1109 | 6 | 2 | 1068 | 7 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 445 | 0 | 988 | 15 | 0 | 13 | 646 | 1972 | 879 | 4 | 1315 | 587 |
| Arrive On Green | 0.12 | 0.00 | 0.12 | 0.01 | 0.00 | 0.01 | 0.19 | 0.55 | 0.55 | 0.00 | 0.37 | 0.37 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 264 | 0 | 224 | 7 | 0 | 1 | 492 | 1109 | 6 | 2 | 1068 | 7 |
| Grp Sat Flow(s),veh/h | 1781 | 0 | 1585 | 1781 | 0 | 1585 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g,s), s | 5.0 | 0.0 | 3.7 | 0.3 | 0.0 | 0.0 | 9.6 | 14.3 | 0.1 | 0.1 | 19.2 | 0.2 |
| Cycle Q Clear(g,c), s | 5.0 | 0.0 | 3.7 | 0.3 | 0.0 | 0.0 | 9.6 | 14.3 | 0.1 | 0.1 | 19.2 | 0.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 445 | 0 | 988 | 15 | 0 | 13 | 646 | 1972 | 879 | 4 | 1315 | 587 |
| V/C Ratio(X) | 0.59 | 0.00 | 0.23 | 0.48 | 0.00 | 0.08 | 0.76 | 0.56 | 0.01 | 0.52 | 0.81 | 0.01 |
| Avail Cap(c), veh/h | 1857 | 0 | 2245 | 126 | 0 | 112 | 1656 | 2854 | 1273 | 226 | 1602 | 715 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.4 | 0.0 | 18.1 | 35.0 | 0.0 | 34.9 | 27.4 | 10.2 | 7.1 | 35.4 | 20.1 | 14.1 |
| Incr Delay (d2), s/veh | 1.3 | 0.0 | 0.1 | 22.2 | 0.0 | 2.5 | 1.9 | 0.3 | 0.0 | 78.4 | 2.7 | 0.0 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/h | 2.1 | 0.0 | 1.3 | 0.2 | 0.0 | 0.0 | 3.7 | 4.3 | 0.0 | 0.1 | 7.2 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 30.6 | 0.0 | 18.2 | 57.2 | 0.0 | 37.4 | 29.3 | 10.5 | 7.1 | 113.7 | 22.9 | 14.1 |
| LnGrp LOS | C | A | B | E | A | D | C | B | A | F | C | B |
| Approach Vol, veh/h | 488 | | | 8 | | | 1607 | | | | 1077 | |
| Approach Delay, s/veh | 24.9 | | | 54.8 | | | 16.2 | | | | 23.0 | |
| Approach LOS | C | | | D | | | B | | | | C | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 6.2 | 45.4 | 5.6 | 19.3 | 32.3 | 13.9 | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax), s | 9.0 | 57.0 | 5.0 | 34.0 | 32.0 | 37.0 | | | | | | |
| Max Q Clear Time (g_c+1t), s | 2.1 | 16.3 | 2.3 | 11.6 | 21.2 | 7.0 | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 9.2 | 0.0 | 1.7 | 5.1 | 1.9 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Existing PM Peak

HCM 6th Signalized Intersection Summary
 1: Maui Veterans Hwy & Nakii Rd

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 07/26/2018

DHHL Pulehunui TIAR
 07/26/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--|------|------|------|------|------|------|
| Lane Configurations | W | W | ↑↑ | ↑ | ↑ | ↑↑ |
| Traffic Volume (veh/h) | 25 | 128 | 1352 | 23 | 60 | 1513 |
| Future Volume (veh/h) | 25 | 128 | 1352 | 23 | 60 | 1513 |
| Initial Q (Obj), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1870 | 1648 | 1752 | 1870 |
| Adj Flow Rate, veh/h | 27 | 0 | 1470 | 14 | 65 | 1645 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 2 | 17 | 10 | 2 |
| Cap, veh/h | 57 | 0 | 1984 | 780 | 102 | 2588 |
| Arrive On Green | 0.03 | 0.00 | 0.56 | 0.56 | 0.06 | 0.73 |
| Sat Flow, veh/h | 1748 | 0 | 3647 | 1397 | 1668 | 3647 |
| Grp Volume(v), veh/h | 28 | 0 | 1470 | 14 | 65 | 1645 |
| Grp Sat Flow(s),veh/h/m | 1813 | 0 | 1777 | 1397 | 1668 | 1777 |
| Q Serve(g,s), s | 0.7 | 0.0 | 14.3 | 0.2 | 1.8 | 10.8 |
| Cycle Q Clear(g,c), s | 0.7 | 0.0 | 14.3 | 0.2 | 1.8 | 10.8 |
| Prop In Lane | 0.96 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 59 | 0 | 1984 | 780 | 102 | 2588 |
| VC Ratio(x) | 0.47 | 0.00 | 0.74 | 0.02 | 0.64 | 0.64 |
| Avail Cap(c,a), veh/h | 236 | 0 | 2549 | 1002 | 181 | 3322 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 21.9 | 0.0 | 7.7 | 4.5 | 21.1 | 3.2 |
| Incr Delay (d2), s/veh | 5.7 | 0.0 | 0.9 | 0.0 | 6.4 | 0.3 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/m | 0.4 | 0.0 | 2.9 | 0.0 | 0.7 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 27.6 | 0.0 | 8.5 | 4.5 | 27.5 | 3.4 |
| LnGrp LOS | C | A | A | A | C | A |
| Approach Vol, veh/h | 28 | | 1484 | | | 1710 |
| Approach Delay, s/veh | 27.6 | | 8.5 | | | 4.3 |
| Approach LOS | C | | A | | | A |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+R), s | 7.8 | 31.7 | | | 39.5 | 6.5 |
| Change Period (Y+R), s | 5.0 | 6.0 | | | 6.0 | 6.0 |
| Max Green Setting (Gmax), s | 5.0 | 33.0 | | | 43.0 | 6.0 |
| Max Q Clear Time (g_c+I1), s | 3.8 | 16.3 | | | 12.8 | 2.7 |
| Green Ext Time (g_e), s | 0.0 | 9.3 | | | 15.0 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | | | 6.5 | |
| HCM 6th LOS | | | | | A | |
| Notes | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|-------|------|------|------|
| Lane Configurations | + | + | + | + | + | + | + | + | + | + | + | + |
| Traffic Volume (veh/h) | 23 | 0 | 13 | 1 | 0 | 23 | 11 | 1282 | 4 | 10 | 1372 | 13 |
| Future Volume (veh/h) | 23 | 0 | 13 | 1 | 0 | 23 | 11 | 1282 | 4 | 10 | 1372 | 13 |
| Initial Q (Obj), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1870 | 788 | 863 | 1870 | 1900 | |
| Adj Flow Rate, veh/h | 25 | 0 | 0 | 1 | 0 | 12 | 1393 | 3 | 11 | 1491 | 9 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 75 | 70 | 2 | 0 | |
| Cap, veh/h | 178 | 0 | 184 | 0 | 28 | 2205 | 415 | 12 | 2201 | 997 | | |
| Arrive On Green | 0.03 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.02 | 0.62 | 0.01 | 0.62 | 0.62 | |
| Sat Flow, veh/h | 1447 | 0 | 1650 | 0 | 1810 | 3554 | 668 | 822 | 3554 | 1610 | | |
| Grp Volume(v), veh/h | 25 | 0 | 1 | 0 | 12 | 1393 | 3 | 11 | 1491 | 9 | | |
| Grp Sat Flow(s),veh/h/m | 1447 | 0 | 1650 | 0 | 1810 | 1777 | 668 | 822 | 1777 | 1610 | | |
| Q Serve(g,s), s | 0.9 | 0.0 | 0.0 | 0.0 | 0.4 | 13.1 | 0.1 | 0.7 | 14.8 | 0.1 | | |
| Cycle Q Clear(g,c), s | 0.9 | 0.0 | 0.0 | 0.0 | 0.4 | 13.1 | 0.1 | 0.7 | 14.8 | 0.1 | | |
| Prop In Lane | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Lane Grp Cap(c), veh/h | 178 | 0 | 184 | 0 | 28 | 2205 | 415 | 12 | 2201 | 997 | | |
| VC Ratio(x) | 0.14 | 0.00 | 0.01 | 0.00 | 0.00 | 0.43 | 0.63 | 0.01 | 0.95 | 0.68 | | |
| Avail Cap(c,a), veh/h | 1047 | 0 | 1053 | 0 | 472 | 6228 | 1171 | 214 | 6228 | 2822 | | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | |
| Uniform Delay (d), s/veh | 25.7 | 0.0 | 0.0 | 25.3 | 0.0 | 26.2 | 6.4 | 3.9 | 26.4 | 6.7 | | |
| Incr Delay (d2), s/veh | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 10.4 | 0.3 | 0.0 | 10.9 | 2.4 | | |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| %ile BackOf(50%),veh/m | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 2.5 | 0.0 | 0.5 | 2.8 | | |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 26.0 | 0.0 | 0.0 | 25.3 | 0.0 | 36.6 | 6.7 | 3.9 | 135.6 | 7.1 | | |
| LnGrp LOS | C | A | A | C | A | A | D | A | F | A | | |
| Approach Vol, veh/h | 25 | | | 1 | | 1408 | | | | 1511 | | |
| Approach Delay, s/veh | 26.0 | | | 25.3 | | 6.9 | | | | 8.0 | | |
| Approach LOS | C | | | C | | A | | | | A | | |
| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+R), s | 6.8 | 39.3 | | 7.6 | 6.8 | 39.2 | | 7.6 | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | 6.0 | | | | |
| Max Green Setting (Gmax), s | 34.0 | 14.0 | | 34.0 | 14.0 | 94.0 | | 34.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 2.9 | 2.4 | | 16.8 | 2.0 | | | 2.0 | | | | |
| Green Ext Time (g_e), s | 0.0 | 14.4 | | 0.1 | 0.0 | 16.5 | | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | 7.6 | | | | | | |
| HCM 6th LOS | | | | | | A | | | | | | |

HCM 6th TWSC
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 07/26/2018

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|-------|------|------|
| Initial Delay, s/veh | 0.1 | | | | | | | | | | | |
| Lane Configurations | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Traffic Volume (veh/h) | 0 | 0 | 0 | 2 | 0 | 4 | 2 | 1272 | 8 | 3 | 1369 | 0 |
| Future Volume (veh/h) | 0 | 0 | 0 | 2 | 0 | 4 | 2 | 1272 | 8 | 3 | 1369 | 0 |
| Initial Q (Obs), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | | | | | | | | | | | | |
| Parking Bus, Adj | | | | | | | | | | | | |
| Work Zone On Approach | | | | | | | | | | | | |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 235 | 0 | 320 | 14 | 4 | 0 | 499 | 1183 | 7 | 1 | 1314 | 75 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 462 | 0 | 993 | 29 | 31 | 0 | 635 | 2064 | 916 | 2 | 1404 | 626 |
| Arrive On Green | 0.13 | 0.00 | 0.13 | 0.02 | 0.02 | 0.00 | 0.18 | 0.58 | 0.58 | 0.00 | 0.40 | 0.40 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1870 | 0 | 3456 | 3554 | 1885 | 1781 | 3554 | 1585 |
| Grp Volume(V), veh/h | 235 | 0 | 320 | 14 | 4 | 0 | 499 | 1183 | 7 | 1 | 1314 | 75 |
| Grp Sat Flow(s),veh/h | 1781 | 0 | 1585 | 1781 | 1870 | 0 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g.s), s | 4.9 | 0.0 | 6.2 | 0.6 | 0.2 | 0.0 | 11.0 | 16.9 | 0.1 | 0.0 | 28.4 | 2.4 |
| Cycle Q Clear(g.c), s | 4.9 | 0.0 | 6.2 | 0.6 | 0.2 | 0.0 | 11.0 | 16.9 | 0.1 | 0.0 | 28.4 | 2.4 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 462 | 0 | 993 | 29 | 31 | 0 | 635 | 2064 | 916 | 2 | 1404 | 626 |
| VC Ratio(X) | 0.51 | 0.00 | 0.32 | 0.48 | 0.13 | 0.00 | 0.79 | 0.58 | 0.01 | 0.45 | 0.94 | 0.12 |
| Avail Cap(c), veh/h | 1648 | 0 | 2049 | 111 | 117 | 0 | 1469 | 2532 | 1129 | 200 | 1421 | 634 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 32.4 | 0.0 | 21.0 | 39.0 | 38.8 | 0.0 | 31.1 | 10.7 | 7.2 | 39.9 | 23.2 | 15.4 |
| Incr Delay (d2), s/veh | 0.9 | 0.0 | 0.2 | 11.5 | 1.9 | 0.0 | 2.2 | 0.3 | 0.0 | 10.1 | 11.7 | 0.1 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%),veh/h | 2.1 | 0.0 | 2.2 | 0.4 | 0.1 | 0.0 | 4.4 | 5.2 | 0.0 | 0.1 | 12.6 | 0.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 33.3 | 0.0 | 21.2 | 50.5 | 40.6 | 0.0 | 33.3 | 10.9 | 7.2 | 141.1 | 34.9 | 15.4 |
| LnGrp LOS | C | A | C | D | A | C | B | A | F | C | C | B |
| Approach Delay, s/veh | | | | | | | | | | | | |
| Approach LOS | | | | | | | | | | | | |
| Approach Delay, s/veh | 555 | | | 18 | | | 1689 | | | | | 1390 |
| Approach LOS | C | | | D | | | B | | | | | C |
| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | 8 | | | | | |
| Phs Duration (G+Y+Rc), s | 6.1 | 52.2 | | 6.3 | 20.7 | 37.6 | 15.4 | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 5.0 | 6.0 | 6.0 | 5.0 | | | | | |
| Max Green Setting (Gmax), s | 9.0 | 57.0 | | 5.0 | 34.0 | 32.0 | 37.0 | | | | | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 18.9 | | 2.6 | 13.0 | 30.4 | 8.2 | | | | | |
| Green Ext Time (g_e), s | 0.0 | 10.0 | | 0.0 | 1.7 | 1.2 | 2.2 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | 25.3 | | | | | |
| HCM 6th LOS | | | | | | | C | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 5: Piliiani Hwy/Maui Veterans Hwy & N Kihei Rd/Monsanto Drwy

DHHL Pulehunui TIAR
 07/26/2018

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Traffic Volume (veh/h) | 216 | 0 | 391 | 13 | 4 | 11 | 459 | 1088 | 11 | 1 | 1209 | 205 |
| Future Volume (veh/h) | 216 | 0 | 391 | 13 | 4 | 11 | 459 | 1088 | 11 | 1 | 1209 | 205 |
| Initial Q (Obs), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 235 | 0 | 320 | 14 | 4 | 0 | 499 | 1183 | 7 | 1 | 1314 | 75 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 462 | 0 | 993 | 29 | 31 | 0 | 635 | 2064 | 916 | 2 | 1404 | 626 |
| Arrive On Green | 0.13 | 0.00 | 0.13 | 0.02 | 0.02 | 0.00 | 0.18 | 0.58 | 0.58 | 0.00 | 0.40 | 0.40 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1870 | 0 | 3456 | 3554 | 1885 | 1781 | 3554 | 1585 |
| Grp Volume(V), veh/h | 235 | 0 | 320 | 14 | 4 | 0 | 499 | 1183 | 7 | 1 | 1314 | 75 |
| Grp Sat Flow(s),veh/h | 1781 | 0 | 1585 | 1781 | 1870 | 0 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g.s), s | 4.9 | 0.0 | 6.2 | 0.6 | 0.2 | 0.0 | 11.0 | 16.9 | 0.1 | 0.0 | 28.4 | 2.4 |
| Cycle Q Clear(g.c), s | 4.9 | 0.0 | 6.2 | 0.6 | 0.2 | 0.0 | 11.0 | 16.9 | 0.1 | 0.0 | 28.4 | 2.4 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 462 | 0 | 993 | 29 | 31 | 0 | 635 | 2064 | 916 | 2 | 1404 | 626 |
| VC Ratio(X) | 0.51 | 0.00 | 0.32 | 0.48 | 0.13 | 0.00 | 0.79 | 0.58 | 0.01 | 0.45 | 0.94 | 0.12 |
| Avail Cap(c), veh/h | 1648 | 0 | 2049 | 111 | 117 | 0 | 1469 | 2532 | 1129 | 200 | 1421 | 634 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 32.4 | 0.0 | 21.0 | 39.0 | 38.8 | 0.0 | 31.1 | 10.7 | 7.2 | 39.9 | 23.2 | 15.4 |
| Incr Delay (d2), s/veh | 0.9 | 0.0 | 0.2 | 11.5 | 1.9 | 0.0 | 2.2 | 0.3 | 0.0 | 10.1 | 11.7 | 0.1 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%),veh/h | 2.1 | 0.0 | 2.2 | 0.4 | 0.1 | 0.0 | 4.4 | 5.2 | 0.0 | 0.1 | 12.6 | 0.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 33.3 | 0.0 | 21.2 | 50.5 | 40.6 | 0.0 | 33.3 | 10.9 | 7.2 | 141.1 | 34.9 | 15.4 |
| LnGrp LOS | C | A | C | D | A | C | B | A | F | C | C | B |
| Approach Delay, s/veh | | | | | | | | | | | | |
| Approach LOS | | | | | | | | | | | | |
| Approach Delay, s/veh | 555 | | | 18 | | | 1689 | | | | | 1390 |
| Approach LOS | C | | | D | | | B | | | | | C |
| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | 8 | | | | | |
| Phs Duration (G+Y+Rc), s | 6.1 | 52.2 | | 6.3 | 20.7 | 37.6 | 15.4 | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 5.0 | 6.0 | 6.0 | 5.0 | | | | | |
| Max Green Setting (Gmax), s | 9.0 | 57.0 | | 5.0 | 34.0 | 32.0 | 37.0 | | | | | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 18.9 | | 2.6 | 13.0 | 30.4 | 8.2 | | | | | |
| Green Ext Time (g_e), s | 0.0 | 10.0 | | 0.0 | 1.7 | 1.2 | 2.2 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | 25.3 | | | | | |
| HCM 6th LOS | | | | | | | C | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

APPENDIX C LEVEL OF SERVICE CALCULATIONS

- Existing WE Peak

HCM 6th Signalized Intersection Summary 1: Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
07/26/2018



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|--|------|------|------|------|------|
| Lane Configurations | W | W | ↑↑ | ↑ | ↑ | ↑↑ |
| Traffic Volume (veh/h) | 8 | 46 | 1058 | 14 | 35 | 1091 |
| Future Volume (veh/h) | 8 | 46 | 1058 | 14 | 35 | 1091 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1870 | 1693 | 1767 | 1870 |
| Adj Flow Rate, veh/h | 9 | 0 | 1150 | 8 | 38 | 1186 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 2 | 14 | 9 | 2 |
| Cap, veh/h | 22 | 0 | 1811 | 731 | 74 | 2447 |
| Arrive On Green | 0.01 | 0.00 | 0.51 | 0.51 | 0.04 | 0.69 |
| Sat Flow, veh/h | 1636 | 0 | 3647 | 1434 | 1682 | 3647 |
| Grp Volume(v), veh/h | 10 | 0 | 1150 | 8 | 38 | 1186 |
| Grp Sat Flow(s), veh/h | 1818 | 0 | 1777 | 1434 | 1682 | 1777 |
| Q Serve(g_s), s | 0.2 | 0.0 | 8.7 | 0.1 | 0.8 | 5.8 |
| Cycle Q Clear(g_c), s | 0.2 | 0.0 | 8.7 | 0.1 | 0.8 | 5.8 |
| Prop In Lane | 0.90 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 24 | 0 | 1811 | 731 | 74 | 2447 |
| VC Ratio(X) | 0.42 | 0.00 | 0.64 | 0.01 | 0.52 | 0.48 |
| Avail Cap(c_a), veh/h | 296 | 0 | 3178 | 1283 | 228 | 4141 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 18.1 | 0.0 | 6.6 | 4.5 | 17.3 | 2.7 |
| Incr Delay (d2), s/veh | 11.1 | 0.0 | 0.4 | 0.0 | 5.5 | 0.1 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%), veh/h | 0.1 | 0.0 | 1.4 | 0.0 | 0.4 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 29.2 | 0.0 | 6.9 | 4.5 | 22.8 | 2.8 |
| LnGrp LOS | C | A | A | A | C | A |
| Approach Vol, veh/h | 10 | 1158 | | | 1224 | |
| Approach Delay, s/veh | 29.2 | 6.9 | | | 3.5 | |
| Approach LOS | C | A | | | A | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 6.6 | 24.8 | | | 31.4 | 5.5 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 5.0 | 33.0 | | | 43.0 | 6.0 |
| Max Q Clear Time (g_c+I1), s | 2.8 | 10.7 | | | 7.8 | 2.2 |
| Green Ext Time (g_e), s | 0.0 | 8.1 | | | 9.8 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 5.2 | | | |
| HCM 6th LOS | | | A | | | |
| Notes | User approved volume balancing among the lanes for turning movement. | | | | | |

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 07/26/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | 24 | 1 | 14 | 5 | 0 | 14 | 11 | 1033 | 2 | 6 | 1059 | 21 |
| Traffic Volume (veh/h) | 24 | 1 | 14 | 5 | 0 | 14 | 11 | 1033 | 2 | 6 | 1059 | 21 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Q _{sb}), veh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | No | No | No | No | No | No | No | No | No | No | No | No |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1870 | 1900 | 1411 | 1870 | 1900 |
| Adj Flow Rate, veh/h | 26 | 1 | 1 | 5 | 0 | 0 | 12 | 1123 | 1 | 7 | 1151 | 13 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cap, veh/h | 217 | 2 | 2 | 232 | 0 | 0 | 28 | 1872 | 848 | 13 | 1850 | 838 |
| Arrive On Green | 0.04 | 0.04 | 0.04 | 0.04 | 0.00 | 0.00 | 0.02 | 0.53 | 0.53 | 0.01 | 0.52 | 0.52 |
| Sat Flow, veh/h | 1377 | 53 | 53 | 1615 | 0 | 0 | 1810 | 3554 | 1610 | 1344 | 3554 | 1610 |
| Grp Volume(v), veh/h | 28 | 0 | 0 | 5 | 0 | 0 | 12 | 1123 | 1 | 7 | 1151 | 13 |
| Grp Sat Flow(s), veh/hln/483 | 0 | 0 | 0 | 1615 | 0 | 0 | 1810 | 1777 | 1610 | 1344 | 1777 | 1610 |
| Q Serve(g_s), s | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 9.2 | 0.0 | 0.2 | 9.7 | 0.2 |
| Cycle Q Clear(g_c), s | 0.8 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 9.2 | 0.0 | 0.2 | 9.7 | 0.2 |
| Prop In Lane | 0.93 | 0.04 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 221 | 0 | 0 | 232 | 0 | 0 | 28 | 1872 | 848 | 13 | 1850 | 838 |
| V/C Ratio(X) | 0.13 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.43 | 0.60 | 0.00 | 0.56 | 0.62 | 0.02 |
| Avail Cap(c), veh/h | 1338 | 0 | 0 | 1333 | 0 | 0 | 599 | 7902 | 3580 | 445 | 7902 | 3580 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 19.9 | 0.0 | 0.0 | 19.6 | 0.0 | 0.0 | 20.6 | 6.9 | 4.7 | 20.9 | 7.2 | 4.9 |
| Incr Delay (d2), s/veh | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.9 | 0.3 | 0.0 | 33.5 | 0.3 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/mn.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.7 | 0.0 | 0.2 | 1.8 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 20.2 | 0.0 | 0.0 | 19.7 | 0.0 | 0.0 | 30.5 | 7.2 | 4.7 | 54.4 | 7.5 | 4.9 |
| LnGrp LOS | C | A | A | B | A | A | C | A | A | D | A | A |
| Approach Delay, s/veh | 28 | | | 5 | | | 1136 | | | 1171 | | |
| Approach LOS | C | | | B | | | A | | | A | | |
| Timer - Assigned PHS | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s/6.4 | 28.3 | 7.6 | 6.7 | 28.0 | 7.6 | | | | | | | |
| Change Period (Y+R), s/6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | | | | |
| Max Green Setting (Gmax) & 94.0 | 34.0 | 14.0 | 14.0 | 94.0 | 34.0 | | | | | | | |
| Max Q Clear Time (g_c+1/2), s | 11.2 | 2.8 | 2.3 | 11.7 | 2.1 | | | | | | | |
| Green Ext Time (p_c), s | 0.0 | 9.8 | 0.1 | 0.0 | 10.3 | 0.0 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |

HCM 6th TWSC
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 07/26/2018

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|--------|--------|--------|-----------------|--------|--------|-------|-------|------|------|------|------|
| Int Delay, s/veh | 0.1 | | | | | | | | | | | |
| Lane Configurations | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 0 | 1051 | 2 | 8 |
| Traffic Vol, veh/h | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 0 | 1051 | 2 | 8 |
| Future Vol, veh/h | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 0 | 1051 | 2 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RT Channelized | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| Stp in Median Storage, # | - | - | - | - | - | - | 100 | 525 | - | 425 | 625 | - |
| Grade, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 0 | 1142 | 2 | 9 |
| Major/Minor | Minor2 | Minor1 | Minor1 | Major1 | Major1 | Major2 | | | | | | |
| Conflicting Flow All | 1742 | 2313 | 577 | 1737 | 2313 | 571 | 1153 | 0 | 0 | 1142 | 0 | 0 |
| Stage 1 | 1171 | 1142 | - | 1142 | 1142 | - | - | - | - | - | - | - |
| Stage 2 | 571 | 1142 | - | 595 | 1171 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 | 4.1 | - | - | 4.1 | - | - |
| Critical Hdwy Stg 1 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 | 2.2 | - | - | 2.2 | - | - |
| Pd Cap-1 Maneuver | 57 | 38 | 465 | 57 | 38 | 469 | 613 | - | - | 619 | - | - |
| Stage 1 | 208 | 269 | - | 217 | 278 | - | - | - | - | - | - | - |
| Stage 2 | 478 | 278 | - | 463 | 269 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | | | | | |
| Mov Cap-1 Maneuver | 56 | 37 | 465 | 56 | 37 | 469 | 613 | - | - | 619 | - | - |
| Mov Cap-2 Maneuver | 56 | 37 | - | 56 | 37 | - | - | - | - | - | - | - |
| Stage 1 | 208 | 265 | - | 217 | 278 | - | - | - | - | - | - | - |
| Stage 2 | 474 | 278 | - | 456 | 265 | - | - | - | - | - | - | - |
| Approach | EB | WB | NB | NB | NB | SB | | | | | | |
| HCM Control Delay, s | 0 | 32.4 | 0 | 0 | 0 | 0.1 | | | | | | |
| HCM LOS | A | D | | | | | | | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLmTWBLmTWBLn2 | SBL | SBT | SBR | | | | | |
| Capacity (veh/h) | 613 | - | - | - | 56 | 469 | 619 | - | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - | - | 0.039 | 0.009 | 0.014 | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | - | 0 | 71.9 | 12.7 | 10.9 | - | - | - | - |
| HCM Lane LOS | A | - | - | - | A | F | B | B | - | - | - | - |
| HCM 95th %ile Q(veh) | 0 | - | - | - | 0.1 | 0 | 0 | 0 | - | - | - | - |

HCM 6th Signalized Intersection Summary
5: Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
07/26/2018

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Base Year 2038 AM Peak

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 160 | 0 | 264 | 1 | 0 | 3 | 293 | 897 | 2 | 1 | 898 | 142 |
| Future Volume (veh/h) | 160 | 0 | 264 | 1 | 0 | 3 | 293 | 897 | 2 | 1 | 898 | 142 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 174 | 0 | 105 | 1 | 0 | 0 | 318 | 975 | 1 | 1 | 976 | 62 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 349 | 0 | 754 | 3 | 3 | 0 | 483 | 1830 | 816 | 3 | 1337 | 596 |
| Arrive On Green | 0.10 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.14 | 0.51 | 0.51 | 0.00 | 0.38 | 0.38 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1870 | 0 | 3456 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 174 | 0 | 105 | 1 | 0 | 0 | 318 | 975 | 1 | 1 | 976 | 62 |
| Grp Sat Flow(s),veh/h | 1781 | 0 | 1585 | 1781 | 1870 | 0 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g.s), s | 2.6 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 5.0 | 10.5 | 0.0 | 0.0 | 13.5 | 1.5 |
| Cycle Q Clear(g.q), s | 2.6 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 5.0 | 10.5 | 0.0 | 0.0 | 13.5 | 1.5 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 349 | 0 | 754 | 3 | 3 | 0 | 483 | 1830 | 816 | 3 | 1337 | 596 |
| V/C Ratio(X) | 0.50 | 0.00 | 0.14 | 0.32 | 0.00 | 0.00 | 0.66 | 0.53 | 0.00 | 0.32 | 0.73 | 0.10 |
| Avail Cap(c), veh/h | 2305 | 0 | 2494 | 156 | 164 | 0 | 2055 | 3542 | 1580 | 280 | 1989 | 887 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.5 | 0.0 | 17.2 | 28.5 | 0.0 | 0.0 | 23.3 | 9.3 | 6.7 | 28.5 | 15.3 | 11.6 |
| Incr Delay (d2), s/veh | 1.1 | 0.0 | 0.1 | 50.6 | 0.0 | 0.0 | 1.5 | 0.2 | 0.0 | 50.6 | 0.8 | 0.1 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q)(50%),veh/h | 1.1 | 0.0 | 0.5 | 0.1 | 0.0 | 0.0 | 1.9 | 2.8 | 0.0 | 0.1 | 4.4 | 0.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 25.5 | 0.0 | 17.3 | 79.2 | 0.0 | 0.0 | 24.8 | 9.5 | 6.7 | 79.2 | 16.1 | 11.7 |
| LnGrp LOS | C | A | B | E | A | A | C | A | A | E | B | B |
| Approach Vol, veh/h | 279 | | | 1 | | | 1294 | | | | 1039 | |
| Approach Delay, s/veh | 22.4 | | | 79.2 | | | 13.3 | | | | 15.9 | |
| Approach LOS | C | | | E | | | B | | | | B | |
| Timer - Assigned PHS | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 6.1 | 35.4 | 5.1 | 14.0 | 27.5 | 10.6 | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax), s | 9.0 | 57.0 | 5.0 | 34.0 | 32.0 | 37.0 | | | | | | |
| Max Q Clear Time (g_c+1T), s | 2.0 | 12.5 | 2.0 | 7.0 | 15.5 | 4.6 | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 7.7 | 0.0 | 1.1 | 6.0 | 1.0 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 1: Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
 10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|----------------------------------|------|------|------|------|-------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 75 | 265 | 1915 | 70 | 360 | 2280 |
| Future Volume (veh/h) | 75 | 265 | 1915 | 70 | 360 | 2280 |
| Initial Q (Q _{bb}) veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1366 | 1781 | 1870 | 1826 | 1826 | 1870 |
| Adj Flow Rate, veh/h | 82 | 85 | 2082 | 41 | 391 | 2478 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 36 | 8 | 2 | 5 | 5 | 2 |
| Cap. veh/h | 112 | 130 | 2138 | 931 | 253 | 2840 |
| Arrive On Green | 0.09 | 0.09 | 0.60 | 0.60 | 0.15 | 0.80 |
| Sat Flow, veh/h | 1301 | 1510 | 3647 | 1547 | 1739 | 3647 |
| Grp Volume(v), veh/h | 82 | 85 | 2082 | 41 | 391 | 2478 |
| Grp Sat Flow(s), veh/hln | 1301 | 1510 | 1777 | 1547 | 1739 | 1777 |
| Q Serve(g, s), s | 5.9 | 5.2 | 54.2 | 1.0 | 14.0 | 44.5 |
| Cycle Q Clear(g, c), s | 5.9 | 5.2 | 54.2 | 1.0 | 14.0 | 44.5 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 112 | 130 | 2138 | 931 | 253 | 2840 |
| V/C Ratio(x) | 0.73 | 0.65 | 0.97 | 0.04 | 1.54 | 0.87 |
| Avail Cap(c, a), veh/h | 433 | 502 | 2143 | 933 | 253 | 2845 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 42.8 | 42.5 | 18.4 | 7.8 | 41.1 | 6.4 |
| Incr Delay (d2), s/veh | 8.7 | 5.4 | 13.8 | 0.0 | 263.8 | 3.3 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/ln | 2.2 | 2.2 | 22.0 | 0.3 | 24.3 | 8.8 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d), s/veh | 51.5 | 47.9 | 32.2 | 7.9 | 304.9 | 9.7 |
| LnGrp LOS | D | D | C | A | F | A |
| Approach Vol, veh/h | 167 | 2123 | | | 2869 | |
| Approach Delay, s/veh | 49.7 | 31.7 | | | 49.9 | |
| Approach LOS | D | C | | | D | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 19.0 | 63.9 | | | 82.9 | 13.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Selling (Gmax), s | 14.0 | 58.0 | | | 77.0 | 32.0 |
| Max Q Clear Time (g, c+1T), s | 16.0 | 56.2 | | | 46.5 | 7.9 |
| Green Ext Time (p, c), s | 0.0 | 1.7 | | | 24.9 | 0.5 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 42.4 | | | |
| HCM 6th LOS | | | D | | | |

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | 5 | 0 | 5 | 50 | 0 | 110 | 5 | 1870 | 195 | 390 | 1940 | 25 |
| Traffic Volume (veh/h) | 5 | 0 | 5 | 50 | 0 | 110 | 5 | 1870 | 195 | 390 | 1940 | 25 |
| Future Volume (veh/h) | 5 | 0 | 5 | 50 | 0 | 110 | 5 | 1870 | 195 | 390 | 1940 | 25 |
| Initial Q (Q _{bb}) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1900 | 1900 | 1900 | 1900 | 507 | 1900 | 1870 | 1870 | 1530 | 1352 | 1870 | 1900 |
| Adj Flow Rate, veh/h | 5 | 0 | 1 | 54 | 0 | 5 | 2033 | 134 | 424 | 2109 | 19 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 94 | 0 | 2 | 25 | 37 | 2 | 0 |
| Cap. veh/h | 121 | 5 | 14 | 132 | 0 | 12 | 2395 | 874 | 157 | 2805 | 1271 | |
| Arrive On Green | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.01 | 0.67 | 0.12 | 0.79 | 0.79 | |
| Sat Flow, veh/h | 1339 | 112 | 290 | 1463 | 0 | 430 | 1810 | 3554 | 1296 | 1287 | 3554 | 1610 |
| Grp Volume(v), veh/h | 6 | 0 | 0 | 54 | 0 | 0 | 5 | 2033 | 134 | 424 | 2109 | 19 |
| Grp Sat Flow(s), veh/hln | 1742 | 0 | 0 | 1463 | 0 | 430 | 1810 | 1777 | 1296 | 1287 | 1777 | 1610 |
| Q Serve(g, s), s | 0.0 | 0.0 | 0.0 | 3.8 | 0.0 | 0.0 | 0.3 | 50.1 | 4.3 | 14.0 | 35.3 | 0.3 |
| Cycle Q Clear(g, c), s | 0.4 | 0.0 | 0.4 | 4.2 | 0.0 | 0.0 | 0.3 | 50.1 | 4.3 | 14.0 | 35.3 | 0.3 |
| Prop In Lane | 0.83 | 0.17 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 140 | 0 | 0 | 132 | 0 | 12 | 2395 | 874 | 157 | 2805 | 1271 | |
| V/C Ratio(x) | 0.04 | 0.00 | 0.00 | 0.41 | 0.00 | 0.43 | 0.85 | 0.15 | 2.70 | 0.75 | 0.01 | |
| Avail Cap(c, a), veh/h | 492 | 0 | 0 | 477 | 0 | 221 | 2908 | 1061 | 157 | 2908 | 1318 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Upstream Filler(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Uniform Delay (d), s/veh | 52.3 | 0.0 | 0.0 | 54.1 | 0.0 | 0.0 | 56.9 | 14.3 | 6.8 | 50.4 | 6.3 | 2.6 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 23.2 | 2.2 | 0.1 | 783.8 | 1.1 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/ln | 2.0 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 0.2 | 17.0 | 1.0 | 38.5 | 8.6 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d), s/veh | 52.4 | 0.0 | 0.0 | 56.1 | 0.0 | 0.0 | 80.1 | 16.4 | 6.9 | 834.2 | 7.4 | 2.6 |
| LnGrp LOS | D | A | A | E | A | F | B | A | F | A | A | A |
| Approach Vol, veh/h | 6 | | | 54 | | | 2172 | | | 2552 | | |
| Approach Delay, s/veh | 52.4 | | | 56.1 | | | 16.0 | | | 144.7 | | |
| Approach LOS | D | | | E | | | B | | | F | | |
| Timer - Assigned Phs | 1 | 2 | | 4 | | | 5 | | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 20.0 | 83.4 | | 11.4 | 6.7 | 96.7 | 11.4 | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | | | | | |
| Max Green Selling (Gmax), s | 33.0 | 14.0 | | 94.0 | | | 33.0 | | | | | |
| Max Q Clear Time (g, c+1T), s | 2.4 | 2.3 | | 37.3 | | | 6.2 | | | | | |
| Green Ext Time (p, c), s | 0.0 | 25.4 | | 0.0 | 0.0 | | 30.7 | | | 0.2 | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | 85.1 | | | F | | | | | |
| HCM 6th LOS | | | | F | | | | | | | | |

Notes
 Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

DHHL Pulehunui TIAR
 10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|----------------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 85 | 85 | 1970 | 250 | 250 | 1740 |
| Future Volume (veh/h) | 85 | 85 | 1970 | 250 | 250 | 1740 |
| Initial Q (Q _{sb}) veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 92 | 0 | 2141 | 176 | 272 | 1891 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 490 | 2459 | 1097 | 316 | 2873 | |
| Arrive On Green | 0.14 | 0.00 | 0.69 | 0.69 | 0.09 | 0.81 |
| Sat Flow, veh/h | 3456 | 1585 | 3647 | 1585 | 3456 | 3647 |
| Grp Volume(v), veh/h | 92 | 0 | 2141 | 176 | 272 | 1891 |
| Grp Sat Flow(s),veh/hln/728 | 1585 | 1777 | 1585 | 1728 | 1777 | |
| Q Serve(g.s), s | 4.2 | 0.0 | 84.0 | 6.9 | 14.0 | 39.2 |
| Cycle Q Clear(g.c), s | 4.2 | 0.0 | 84.0 | 6.9 | 14.0 | 39.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 490 | 2459 | 1097 | 316 | 2873 | |
| V/C Ratio(X) | 0.19 | 0.87 | 0.16 | 0.86 | 0.66 | |
| Avail Cap(c), veh/h | 490 | 2459 | 1097 | 432 | 2873 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.56 | 0.56 |
| Uniform Delay (d), s/veh | 68.1 | 0.0 | 21.5 | 9.6 | 80.6 | 7.1 |
| Incr Delay (d2), s/veh | 0.8 | 0.0 | 4.6 | 0.3 | 7.4 | 0.7 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 9 | 0.0 | 33.5 | 2.6 | 6.5 | 12.4 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)1/s/veh | 69.0 | 0.0 | 26.1 | 9.9 | 88.1 | 7.7 |
| LnGrp LOS | E | C | A | F | A | |
| Approach Vol, veh/h | 92 | A | 2317 | | 2163 | |
| Approach Delay, s/veh | 69.0 | | 24.8 | | 17.8 | |
| Approach LOS | E | C | C | | B | |
| Timer - Assigned Phs | 1 | 2 | | 6 | 8 | |
| Phs Duration (G+Y+R), s | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Max Green Selling (Gmax) s | 118.5 | 145.5 | 118.5 | 145.5 | 118.5 | 145.5 |
| Max Q Clear Time (g_c+I+M) s | 86.0 | 41.2 | 86.0 | 41.2 | 86.0 | 41.2 |
| Green Ext Time (p_c) s | 0.5 | 23.1 | 0.5 | 23.1 | 0.5 | 23.1 |
| Intersection Summary | | | 22.4 | | | |
| HCM 6th Ctrl Delay | | | | | | |
| HCM 6th LOS | | | | | | |

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 10/24/2018

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---------------------------|--------|--------------------|--------|-------------------------|--------|-----------------------------|----------|-------|------|------|------|------|
| Int Delay, s/veh | 288.5 | | | | | | | | | | | |
| Movement | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 0 | 65 | 0 | 40 | 5 | 2185 | 155 | 70 | 1755 | 0 |
| Future Vol, veh/h | 0 | 0 | 0 | 65 | 0 | 40 | 5 | 2185 | 155 | 70 | 1755 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | - | - | - | - | Stop | Yield | - | - | - | - |
| Storage Length | - | - | - | - | - | - | 100 | 525 | - | 425 | 625 | - |
| Veh in Median Storage, # | - | - | - | - | - | - | 0 | - | 0 | - | 0 | - |
| Grade, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 0 | 0 | 71 | 0 | 43 | 5 | 2375 | 168 | 76 | 1908 | 0 |
| Major/Minor | Minor2 | Minor1 | Minor1 | Major1 | Major1 | Major2 | | | | | | |
| Conflicting Flow All | 3258 | 4445 | 954 | 3491 | 4445 | 1188 | 1908 | 0 | 0 | 2375 | 0 | 0 |
| Stage 1 | 2060 | 2060 | - | 2385 | 2385 | - | - | - | - | - | - | - |
| Stage 2 | 1198 | 2385 | - | 1106 | 2060 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 | 4.1 | - | - | 4.1 | - | - |
| Critical Hdwy Stg 1 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 | 2.2 | - | - | 2.2 | - | - |
| Pl Cap-1 Maneuver | 4 | 1 | 263 | - | 3 | 1 | 184 | 316 | - | - | 207 | - |
| Stage 1 | 88 | 99 | - | - | 36 | 67 | - | - | - | - | - | - |
| Stage 2 | 200 | 67 | - | 228 | 99 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | | | | | |
| Mov Cap-1 Maneuver | 2 | 1 | 263 | - | 2 | 1 | 184 | 316 | - | - | 207 | - |
| Mov Cap-2 Maneuver | 2 | 1 | - | - | 2 | 1 | - | - | - | - | - | - |
| Stage 1 | 57 | 63 | - | - | 35 | 66 | - | - | - | - | - | - |
| Stage 2 | 150 | 66 | - | 144 | 63 | - | - | - | - | - | - | - |
| Approach | EB | WB | NB | NB | NB | SB | | | | | | |
| HCM Control Delay, s | 0 | \$ | 11726 | 0 | | | | | | | | 1.2 |
| HCM LOS | A | F | | | | | | | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLm1 | WBLm1 | WBLn2 | SBL | SBT | SBR | | | |
| Capacity (veh/h) | 316 | - | - | - | - | 2 | 184 | 207 | - | - | - | - |
| HCM Lane V/C Ratio | 0.017 | - | - | - | - | - | 0.236 | 0.368 | - | - | - | - |
| HCM Control Delay (s) | 16.6 | - | - | - | - | - | \$0.8923 | 3.305 | 32.2 | - | - | - |
| HCM Lane LOS | C | - | - | - | - | - | A | F | D | - | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | - | - | 11 | 0.9 | 1.6 | - | - | - |
| Notes | | | | | | | | | | | | |
| - Volume exceeds capacity | \$ | Delay exceeds 300s | + | Computation Not Defined | + | All major volume in platoon | | | | | | |

HCM 6th Signalized Intersection Summary
5: Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|------|------|------|------|-------|------|------|
| Lane Configurations | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 |
| Traffic Volume (veh/h) | 400 | 5 | 450 | 10 | 0 | 5 | 550 | 1940 | 10 | 5 | 1605 | 55 |
| Future Volume (veh/h) | 400 | 5 | 450 | 10 | 0 | 5 | 550 | 1940 | 10 | 5 | 1605 | 55 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 439 | 0 | 350 | 11 | 0 | 0 | 598 | 2109 | 8 | 5 | 1745 | 28 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 521 | 0 | 1067 | 17 | 18 | 0 | 658 | 2535 | 1131 | 9 | 1876 | 837 |
| Arrive On Green | 0.15 | 0.00 | 0.15 | 0.01 | 0.00 | 0.00 | 0.19 | 0.71 | 0.71 | 0.00 | 0.53 | 0.53 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1870 | 0 | 3456 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 439 | 0 | 350 | 11 | 0 | 0 | 598 | 2109 | 8 | 5 | 1745 | 28 |
| Grp Sat Flow(s), veh/h | 1781 | 0 | 1585 | 1781 | 1870 | 0 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 20.9 | 0.0 | 14.4 | 1.1 | 0.0 | 0.0 | 29.6 | 73.0 | 0.3 | 0.5 | 79.5 | 1.5 |
| Cycle Q Clear(g_c), s | 20.9 | 0.0 | 14.4 | 1.1 | 0.0 | 0.0 | 29.6 | 73.0 | 0.3 | 0.5 | 79.5 | 1.5 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 521 | 0 | 1067 | 17 | 18 | 0 | 658 | 2535 | 1131 | 9 | 1876 | 837 |
| V/C Ratio(x) | 0.84 | 0.00 | 0.33 | 0.65 | 0.00 | 0.00 | 0.91 | 0.83 | 0.01 | 0.57 | 0.93 | 0.03 |
| Avail Cap(c_a), veh/h | 715 | 0 | 1239 | 143 | 150 | 0 | 832 | 2709 | 1208 | 61 | 1976 | 881 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 72.5 | 0.0 | 43.2 | 86.1 | 0.0 | 0.0 | 69.1 | 17.6 | 7.2 | 86.6 | 38.2 | 19.8 |
| Incr Delay (d2), s/veh | 6.7 | 0.0 | 0.2 | 35.2 | 0.0 | 0.0 | 11.8 | 2.2 | 0.0 | 47.0 | 8.3 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/m | 10.1 | 0.0 | 5.8 | 0.7 | 0.0 | 0.0 | 14.0 | 27.6 | 0.1 | 0.3 | 35.3 | 0.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 79.2 | 0.0 | 43.3 | 121.4 | 0.0 | 0.0 | 81.0 | 19.9 | 7.2 | 133.6 | 46.5 | 19.8 |
| LnGrp LOS | E | A | D | F | A | A | F | B | A | F | D | B |
| Approach Vol, veh/h | 789 | | | 11 | | | 2715 | | | | 1778 | |
| Approach Delay, s/veh | 63.3 | | | 121.4 | | | 33.3 | | | | 46.3 | |
| Approach LOS | E | | | F | | | C | | | | D | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 6.9 | 130.5 | 6.7 | 39.2 | 98.1 | 30.5 | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax), s | 6.0 | 133.0 | 14.0 | 42.0 | 97.0 | 35.0 | | | | | | |
| Max Q Clear Time (g_c+1T), s | 2.5 | 75.0 | 3.1 | 31.6 | 81.5 | 22.9 | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 31.0 | 0.0 | 1.7 | 10.6 | 2.6 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | 42.3 | | | | | |
| HCM 6th LOS | | | | | | | D | | | | | |

Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Base Year 2038 PM Peak

HCM 6th Signalized Intersection Summary
 1: Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
 10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|-------|-------|-------|------|-------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 5 | 4 |
| Traffic Volume (veh/h) | 75 | 385 | 2945 | 70 | 180 | 2715 |
| Future Volume (veh/h) | 75 | 385 | 2945 | 70 | 180 | 2715 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1841 | 1856 | 1870 | 1648 | 1752 | 1870 |
| Adj Flow Rate, veh/h | 82 | 313 | 3201 | 52 | 196 | 2951 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 4 | 3 | 2 | 17 | 10 | 2 |
| Cap, veh/h | 146 | 131 | 2517 | 989 | 125 | 2932 |
| Arrive On Green | 0.08 | 0.08 | 0.71 | 0.71 | 0.08 | 0.82 |
| Sat Flow, veh/h | 1753 | 1572 | 3647 | 1397 | 1668 | 3647 |
| Grp Volume(v), veh/h | 82 | 313 | 3201 | 52 | 196 | 2951 |
| Grp Sat Flow(s), veh/h | 1753 | 1572 | 1777 | 1397 | 1668 | 1777 |
| Q Serve(g, s), s | 5.4 | 10.0 | 85.0 | 1.4 | 9.0 | 99.0 |
| Cycle Q Clear(g, c), s | 5.4 | 10.0 | 85.0 | 1.4 | 9.0 | 99.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 146 | 131 | 2517 | 989 | 125 | 2932 |
| V/C Ratio(x) | 0.56 | 2.39 | 1.27 | 0.05 | 1.57 | 1.01 |
| Avail Cap(c, a), veh/h | 146 | 131 | 2517 | 989 | 125 | 2932 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 52.9 | 55.0 | 17.5 | 5.3 | 55.5 | 10.5 |
| Incr Delay (d2), s/veh | 4.8 | 647.7 | 126.5 | 0.0 | 289.9 | 18.2 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m | 2.6 | 27.6 | 70.5 | 0.3 | 13.8 | 26.4 |
| Unsig. Movement Delay, s/veh | 57.7 | 702.7 | 143.0 | 5.3 | 345.4 | 28.7 |
| LnGrp Delay(d), s/veh | E | F | F | A | F | F |
| LnGrp LOS | E | F | F | A | F | F |
| Approach Vol, veh/h | 395 | 3253 | | | 3147 | |
| Approach Delay, s/veh | 568.8 | 140.8 | | | 48.4 | |
| Approach LOS | F | F | | | D | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 14.0 | 91.0 | | | 105.0 | 15.0 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Selling (Gmax), s | 9.0 | 85.0 | | | 99.0 | 10.0 |
| Max Q Clear Time (g, c+1T), s | 11.0 | 87.0 | | | 101.0 | 12.0 |
| Green Ext Time (p, c), s | 0.0 | 0.0 | | | 0.0 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | 122.9 | | | | | |
| HCM 6th LOS | F | | | | | |

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehameha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--|-------|------|-------|------|-------|------|-------|-------|-------|-------|------|
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 25 | 0 | 15 | 220 | 0 | 480 | 15 | 2485 | 100 | 235 | 2400 | 15 |
| Future Volume (veh/h) | 25 | 0 | 15 | 220 | 0 | 480 | 15 | 2485 | 100 | 235 | 2400 | 15 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1900 | 1900 | 1574 | 1900 | 1870 | 1870 | 788 | 863 | 1870 | 1900 |
| Adj Flow Rate, veh/h | 27 | 0 | 6 | 239 | 0 | 16 | 2701 | 70 | 295 | 2609 | 11 | 92 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 2 | 75 | 70 | 2 | 0 |
| Cap, veh/h | 299 | 4 | 58 | 307 | 0 | 29 | 2180 | 410 | 75 | 2447 | 1109 | 0 |
| Arrive On Green | 0.18 | 0.00 | 0.18 | 0.18 | 0.00 | 0.00 | 0.02 | 0.61 | 0.61 | 0.09 | 0.69 | 0.69 |
| Sat Flow, veh/h | 1440 | 25 | 325 | 1464 | 0 | 1334 | 1810 | 3554 | 668 | 822 | 3554 | 1610 |
| Grp Volume(v), veh/h | 33 | 0 | 0 | 239 | 0 | 0 | 16 | 2701 | 70 | 255 | 2609 | 11 |
| Grp Sat Flow(s), veh/h | 1790 | 0 | 0 | 1464 | 0 | 1334 | 1810 | 1777 | 668 | 822 | 1777 | 1610 |
| Q Serve(g, s), s | 0.0 | 0.0 | 0.0 | 22.2 | 0.0 | 0.0 | 1.3 | 94.0 | 6.9 | 14.0 | 105.5 | 0.3 |
| Cycle Q Clear(g, c), s | 2.3 | 0.0 | 0.0 | 24.5 | 0.0 | 0.0 | 1.3 | 94.0 | 6.9 | 14.0 | 105.5 | 0.3 |
| Prop In Lane | 0.82 | 0.18 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 361 | 0 | 0 | 307 | 0 | 29 | 2180 | 410 | 75 | 2447 | 1109 | 0 |
| V/C Ratio(x) | 0.09 | 0.00 | 0.00 | 0.78 | 0.00 | 0.55 | 1.24 | 0.17 | 3.40 | 1.07 | 0.01 | 0.01 |
| Avail Cap(c, a), veh/h | 426 | 0 | 0 | 370 | 0 | 765 | 2180 | 410 | 75 | 2447 | 1109 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 52.8 | 0.0 | 0.0 | 61.6 | 0.0 | 0.0 | 74.8 | 29.6 | 12.8 | 69.6 | 23.9 | 7.5 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.0 | 8.4 | 0.0 | 0.0 | 15.1 | 111.7 | 0.2 | 111.9 | 38.8 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m | 1.0 | 0.0 | 0.0 | 9.9 | 0.0 | 0.0 | 0.7 | 70.2 | 1.0 | 26.1 | 51.4 | 0.1 |
| Unsig. Movement Delay, s/veh | 52.9 | 0.0 | 0.0 | 70.0 | 0.0 | 0.0 | 89.9 | 141.3 | 13.0 | 118.1 | 62.7 | 7.5 |
| LnGrp Delay(d), s/veh | D | A | A | E | A | E | F | F | B | F | F | A |
| LnGrp LOS | D | A | A | E | A | E | F | F | B | F | F | A |
| Approach Vol, veh/h | 33 | 239 | A | 2787 | | | | | 2875 | | | |
| Approach Delay, s/veh | 52.9 | 70.0 | | 137.8 | | | | | 161.7 | | | |
| Approach LOS | D | E | | F | | | | | F | | | F |
| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | | 8 | | | |
| Phs Duration (G+Y+Rc), s | 20.0 | 100.0 | | 33.2 | 8.5 | 111.5 | | | 33.2 | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | | | 6.0 | | | |
| Max Green Selling (Gmax), s | 94.0 | 34.0 | | 14.0 | 94.0 | 34.0 | | | 94.0 | | | |
| Max Q Clear Time (g, c+1T), s | 3.3 | 107.5 | | 4.3 | 3.3 | 107.5 | | | 26.5 | | | |
| Green Ext Time (p, c), s | 0.0 | 0.0 | | 0.1 | 0.0 | 0.0 | | | 0.7 | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 146.2 | | | | | | | | | | | |
| HCM 6th LOS | F | | | | | | | | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

DHHL Pulehunui TIAR
 10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|--|-------|-------|-------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 445 | 450 | 2125 | 320 | 320 | 2330 |
| Future Volume (veh/h) | 445 | 450 | 2125 | 320 | 320 | 2330 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 484 | 0 | 2310 | 220 | 348 | 2533 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 540 | 2333 | 1041 | 388 | 2821 | |
| Arrive On Green | 0.16 | 0.00 | 0.66 | 0.66 | 0.11 | 0.79 |
| Sat Flow, veh/h | 3456 | 1585 | 3647 | 1585 | 3456 | 3647 |
| Grp Volume(v), veh/h | 484 | 0 | 2310 | 220 | 348 | 2533 |
| Grp Sat Flow(s), veh/h/mi/20 | 1585 | 1777 | 1585 | 1777 | 1585 | 1777 |
| Q Serve(g.s), s | 24.7 | 0.0 | 114.9 | 10.0 | 17.9 | 92.1 |
| Cycle Q Clear(g.c), s | 24.7 | 0.0 | 114.9 | 10.0 | 17.9 | 92.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 540 | 2333 | 1041 | 388 | 2821 | |
| V/C Ratio(X) | 0.90 | 0.99 | 0.21 | 0.90 | 0.90 | |
| Avail Cap(c), veh/h | 720 | 2333 | 1041 | 432 | 2821 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.09 | 0.09 |
| Uniform Filter(d), s/veh | 74.5 | 0.0 | 30.4 | 12.3 | 78.9 | 13.3 |
| Incr Delay (d2), s/veh | 11.3 | 0.0 | 16.5 | 0.5 | 2.4 | 0.5 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q)(50%), veh/mi | 9 | 0.0 | 50.3 | 3.8 | 8.0 | 30.0 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d), s/veh | 85.8 | 0.0 | 46.8 | 12.8 | 81.2 | 13.8 |
| LnGrp LOS | F | D | B | F | B | |
| Approach Vol, veh/h | 484 | A | 2530 | | 2881 | |
| Approach Delay, s/veh | 85.8 | | 43.9 | | 22.0 | |
| Approach LOS | F | D | C | | C | |
| Timer - Assigned PHS | 1 | 2 | | 6 | 8 | |
| Phs Duration (G+Y+R), s | 24.7 | 122.7 | | 147.4 | 32.6 | |
| Change Period (Y+R), s | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Max Green Selling (Gmax), s | 106.5 | 133.5 | | 133.5 | 37.5 | |
| Max Q Clear Time (g_c+ltt), s | 116.9 | 94.1 | | 94.1 | 26.7 | |
| Green Ext Time (p_c), s | 0.3 | 0.0 | | 31.3 | 1.4 | |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 36.6 | | | |
| HCM 6th LOS | | | D | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

HCM 6th TWSC
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 10/24/2018

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|--|--------|---------|--------|-----------|--------|-------|------|------|-------|------|------|
| In Delay, s/veh | 5526.2 | | | | | | | | | | | |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Vol, veh/h | 0 | 0 | 0 | 245 | 0 | 100 | 5 | 2330 | 170 | 60 | 2700 | 0 |
| Future Vol, veh/h | 0 | 0 | 0 | 245 | 0 | 100 | 5 | 2330 | 170 | 60 | 2700 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RT Channelized | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| Storage Length | - | - | - | - | - | - | 100 | 525 | - | Yield | - | None |
| Veh in Median Storage, # | - | - | - | - | - | - | 0 | 0 | 0 | 0 | 0 | 0 |
| Grade, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Mvmt Flow | 0 | 0 | 0 | 266 | 0 | 109 | 5 | 2533 | 185 | 65 | 2935 | 0 |
| Major/Minor | Minor2 | Minor1 | Minor1 | Major1 | Major1 | Major2 | | | | | | |
| Conflicting Flow All | 4342 | 5608 | 1468 | 4141 | 5608 | 1267 | 2935 | 0 | 0 | 2533 | 0 | 0 |
| Stage 1 | 3065 | 3065 | - | 2543 | 2543 | - | - | - | - | - | - | - |
| Stage 2 | 1277 | 2543 | - | 1598 | 3065 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 | 4.1 | - | - | 4.1 | - | - |
| Critical Hdwy Stg 1 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 | 2.2 | - | - | 2.2 | - | - |
| Pl Cap-1 Maneuver | 1 | 0 | 119 | -1 | 0 | 163 | 124 | - | - | 180 | - | - |
| Stage 1 | 13 | 29 | - | -28 | 56 | - | - | - | - | - | - | - |
| Stage 2 | 179 | 56 | - | -113 | 29 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | | | | | |
| Mov Cap-1 Maneuver | 0 | 0 | 119 | -1 | 0 | 163 | 124 | - | - | 180 | - | - |
| Mov Cap-2 Maneuver | 0 | 0 | - | -1 | 0 | - | - | - | - | - | - | - |
| Stage 1 | 12 | 19 | - | -27 | 54 | - | - | - | - | - | - | - |
| Stage 2 | 57 | 54 | - | -72 | 19 | - | - | - | - | - | - | - |
| Approach | EB | WB | NB | WB | NB | SB | | | | | | |
| HCM Control Delay, s | 0 | \$ | 89853.2 | F | 0.1 | 0.8 | | | | | | |
| HCM LOS | A | | | F | | | | | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLm1 | WBLm1 | WBLm2 | SBL | SBT | SBR | | | |
| Capacity (veh/h) | 124 | - | - | - | 1 | 163 | 180 | - | - | - | - | - |
| HCM Lane V/C Ratio | 0.044 | - | - | - | 266.304 | 0.667 | 0.362 | - | - | - | - | - |
| HCM Control Delay (s) | 35.4 | - | - | - | 1076502.3 | 62.8 | 35.9 | - | - | - | - | - |
| HCM Lane LOS | E | - | - | - | A | F | E | - | - | - | - | - |
| HCM 95th %ile Q(veh) | 0.1 | - | - | - | 35.9 | 3.8 | 1.5 | - | - | - | - | - |
| Notes | - Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
5: Piliiani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 365 | 0 | 530 | 15 | 5 | 15 | 625 | 2160 | 15 | 5 | 2540 | 430 |
| Future Volume (veh/h) | 365 | 0 | 530 | 15 | 5 | 15 | 625 | 2160 | 15 | 5 | 2540 | 430 |
| Initial Q (Qsb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 397 | 0 | 549 | 16 | 5 | 0 | 679 | 2348 | 11 | 5 | 2761 | 333 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 552 | 0 | 1149 | 24 | 25 | 0 | 717 | 2559 | 1141 | 9 | 1839 | 820 |
| Arrive On Green | 0.16 | 0.00 | 0.16 | 0.01 | 0.01 | 0.00 | 0.21 | 0.72 | 0.72 | 0.00 | 0.52 | 0.52 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1870 | 0 | 3456 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 397 | 0 | 549 | 16 | 5 | 0 | 679 | 2348 | 11 | 5 | 2761 | 333 |
| Grp Sat Flow(s),veh/hln | 1781 | 0 | 1585 | 1781 | 1870 | 0 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 21.9 | 0.0 | 27.6 | 1.8 | 0.5 | 0.0 | 40.1 | 112.7 | 0.4 | 0.6 | 107.0 | 26.5 |
| Cycle Q Clear(g_c), s | 21.9 | 0.0 | 27.6 | 1.8 | 0.5 | 0.0 | 40.1 | 112.7 | 0.4 | 0.6 | 107.0 | 26.5 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 552 | 0 | 1149 | 24 | 25 | 0 | 717 | 2559 | 1141 | 9 | 1839 | 820 |
| V/C Ratio(X) | 0.72 | 0.00 | 0.48 | 0.66 | 0.20 | 0.00 | 0.95 | 0.92 | 0.01 | 0.58 | 1.50 | 0.41 |
| Avail Cap(c_a), veh/h | 638 | 0 | 1225 | 34 | 36 | 0 | 752 | 2559 | 1141 | 34 | 1839 | 820 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 83.1 | 0.0 | 50.8 | 101.5 | 100.9 | 0.0 | 80.8 | 23.9 | 8.2 | 102.7 | 49.9 | 30.5 |
| Incr Delay (d2), s/veh | 3.3 | 0.0 | 0.3 | 26.9 | 3.7 | 0.0 | 20.5 | 5.9 | 0.0 | 49.7 | 228.5 | 0.3 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/h | 10.5 | 0.0 | 11.2 | 1.0 | 0.3 | 0.0 | 19.8 | 45.4 | 0.1 | 0.4 | 104.4 | 10.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)S/veh | 86.4 | 0.0 | 51.1 | 128.4 | 104.6 | 0.0 | 101.3 | 29.7 | 8.2 | 152.3 | 278.4 | 30.8 |
| LnGrp LOS | F | A | D | F | F | A | F | C | A | F | F | C |
| Approach Vol, veh/h | 946 | | | 21 | | | 3038 | | | | 3099 | |
| Approach Delay, s/veh | 65.9 | | | 122.7 | | | 45.7 | | | | 251.6 | |
| Approach LOS | E | | | F | | | D | | | | F | |
| Timer - Assigned PHS | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 7.0 | 154.9 | 7.8 | 48.9 | 113.0 | 37.1 | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax), s | 4.0 | 148.0 | 4.0 | 45.0 | 107.0 | 37.0 | | | | | | |
| Max Q Clear Time (g_c+1T), s | 2.6 | 114.7 | 3.8 | 42.1 | 109.0 | 29.6 | | | | | | |
| Green Ext Time (p_c), s | 0.0 | 25.4 | 0.0 | 0.8 | 0.0 | 2.5 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Base Year 2038 WE Peak

HCM 6th Signalized Intersection Summary
 1: Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
 10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|----------------------------------|------|------|------|------|-------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 25 | 140 | 2555 | 45 | 105 | 2425 |
| Future Volume (veh/h) | 25 | 140 | 2555 | 45 | 105 | 2425 |
| Initial Q (Q _{bb}) veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1707 | 1841 | 1870 | 1693 | 1767 | 1870 |
| Adj Flow Rate, veh/h | 27 | 57 | 2777 | 32 | 114 | 2636 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 13 | 4 | 2 | 14 | 9 | 2 |
| Cap, veh/h | 85 | 81 | 2507 | 1012 | 111 | 2938 |
| Arrive On Green | 0.05 | 0.05 | 0.71 | 0.71 | 0.07 | 0.83 |
| Sat Flow, veh/h | 1626 | 1560 | 3647 | 1434 | 1682 | 3647 |
| Grp Volume(v), veh/h | 27 | 57 | 2777 | 32 | 114 | 2636 |
| Grp Sat Flow(s), veh/h | 1626 | 1560 | 1777 | 1434 | 1682 | 1777 |
| Q Serve(g.s), s | 1.5 | 3.3 | 64.0 | 0.6 | 6.0 | 45.2 |
| Cycle Q Clear(g.c), s | 1.5 | 3.3 | 64.0 | 0.6 | 6.0 | 45.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 85 | 81 | 2507 | 1012 | 111 | 2938 |
| V/C Ratio(x) | 0.32 | 0.70 | 1.11 | 0.03 | 1.02 | 0.90 |
| Avail Cap(c), veh/h | 251 | 241 | 2507 | 1012 | 111 | 2938 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 41.4 | 42.3 | 13.4 | 4.0 | 42.4 | 5.3 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), s/veh | 0.6 | 1.5 | 35.7 | 0.1 | 5.2 | 5.9 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 43.6 | 52.7 | 68.4 | 4.0 | 134.4 | 9.4 |
| LnGrp LOS | D | D | F | A | F | A |
| Approach Vol, veh/h | 84 | 2809 | | | 2750 | |
| Approach Delay, s/veh | 49.8 | 67.6 | | | 14.6 | |
| Approach LOS | D | E | | | B | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+R), s | 11.0 | 70.0 | | | 81.0 | 9.7 |
| Change Period (Y+R), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 6.0 | 64.0 | | | 75.0 | 14.0 |
| Max Q Clear Time (g.c+H), s | 8.0 | 66.0 | | | 47.2 | 5.3 |
| Green Ext Time (p.c), s | 0.0 | 0.0 | | | 24.2 | 0.1 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 41.5 | | | |
| HCM 6th LOS | | | D | | | |

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------------|------|-------|------|------|------|-------|------|------|------|-------|------|------|
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 25 | 5 | 15 | 175 | 0 | 410 | 15 | 2190 | 125 | 315 | 2100 | 25 |
| Future Volume (veh/h) | 25 | 5 | 15 | 175 | 0 | 410 | 15 | 2190 | 125 | 315 | 2100 | 25 |
| Initial Q (Q _{bb}) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1870 | 1900 | 1411 | 1870 | 1900 |
| Adj Flow Rate, veh/h | 27 | 5 | 4 | 190 | 0 | 16 | 2380 | 82 | 342 | 2283 | 17 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 33 | 2 | 0 |
| Cap, veh/h | 231 | 42 | 29 | 262 | 0 | 30 | 2267 | 1027 | 128 | 2547 | 1154 | |
| Arrive On Green | 0.14 | 0.14 | 0.14 | 0.00 | 0.00 | 0.02 | 0.64 | 0.64 | 0.10 | 0.72 | 0.72 | |
| Sat Flow, veh/h | 1299 | 292 | 199 | 1473 | 0 | 1610 | 1810 | 3554 | 1610 | 1344 | 3554 | 1610 |
| Grp Volume(v), veh/h | 36 | 0 | 0 | 190 | 0 | 16 | 2380 | 82 | 342 | 2283 | 17 | |
| Grp Sat Flow(s), veh/h | 1790 | 0 | 0 | 1473 | 0 | 1610 | 1810 | 1777 | 1610 | 1344 | 1777 | 1610 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 16.0 | 0.0 | 1.3 | 94.0 | 2.9 | 14.0 | 75.0 | 0.4 | |
| Cycle Q Clear(g.c), s | 2.5 | 0.0 | 0.0 | 18.6 | 0.0 | 1.3 | 94.0 | 2.9 | 14.0 | 75.0 | 0.4 | |
| Prop In Lane | 0.75 | 0.11 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 302 | 0 | 0 | 262 | 0 | 30 | 2267 | 1027 | 128 | 2547 | 1154 | |
| V/C Ratio(x) | 0.12 | 0.00 | 0.00 | 0.72 | 0.00 | 0.54 | 1.05 | 0.08 | 2.68 | 0.90 | 0.01 | |
| Avail Cap(c), veh/h | 432 | 0 | 0 | 385 | 0 | 172 | 2267 | 1027 | 128 | 2547 | 1154 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Upstream Filler(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Uniform Delay (d), s/veh | 54.9 | 0.0 | 0.0 | 61.5 | 0.0 | 0.0 | 71.9 | 26.7 | 10.2 | 66.7 | 16.5 | |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.0 | 3.8 | 0.0 | 0.0 | 14.6 | 33.6 | 0.0 | 77.3 | 4.7 | |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| %ile BackOfQ(50%), s/veh | 2.0 | 0.0 | 0.0 | 7.3 | 0.0 | 0.0 | 0.7 | 45.8 | 1.0 | 32.3 | 27.3 | |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 55.1 | 0.0 | 0.0 | 65.3 | 0.0 | 0.0 | 86.5 | 60.3 | 10.2 | 84.0 | 21.2 | |
| LnGrp LOS | E | A | A | E | A | F | F | B | F | C | A | |
| Approach Vol, veh/h | 36 | | | 190 | | | 2478 | | | 2642 | | |
| Approach Delay, s/veh | 55.1 | | | 65.3 | | | 58.8 | | | 127.6 | | |
| Approach LOS | E | | | E | | | E | | | F | | |
| Timer - Assigned Phs | 1 | 2 | | 4 | 5 | 6 | 8 | | | | | |
| Phs Duration (G+Y+R), s | 20.0 | 100.0 | | 27.4 | 8.4 | 111.6 | 27.4 | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | | 6.0 | 6.0 | 6.0 | 6.0 | | | | | |
| Max Green Setting (Gmax), s | 94.0 | 14.0 | | 34.0 | 14.0 | 94.0 | 34.0 | | | | | |
| Max Q Clear Time (g.c+H), s | 96.0 | 4.5 | | 3.3 | 77.0 | 20.6 | 20.6 | | | | | |
| Green Ext Time (p.c), s | 0.0 | 0.0 | | 0.0 | 14.2 | 0.8 | 0.8 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | 93.0 | | | | | | | | |
| HCM 6th LOS | | | | F | | | | | | | | |

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--|--|-------|------|-------|------|------|
| Lane Configurations | 530 | 1800 | 495 | 495 | 1825 | 1825 |
| Traffic Volume (veh/h) | 530 | 1800 | 495 | 495 | 1825 | 1825 |
| Future Vol. (veh/h) | 530 | 1800 | 495 | 495 | 1825 | 1825 |
| Initial Q (Q _{bb}) veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 576 | 0 | 1957 | 305 | 538 | 1984 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh. % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 586 | 2085 | 930 | 583 | 2774 | 2774 |
| Arrive On Green | 0.17 | 0.00 | 0.59 | 0.59 | 0.17 | 0.78 |
| Sat Flow, veh/h | 3456 | 1585 | 3647 | 1585 | 3456 | 3647 |
| Grp Volume(v), veh/h | 576 | 0 | 1957 | 305 | 538 | 1984 |
| Grp Sat Flow(s), veh/hln | 1728 | 1585 | 1777 | 1585 | 1728 | 1777 |
| Q Serve(g.s), s | 29.9 | 0.0 | 91.2 | 17.7 | 27.6 | 49.9 |
| Cycle Q Clear(g.c), s | 29.9 | 0.0 | 91.2 | 17.7 | 27.6 | 49.9 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 586 | 2085 | 930 | 583 | 2774 | 2774 |
| V/C Ratio(X) | 0.98 | 0.94 | 0.33 | 0.92 | 0.72 | 0.72 |
| Avail Cap(c), veh/h | 586 | 2085 | 930 | 583 | 2774 | 2774 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.20 | 0.20 |
| Uniform Delay (d), s/veh | 74.5 | 0.0 | 34.2 | 19.0 | 73.7 | 9.8 |
| Incr Delay (d2), s/veh | 32.9 | 0.0 | 9.7 | 0.9 | 4.8 | 0.3 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/m6.0 | 0.0 | 40.0 | 7.0 | 12.5 | 16.8 | 16.8 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 107.4 | 0.0 | 43.9 | 20.0 | 78.5 | 10.1 |
| LnGrp LOS | F | D | B | E | B | B |
| Approach Vol. veh/h | 576 | A | 2262 | | 2522 | |
| Approach Delay, s/veh | 107.4 | | 40.7 | | 24.7 | |
| Approach LOS | F | D | D | | C | |
| Timer - Assigned Phs | 1 | 2 | | 6 | 8 | |
| Phs Duration (G+Y+Rc) | 34.9 | 110.1 | | 145.0 | 35.0 | |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | 4.5 | 4.5 | |
| Max Green Selling (Gmax) | 102.5 | 140.5 | | 140.5 | 30.5 | |
| Max Q Clear Time (g.c+Q _{bb}), s | 93.2 | 51.9 | | 31.9 | 31.9 | |
| Green Ext Time (g.c), s | 0.8 | 7.9 | | 31.7 | 0.0 | |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | | 40.4 | | |
| HCM 6th LOS | | | | D | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

| Intersection | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--------------------------|--|-------------|--------|--------|--------|-------------|-------|-------|------|------|------|------|
| Ini Delay, s/veh | 8357.4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | 0 | 0 | 0 | 290 | 0 | 115 | 0 | 2155 | 250 | 95 | 2250 | 0 |
| Traffic Vol. veh/h | 0 | 0 | 0 | 290 | 0 | 115 | 0 | 2155 | 250 | 95 | 2250 | 0 |
| Future Vol. veh/h | 0 | 0 | 0 | 290 | 0 | 115 | 0 | 2155 | 250 | 95 | 2250 | 0 |
| Conflicting Peds. #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | None | - | - | Stop | - | Yield | - | - | - | None | - |
| Storage Length | - | - | - | - | - | 100 | 525 | - | 425 | 625 | - | - |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grade, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour Factor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Heavy Vehicles, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 0 | 0 | 315 | 0 | 125 | 0 | 2342 | 272 | 103 | 2446 | 0 |
| Major/Minor | Minor2 | Minor1 | Minor1 | Major1 | Major1 | Major2 | | | | | | |
| Conflicting Flow All | 3823 | 4994 | 1223 | 3771 | 4994 | 1171 | 2446 | 0 | 0 | 2342 | 0 | 0 |
| Stage 1 | 2652 | 2652 | - | 2342 | 2342 | - | - | - | - | - | - | - |
| Stage 2 | 1171 | 2342 | - | 1429 | 2652 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 | 4.1 | - | - | 4.1 | - | - |
| Critical Hdwy Stg 1 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.5 | 5.5 | - | 6.5 | 5.5 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 | 2.2 | - | - | 2.2 | - | - |
| Pl Cap-1 Maneuver | 1 | 1 | 174 | - | 1 | 189 | 195 | - | - | 214 | - | - |
| Stage 1 | 24 | 49 | - | - | 38 | 71 | - | - | - | - | - | - |
| Stage 2 | 208 | 71 | - | - | 144 | 49 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | | | | | |
| Mov Cap-1 Maneuver | 0 | 1 | 174 | - | 1 | 189 | 195 | - | - | 214 | - | - |
| Mov Cap-2 Maneuver | 0 | 1 | - | - | 1 | - | - | - | - | - | - | - |
| Stage 1 | 24 | 25 | - | - | 38 | 71 | - | - | - | - | - | - |
| Stage 2 | 70 | 71 | - | - | 75 | 25 | - | - | - | - | - | - |
| Approach | EB | WB | NB | NB | SB | SB | | | | | | |
| HCM Control Delay, s | 0 | \$ 106367.9 | 0 | 0 | 0 | 1.5 | | | | | | |
| HCM LOS | A | F | | | | | | | | | | |
| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLm1 | WBLm1 | WBLn2 | SBL | SBT | SBR | | | |
| Capacity (veh/h) | 195 | - | - | - | - | 1 | 189 | 214 | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - | - | 315.217 | 0.661 | 0.483 | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | - | - | \$ 108526.5 | 55 | 36.6 | - | - | - | - |
| HCM Lane LOS | A | - | - | - | - | A | F | E | - | - | - | - |
| HCM 95th %tile Q(veh) | 0 | - | - | - | - | 42.1 | 3.9 | 2.4 | - | - | - | - |
| Notes | - Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
5: Pijilani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|-------|------|------|------|------|------|-------|-------|------|
| Lane Configurations | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 4 |
| Traffic Volume (veh/h) | 340 | 0 | 385 | 5 | 0 | 5 | 410 | 2070 | 5 | 5 | 2145 | 350 |
| Future Volume (veh/h) | 340 | 0 | 385 | 5 | 0 | 5 | 410 | 2070 | 5 | 5 | 2145 | 350 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 370 | 0 | 355 | 5 | 0 | 5 | 446 | 2250 | 3 | 5 | 2332 | 215 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 494 | 0 | 917 | 9 | 10 | 0 | 520 | 2391 | 1067 | 9 | 1874 | 836 |
| Arrive On Green | 0.14 | 0.00 | 0.14 | 0.01 | 0.00 | 0.00 | 0.15 | 0.67 | 0.67 | 0.01 | 0.53 | 0.53 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1870 | 0 | 3456 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 370 | 0 | 355 | 5 | 0 | 0 | 446 | 2250 | 3 | 5 | 2332 | 215 |
| Grp Sat Flow(s),veh/h | 1781 | 0 | 1585 | 1781 | 1870 | 0 | 1728 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 12.3 | 0.0 | 11.1 | 0.3 | 0.0 | 0.0 | 15.5 | 69.7 | 0.1 | 0.3 | 65.1 | 9.2 |
| Cycle Q Clear(g_c), s | 12.3 | 0.0 | 11.1 | 0.3 | 0.0 | 0.0 | 15.5 | 69.7 | 0.1 | 0.3 | 65.1 | 9.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 494 | 0 | 917 | 9 | 10 | 0 | 520 | 2391 | 1067 | 9 | 1874 | 836 |
| V/C Ratio(X) | 0.75 | 0.00 | 0.39 | 0.55 | 0.00 | 0.00 | 0.86 | 0.94 | 0.00 | 0.55 | 1.24 | 0.26 |
| Avail Cap(c_a), veh/h | 1010 | 0 | 1376 | 58 | 61 | 0 | 728 | 2447 | 1092 | 58 | 1874 | 836 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.1 | 0.0 | 35.1 | 61.3 | 0.0 | 0.0 | 51.1 | 18.0 | 6.6 | 61.3 | 29.2 | 15.9 |
| Incr Delay (d2), s/veh | 2.3 | 0.0 | 0.3 | 43.1 | 0.0 | 0.0 | 7.3 | 8.0 | 0.0 | 43.1 | 114.6 | 0.2 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/h | 5.7 | 0.0 | 4.3 | 0.3 | 0.0 | 0.0 | 7.1 | 26.1 | 0.0 | 0.3 | 54.9 | 3.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 53.4 | 0.0 | 35.4 | 104.3 | 0.0 | 0.0 | 58.4 | 26.0 | 6.6 | 104.3 | 143.7 | 16.1 |
| LnGrp LOS | D | A | D | F | A | A | E | C | A | F | F | B |
| Approach Vol, veh/h | 725 | | | 5 | | | 2699 | | | | 2552 | |
| Approach Delay, s/veh | 44.6 | | | 104.3 | | | 31.4 | | | | 132.9 | |
| Approach LOS | D | | | F | | | C | | | | F | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 6.6 | 89.1 | 5.6 | 24.6 | 71.1 | 22.1 | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax), s | 4.0 | 85.0 | 4.0 | 26.0 | 63.0 | 35.0 | | | | | | |
| Max Q Clear Time (g_c+1T), s | 2.3 | 71.7 | 2.3 | 17.5 | 67.1 | 14.3 | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 11.4 | 0.0 | 1.1 | 0.0 | 2.8 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | 76.4 | | | | | |
| HCM 6th LOS | | | | | | | E | | | | | |

Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Base Year 2038 AM Peak With Mitigation

HCM 6th Signalized Intersection Summary
 1. Mokulele Hwy/Maui Veterans Hwy & Nakii Rd

10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBR |
|------------------------------|--|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 5 | 5 |
| Traffic Volume (veh/h) | 75 | 265 | 1915 | 70 | 360 | 2280 |
| Future Volume (veh/h) | 75 | 265 | 1915 | 70 | 360 | 2280 |
| Initial Q (Obj), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1366 | 1663 | 1870 | 1826 | 1826 | 1870 |
| Adj Flow Rate, veh/h | 82 | 0 | 2082 | 41 | 391 | 2478 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 36 | 16 | 2 | 5 | 5 | 2 |
| Cap, veh/h | 98 | 3078 | 933 | 470 | 2840 | |
| Arrive On Green | 0.08 | 0.00 | 0.60 | 0.60 | 0.14 | 0.80 |
| Sat Flow, veh/h | 1301 | 1409 | 5274 | 1547 | 3374 | 3647 |
| Grp Volume(v), veh/h | 82 | 0 | 2082 | 41 | 391 | 2478 |
| Grp Sat Flow(s), veh/h | 1301 | 1409 | 1702 | 1547 | 1687 | 1777 |
| Q Serve(g_s), s | 5.5 | 0.0 | 24.0 | 0.9 | 9.9 | 40.6 |
| Cycle Q Clear(g_c), s | 5.5 | 0.0 | 24.0 | 0.9 | 9.9 | 40.6 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 98 | 3078 | 933 | 470 | 2840 | |
| V/C Ratio(x) | 0.83 | 0.68 | 0.04 | 0.04 | 0.83 | 0.87 |
| Avail Cap(c_a), veh/h | 475 | 3377 | 1023 | 539 | 3120 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 40.0 | 0.0 | 11.7 | 7.1 | 36.7 | 5.8 |
| Incr Delay (d2), s/veh | 16.4 | 0.0 | 0.5 | 0.0 | 9.6 | 2.8 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%), veh/m3 | 2.2 | 0.0 | 7.3 | 0.3 | 4.5 | 6.6 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 56.4 | 0.0 | 12.2 | 7.1 | 46.4 | 8.7 |
| LnGrp LOS | E | B | A | D | A | A |
| Approach Vol, veh/h | 82 | A | 2123 | | 2869 | |
| Approach Delay, s/veh | 56.4 | | 12.1 | | 13.8 | |
| Approach LOS | E | B | B | | B | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 17.2 | 58.9 | | | 76.1 | 11.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 14.0 | 58.0 | | | 77.0 | 32.0 |
| Max Q Clear Time (g_c+I1), s | 11.9 | 26.0 | | | 42.6 | 7.5 |
| Green Ext Time (g_e), s | 0.3 | 20.1 | | | 27.5 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 13.8 | | | |
| HCM 6th LOS | | | B | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

HCM 6th Signalized Intersection Summary
 2. Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|--|-------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 5 | 0 | 5 | 50 | 0 | 110 | 5 | 1870 | 195 | 390 | 1940 | 25 |
| Future Volume (veh/h) | 5 | 0 | 5 | 50 | 0 | 110 | 5 | 1870 | 195 | 390 | 1940 | 25 |
| Initial Q (Obj), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1885 | 1900 | 1559 | 1870 | 1470 | 1900 | 1870 | 1604 | 1544 | 1870 | 1885 |
| Adj Flow Rate, veh/h | 5 | 0 | 5 | 54 | 0 | 5 | 2033 | 138 | 424 | 2109 | 20 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 1 | 0 | 23 | 2 | 29 | 0 | 2 | 20 | 24 | 2 | 1 |
| Cap, veh/h | 11 | 14 | 12 | 82 | 55 | 11 | 3446 | 917 | 469 | 2961 | 1331 | |
| Arrive On Green | 0.01 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | 0.01 | 0.67 | 0.67 | 0.16 | 0.83 | 0.83 |
| Sat Flow, veh/h | 1810 | 1885 | 1610 | 2881 | 1870 | 1246 | 1810 | 5106 | 1359 | 2853 | 3554 | 1598 |
| Grp Volume(v), veh/h | 5 | 0 | 5 | 54 | 0 | 5 | 2033 | 138 | 424 | 2109 | 20 | |
| Grp Sat Flow(s), veh/h | 1810 | 1885 | 1610 | 1440 | 1870 | 1246 | 1810 | 1702 | 1359 | 1427 | 1777 | 1598 |
| Q Serve(g_s), s | 0.5 | 0.0 | 0.1 | 3.3 | 0.0 | 0.5 | 38.7 | 6.6 | 26.2 | 43.8 | 0.4 | |
| Cycle Q Clear(g_c), s | 0.5 | 0.0 | 0.1 | 3.3 | 0.0 | 0.5 | 38.7 | 6.6 | 26.2 | 43.8 | 0.4 | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 11 | 14 | 12 | 82 | 55 | 11 | 3446 | 917 | 469 | 2961 | 1331 | |
| V/C Ratio(x) | 0.45 | 0.00 | 0.09 | 0.66 | 0.00 | 0.45 | 0.59 | 0.15 | 0.90 | 0.71 | 0.02 | |
| Avail Cap(c_a), veh/h | 206 | 157 | 134 | 616 | 343 | 50 | 3446 | 917 | 697 | 2961 | 1331 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Upstream Filler(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Uniform Delay (d), s/veh | 89.1 | 0.0 | 88.8 | 86.6 | 0.0 | 89.1 | 15.8 | 10.6 | 73.8 | 6.2 | 2.5 | |
| Incr Delay (d2), s/veh | 25.9 | 0.0 | 3.1 | 8.7 | 0.0 | 25.9 | 0.7 | 0.3 | 11.0 | 1.5 | 0.0 | |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| %ile BackQ(50%), veh/m3 | 0.0 | 0.1 | 1.4 | 0.0 | 0.0 | 0.3 | 14.5 | 2.1 | 10.2 | 13.1 | 0.1 | |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 115.0 | 0.0 | 91.9 | 95.2 | 0.0 | 115.0 | 16.6 | 10.9 | 84.8 | 7.6 | 2.6 | |
| LnGrp LOS | F | A | F | F | A | F | B | B | F | A | A | |
| Approach Vol, veh/h | 6 | | 54 | | A | | 2176 | | 2553 | | | |
| Approach Delay, s/veh | 111.2 | | 95.2 | | 16.4 | | 20.4 | | | | | |
| Approach LOS | F | | F | | B | | C | | | | | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 35.6 | 127.5 | 9.6 | 7.3 | 7.1 | 156.0 | 5.6 | 11.3 | | | | |
| Change Period (Y+Rc), s | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 60.0 | 38.5 | 15.0 | 5.0 | 99.0 | 20.5 | 33.0 | | | | | |
| Max Q Clear Time (g_c+I1), s | 40.7 | 5.3 | 2.1 | 2.5 | 45.8 | 2.5 | 0.0 | | | | | |
| Green Ext Time (g_e), s | 11.4 | 14.0 | 0.2 | 0.0 | 0.0 | 29.7 | 0.0 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | 19.6 | | | | | | | | | |
| HCM 6th LOS | | | B | | | | | | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-------------------------------|-------|-------|------|------|-------|------|
| Lane Configurations | W | R | T | T | T | T |
| Traffic Volume (veh/h) | 85 | 1970 | 250 | 250 | 1740 | 1740 |
| Future Volume (veh/h) | 85 | 1970 | 250 | 250 | 1740 | 1740 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1781 | 1767 | 1870 | 1856 | 1856 | 1870 |
| Adj Flow Rate, veh/h | 92 | 0 | 2141 | 176 | 272 | 1891 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 8 | 9 | 2 | 3 | 3 | 2 |
| Cap, veh/h | 466 | 3530 | 1087 | 315 | 2873 | 2873 |
| Arrive On Green | 0.14 | 0.00 | 0.69 | 0.69 | 0.09 | 0.81 |
| Sat Flow, veh/h | 3291 | 1497 | 5274 | 1572 | 3428 | 3647 |
| Grp Volume(v), veh/h | 92 | 0 | 2141 | 176 | 272 | 1891 |
| Grp Sat Flow(s), veh/h | 1497 | 1702 | 1572 | 1714 | 1714 | 1777 |
| Q Serve(g.s), s | 4.4 | 0.0 | 40.1 | 7.0 | 14.1 | 39.2 |
| Cycle Q Clear(g.c), s | 4.4 | 0.0 | 40.1 | 7.0 | 14.1 | 39.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 466 | 3530 | 1087 | 315 | 2873 | 2873 |
| VC Ratio(x) | 0.20 | 0.61 | 0.16 | 0.86 | 0.66 | 0.66 |
| Avail Cap(c), veh/h | 466 | 3530 | 1087 | 429 | 2873 | 2873 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 0.71 | 0.71 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 68.2 | 0.0 | 14.8 | 9.7 | 80.6 | 7.1 |
| Incr Delay (d2), s/veh | 0.9 | 0.0 | 0.6 | 0.2 | 12.7 | 1.2 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/lane | 0.0 | 0.0 | 14.8 | 2.5 | 6.7 | 12.6 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 69.2 | 0.0 | 15.3 | 9.9 | 93.3 | 8.3 |
| LnGrp LOS | E | B | B | A | F | A |
| Approach Vol, veh/h | 92 | A | 2317 | | 2163 | |
| Approach Delay, s/veh | 69.2 | | 14.9 | | 19.0 | |
| Approach LOS | E | B | B | | B | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+R), s | 1.1 | 128.9 | | | 150.0 | 30.0 |
| Change Period (Y+R), s | 4.5 | 4.5 | | | 4.5 | 4.5 |
| Max Green Selling (Gmax), s | 118.5 | 145.5 | | | 145.5 | 25.5 |
| Max Q Clear Time (g_c+llb), s | 42.1 | 41.2 | | | 41.2 | 6.4 |
| Green Ext Time (p_c), s | 0.5 | 33.9 | | | 29.0 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | | | 17.9 | |
| HCM 6th LOS | | | | | B | |
| Notes | | | | | | |

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 0 | 0 | 0 | 65 | 0 | 40 | 5 | 2185 | 155 | 70 | 1755 | 0 |
| Future Volume (veh/h) | 0 | 0 | 0 | 65 | 0 | 40 | 5 | 2185 | 155 | 70 | 1755 | 0 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 0 | 0 | 0 | 71 | 0 | 1 | 5 | 2375 | 109 | 76 | 1908 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 0 | 114 | 0 | 166 | 0 | 96 | 12 | 3749 | 1164 | 98 | 3997 | 1241 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.06 | 0.01 | 0.73 | 0.30 | 0.06 | 0.78 | 0.00 |
| Sat Flow, veh/h | 0 | 1870 | 0 | 1418 | 0 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 0 | 0 | 0 | 71 | 0 | 1 | 5 | 2375 | 109 | 76 | 1908 | 0 |
| Grp Sat Flow(s), veh/h | 0 | 1870 | 0 | 1418 | 0 | 1585 | 1781 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 4.5 | 0.0 | 0.1 | 0.3 | 20.8 | 1.8 | 3.8 | 11.7 | 0.0 |
| Cycle Q Clear(g.c), s | 0.0 | 0.0 | 0.0 | 4.5 | 0.0 | 0.1 | 0.3 | 20.8 | 1.8 | 3.8 | 11.7 | 0.0 |
| Prop In Lane | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 0 | 114 | 0 | 166 | 0 | 96 | 12 | 3749 | 1164 | 98 | 3997 | 1241 |
| VC Ratio(x) | 0.00 | 0.00 | 0.00 | 0.43 | 0.00 | 0.01 | 0.43 | 0.63 | 0.09 | 0.77 | 0.48 | 0.00 |
| Avail Cap(c), veh/h | 0 | 239 | 0 | 261 | 0 | 203 | 709 | 3749 | 1164 | 188 | 3997 | 1241 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.00 |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 41.8 | 0.0 | 39.7 | 44.5 | 5.9 | 3.4 | 42.0 | 3.4 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 17.3 | 0.6 | 0.1 | 9.1 | 0.3 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/lane | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 0.2 | 4.8 | 0.4 | 1.8 | 2.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 0.0 | 0.0 | 0.0 | 43.5 | 0.0 | 39.8 | 61.8 | 6.6 | 3.5 | 51.1 | 3.7 | 0.0 |
| LnGrp LOS | A | A | A | D | A | D | E | A | A | D | A | A |
| Approach Vol, veh/h | 0 | | | 72 | | | | 2489 | | | 1984 | |
| Approach Delay, s/veh | 0.0 | | | 43.5 | | | | 6.5 | | | 5.5 | |
| Approach LOS | | | | D | | | | A | | | A | |
| Timer - Assigned Phs | 1 | 2 | | 4 | | 5 | 6 | 8 | | | | |
| Phs Duration (G+Y+R), s | 9.5 | 70.6 | | 10.0 | | 5.1 | 74.9 | 10.0 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | | 4.5 | | 4.5 | 4.5 | 4.5 | | | 4.5 | |
| Max Green Selling (Gmax), s | 55.5 | 11.5 | | 5.5 | | 59.5 | 11.5 | 11.5 | | | 11.5 | |
| Max Q Clear Time (g_c+llb), s | 22.8 | 0.0 | | 2.3 | | 13.7 | 6.5 | 6.5 | | | 6.5 | |
| Green Ext Time (p_c), s | 0.0 | 24.0 | | 0.0 | | 21.1 | 0.1 | 0.1 | | | 0.1 | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | 6.7 | | | | |
| HCM 6th LOS | | | | | | | | A | | | | |
| Notes | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
5. Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

10/24/2018



APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Base Year 2038 PM Peak With Mitigation

| Movement | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 400 | 5 | 450 | 10 | 0 | 5 | 550 | 1940 | 10 | 5 |
| Future Volume (veh/h) | 400 | 5 | 450 | 10 | 0 | 5 | 550 | 1940 | 10 | 5 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A, pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 439 | 0 | 366 | 11 | 0 | 1 | 598 | 2109 | 7 | 5 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 584 | 0 | 1166 | 20 | 0 | 18 | 704 | 3164 | 982 | 9 |
| Arrive On Green | 0.16 | 0.00 | 0.16 | 0.01 | 0.00 | 0.01 | 0.20 | 0.62 | 0.01 | 0.42 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 5106 | 1585 | 1781 |
| Grp Volume(v), veh/h | 439 | 0 | 366 | 11 | 0 | 1 | 598 | 2109 | 7 | 5 |
| Grp Sat Flow(s), veh/hln | 1781 | 0 | 1585 | 1781 | 0 | 1585 | 1728 | 1702 | 1585 | 1781 |
| Q Serve(g, s), s | 12.9 | 0.0 | 9.1 | 0.7 | 0.0 | 0.1 | 18.3 | 29.4 | 0.2 | 0.3 |
| Cycle Q Clear(g, c), s | 12.9 | 0.0 | 9.1 | 0.7 | 0.0 | 0.1 | 18.3 | 29.4 | 0.2 | 0.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 584 | 0 | 1166 | 20 | 0 | 18 | 704 | 3164 | 982 | 9 |
| V/C Ratio(x) | 0.75 | 0.00 | 0.31 | 0.55 | 0.00 | 0.06 | 0.85 | 0.67 | 0.01 | 0.54 |
| Avail Cap(c, a), veh/h | 1134 | 0 | 1656 | 227 | 0 | 202 | 1320 | 6179 | 1918 | 97 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 43.8 | 0.0 | 24.8 | 54.1 | 0.0 | 53.8 | 42.1 | 13.6 | 8.0 | 54.5 |
| Incr Delay (d2), s/veh | 2.0 | 0.0 | 0.2 | 21.8 | 0.0 | 1.3 | 3.0 | 0.2 | 0.0 | 42.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q)(50%), veh/m8 | 0.0 | 3.4 | 0.4 | 0.0 | 0.0 | 0.0 | 7.8 | 9.7 | 0.1 | 8.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | |
| LnGrp Delay(d), s/veh | 45.8 | 0.0 | 25.0 | 75.9 | 0.0 | 55.1 | 45.1 | 13.8 | 8.0 | 96.6 |
| LnGrp LOS | D | A | C | E | A | E | D | B | A | F |
| Approach Vol, veh/h | 805 | | | 12 | | | 2714 | | | 1772 |
| Approach Delay, s/veh | 36.3 | | | 74.2 | | | 20.7 | | | 25.7 |
| Approach LOS | D | | | E | | | C | | | C |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | |
| Phs Duration (G+Y+R), s | 6.6 | 74.1 | 6.2 | 28.4 | 52.3 | 23.0 | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | |
| Max Green Setting (Gmax) & 133.0 | 14.0 | 42.0 | 14.0 | 42.0 | 97.0 | 35.0 | | | | |
| Max Q Clear Time (g_c+1/2) & 31.4 | 2.7 | 20.3 | 2.7 | 20.3 | 25.7 | 14.9 | | | | |
| Green Ext Time (p_c) & 0.0 | 33.0 | 0.0 | 33.0 | 0.0 | 2.1 | 20.6 | 3.1 | | | |
| Intersection Summary | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | 24.8 |
| HCM 6th LOS | | | | | | | | | | C |
| Notes | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 1. Mokulele Hwy/Maui Veterans Hwy & Nakii Rd

10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|--|-------|------|------|-------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 75 | 385 | 2945 | 70 | 180 | 2715 |
| Future Volume (veh/h) | 75 | 385 | 2945 | 70 | 180 | 2715 |
| Initial Q (Obj), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1841 | 1856 | 1870 | 1648 | 1752 | 1870 |
| Adj Flow Rate, veh/h | 82 | 0 | 3201 | 47 | 196 | 2951 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 4 | 3 | 2 | 17 | 10 | 2 |
| Cap, veh/h | 104 | 3833 | 1048 | 242 | 3061 | |
| Arrive On Green | 0.06 | 0.00 | 0.75 | 0.75 | 0.07 | 0.86 |
| Sat Flow, veh/h | 1753 | 1572 | 5274 | 1397 | 3237 | 3647 |
| Grp Volume(v), veh/h | 82 | 0 | 3201 | 47 | 196 | 2951 |
| Grp Sat Flow(s), veh/h | 1753 | 1572 | 1702 | 1397 | 1618 | 1777 |
| Q Serve(g_s), s | 6.4 | 0.0 | 58.1 | 1.2 | 8.3 | 94.0 |
| Cycle Q Clear(g_c), s | 6.4 | 0.0 | 58.1 | 1.2 | 8.3 | 94.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 104 | 3833 | 1048 | 242 | 3061 | |
| V/C Ratio(x) | 0.79 | 0.84 | 0.04 | 0.04 | 0.81 | 0.96 |
| Avail Cap(c_a), veh/h | 354 | 3833 | 1048 | 280 | 3102 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 64.4 | 0.0 | 11.6 | 4.5 | 63.2 | 7.8 |
| Incr Delay (d2), s/veh | 12.5 | 0.0 | 1.7 | 0.0 | 14.4 | 9.3 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m | 3.2 | 0.0 | 17.9 | 0.3 | 3.8 | 19.6 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 76.8 | 0.0 | 13.3 | 4.5 | 77.5 | 17.1 |
| LnGrp LOS | E | B | A | E | B | |
| Approach Vol, veh/h | 82 | A | 3248 | | | 3147 |
| Approach Delay, s/veh | 76.8 | | 13.2 | | | 20.9 |
| Approach LOS | E | B | B | | | C |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+R), s | 15.4 | 110.1 | | | 125.4 | 13.2 |
| Change Period (Y+R), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 12.0 | 104.0 | | | 121.0 | 28.0 |
| Max Q Clear Time (g_c+I1), s | 10.3 | 60.1 | | | 96.0 | 8.4 |
| Green Ext Time (p_c), s | 0.1 | 39.7 | | | 23.4 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 17.7 | | | |
| HCM 6th LOS | | | B | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

HCM 6th Signalized Intersection Summary
 2. Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|--|-------|------|------|-------|-------|-------|------|------|-------|-------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 25 | 0 | 15 | 220 | 0 | 480 | 15 | 2485 | 100 | 235 | 2400 | 15 |
| Future Volume (veh/h) | 25 | 0 | 15 | 220 | 0 | 480 | 15 | 2485 | 100 | 235 | 2400 | 15 |
| Initial Q (Obj), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1900 | 1648 | 1900 | 1693 | 1900 | 1870 | 1693 | 1737 | 1870 | 1885 |
| Adj Flow Rate, veh/h | 27 | 0 | 1 | 239 | 0 | 16 | 2701 | 64 | 255 | 2609 | 11 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Percent Heavy Veh, % | 0 | 0 | 0 | 17 | 0 | 14 | 0 | 2 | 14 | 11 | 2 | |
| Cap, veh/h | 37 | 40 | 34 | 283 | 177 | 28 | 3427 | 963 | 289 | 2651 | 1192 | |
| Arrive On Green | 0.02 | 0.00 | 0.02 | 0.09 | 0.00 | 0.00 | 0.02 | 0.67 | 0.67 | 0.09 | 0.75 | |
| Sat Flow, veh/h | 1810 | 1900 | 1610 | 3045 | 1900 | 1434 | 1810 | 5106 | 1434 | 3209 | 3554 | |
| Grp Volume(v), veh/h | 27 | 0 | 1 | 239 | 0 | 16 | 2701 | 64 | 255 | 2609 | 11 | |
| Grp Sat Flow(s), veh/h | 1810 | 1900 | 1610 | 1522 | 1900 | 1434 | 1810 | 1702 | 1434 | 1605 | 1777 | |
| Q Serve(g_s), s | 2.7 | 0.0 | 0.1 | 13.9 | 0.0 | 0.0 | 1.6 | 66.5 | 2.8 | 14.1 | 126.3 | |
| Cycle Q Clear(g_c), s | 2.7 | 0.0 | 0.1 | 13.9 | 0.0 | 0.0 | 1.6 | 66.5 | 2.8 | 14.1 | 126.3 | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 37 | 40 | 34 | 283 | 177 | 28 | 3427 | 963 | 289 | 2651 | 1192 | |
| V/C Ratio(x) | 0.73 | 0.00 | 0.03 | 0.85 | 0.00 | 0.58 | 0.79 | 0.07 | 0.88 | 0.98 | 0.01 | |
| Avail Cap(c_a), veh/h | 196 | 158 | 134 | 634 | 348 | 50 | 3427 | 963 | 303 | 2651 | 1192 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Uniform Delay (d), s/veh | 87.6 | 0.0 | 86.3 | 80.4 | 0.0 | 0.0 | 88.0 | 20.7 | 10.2 | 80.9 | 21.9 | |
| Incr Delay (d2), s/veh | 23.2 | 0.0 | 0.4 | 6.9 | 0.0 | 0.0 | 17.6 | 1.9 | 0.1 | 24.1 | 14.1 | |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| %ile BackOf(50%), veh/m | 5.0 | 0.0 | 0.0 | 5.8 | 0.0 | 0.0 | 0.9 | 25.2 | 0.9 | 6.8 | 50.1 | |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 110.8 | 0.0 | 86.7 | 87.2 | 0.0 | 0.0 | 105.7 | 22.6 | 10.3 | 105.0 | 36.0 | |
| LnGrp LOS | F | A | F | F | A | F | C | B | F | D | A | |
| Approach Vol, veh/h | 28 | | 239 | A | | 2781 | | | | 2875 | | |
| Approach Delay, s/veh | 110.0 | | 87.2 | | | 22.8 | | | | 42.0 | | |
| Approach LOS | F | | F | | | C | | | | D | | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 22.2 | 126.8 | 21.2 | 9.8 | 8.8 | 140.3 | 8.2 | 22.8 | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 88.0 | 37.5 | 15.0 | 5.0 | 100.0 | 19.5 | 33.0 | | | | | |
| Max Q Clear Time (g_c+I1), s | 68.5 | 15.9 | 2.1 | 3.6 | 128.3 | 4.7 | 0.0 | | | | | |
| Green Ext Time (p_c), s | 0.1 | 17.2 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | 35.1 | | | | | | | |
| HCM 6th LOS | | | | | D | | | | | | | |
| Notes | User approved pedestrian interval to be less than phase max green. Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--|--|-------|-------|------|------|------|
| Lane Configurations | W | R | T | T | T | T |
| Traffic Volume (veh/h) | 445 | 450 | 2125 | 320 | 2330 | 2330 |
| Future Volume (veh/h) | 445 | 450 | 2125 | 320 | 2330 | 2330 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 484 | 0 | 2310 | 196 | 348 | 2533 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 540 | 3352 | 1041 | 388 | 2821 | |
| Arrive On Green | 0.16 | 0.00 | 0.66 | 0.66 | 0.11 | 0.79 |
| Sat Flow, veh/h | 3456 | 1585 | 5274 | 1585 | 3456 | 3647 |
| Grp Volume(v), veh/h | 484 | 0 | 2310 | 196 | 348 | 2533 |
| Grp Sat Flow(s), veh/h | 1728 | 1585 | 1702 | 1585 | 1728 | 1777 |
| Q Serve(g, s), s | 24.7 | 0.0 | 51.1 | 8.7 | 17.9 | 92.1 |
| Cycle Q Clear(g, c), s | 24.7 | 0.0 | 51.1 | 8.7 | 17.9 | 92.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 540 | 3352 | 1041 | 388 | 2821 | |
| V/C Ratio(X) | 0.90 | 0.69 | 0.19 | 0.90 | 0.90 | |
| Avail Cap(c, a), veh/h | 720 | 3352 | 1041 | 432 | 2821 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 0.57 | 0.57 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 74.5 | 0.0 | 19.4 | 12.1 | 78.9 | 13.3 |
| Incr Delay (d2), s/veh | 11.3 | 0.0 | 0.7 | 0.2 | 19.6 | 5.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh | 0.0 | 0.0 | 19.4 | 3.3 | 9.0 | 31.8 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 85.8 | 0.0 | 20.1 | 12.3 | 98.5 | 18.4 |
| LnGrp LOS | F | C | C | B | F | B |
| Approach Vol, veh/h | 484 | A | 2506 | | 2881 | |
| Approach Delay, s/veh | 85.8 | | 19.5 | | 28.1 | |
| Approach LOS | F | B | B | | C | |
| Timer - Assigned Phs | 1 | 2 | 6 | 8 | | |
| Phs Duration (G+Y+R), s | 34.7 | 122.7 | 147.4 | 32.6 | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | | |
| Max Green Setting (G _{max}), s | 106.5 | 133.5 | 133.5 | 37.5 | | |
| Max Q Clear Time (g_c+I _{19.5}), s | 53.1 | 94.1 | 94.1 | 26.7 | | |
| Green Ext Time (g_e), s | 0.3 | 32.9 | 31.3 | 1.4 | | |
| Intersection Summary | | | 29.2 | | | |
| HCM 6th Ctrl Delay | | | | | | C |
| HCM 6th LOS | | | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 0 | 0 | 0 | 245 | 0 | 100 | 5 | 2330 | 170 | 60 | 2700 | 0 |
| Future Volume (veh/h) | 0 | 0 | 0 | 245 | 0 | 100 | 5 | 2330 | 170 | 60 | 2700 | 0 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 0 | 0 | 0 | 266 | 0 | 95 | 5 | 2533 | 122 | 65 | 2935 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 0 | 382 | 0 | 329 | 0 | 323 | 11 | 3449 | 1071 | 81 | 3650 | 1133 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.20 | 0.00 | 0.20 | 0.01 | 0.68 | 0.68 | 0.05 | 0.71 | 0.00 |
| Sat Flow, veh/h | 0 | 1870 | 0 | 1418 | 0 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 0 | 0 | 0 | 266 | 0 | 55 | 5 | 2533 | 122 | 65 | 2935 | 0 |
| Grp Sat Flow(s), veh/h | 0 | 1870 | 0 | 1418 | 0 | 1585 | 1781 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g, s), s | 0.0 | 0.0 | 0.0 | 33.1 | 0.0 | 5.2 | 0.5 | 57.5 | 4.9 | 6.5 | 69.4 | 0.0 |
| Cycle Q Clear(g, c), s | 0.0 | 0.0 | 0.0 | 33.1 | 0.0 | 5.2 | 0.5 | 57.5 | 4.9 | 6.5 | 69.4 | 0.0 |
| Prop In Lane | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 0 | 382 | 0 | 329 | 0 | 323 | 11 | 3449 | 1071 | 81 | 3650 | 1133 |
| V/C Ratio(X) | 0.00 | 0.00 | 0.00 | 0.81 | 0.00 | 0.17 | 0.46 | 0.73 | 0.11 | 0.80 | 0.80 | 0.00 |
| Avail Cap(c, a), veh/h | 0 | 566 | 0 | 469 | 0 | 480 | 272 | 3449 | 1071 | 114 | 3650 | 1133 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.73 | 0.73 | 0.73 | 0.27 | 0.27 | 0.00 |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 70.2 | 0.0 | 59.1 | 89.1 | 18.8 | 10.3 | 85.1 | 17.2 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 6.8 | 0.0 | 0.2 | 20.2 | 1.0 | 0.2 | 7.3 | 0.5 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh | 0.0 | 0.0 | 0.0 | 12.7 | 0.0 | 2.1 | 0.3 | 21.6 | 1.7 | 3.1 | 24.8 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 0.0 | 0.0 | 0.0 | 77.0 | 0.0 | 59.3 | 109.3 | 19.9 | 10.4 | 92.4 | 17.8 | 0.0 |
| LnGrp LOS | A | A | A | E | A | E | F | B | B | F | B | A |
| Approach Vol, veh/h | 0 | 321 | 0 | 321 | 0 | 2660 | 19.4 | 19.4 | 19.4 | 19.4 | 3000 | 19.4 |
| Approach Delay, s/veh | 0.0 | 74.0 | 0.0 | 74.0 | 0.0 | 19.6 | 19.6 | 19.6 | 19.6 | 19.6 | 19.4 | 19.4 |
| Approach LOS | | E | | E | | B | B | B | B | B | B | B |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 126.1 | 41.2 | 5.6 | 133.2 | 41.2 | | | | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | |
| Max Green Setting (G _{max}), s | 100.5 | 54.5 | 27.5 | 84.5 | 54.5 | | | | | | | |
| Max Q Clear Time (g_c+I _{19.5}), s | 59.5 | 0.0 | 2.5 | 71.4 | 35.1 | | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 30.6 | 0.0 | 12.3 | 1.6 | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | C | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
5: Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy 10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|-------|-------|------|-------|-------|------|------|-------|------|------|
| Lane Configurations | 3 | 4 | 4 | 1 | 1 | 1 | 4 | 4 | 4 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 365 | 0 | 530 | 15 | 5 | 15 | 625 | 2160 | 15 | 5 | 2540 | 430 |
| Future Volume (veh/h) | 365 | 0 | 530 | 15 | 5 | 15 | 625 | 2160 | 15 | 5 | 2540 | 430 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 397 | 0 | 549 | 16 | 5 | 16 | 679 | 2348 | 11 | 5 | 2761 | 254 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 552 | 0 | 1149 | 25 | 21 | 4 | 717 | 3676 | 1141 | 9 | 3328 | 820 |
| Arrive On Green | 0.16 | 0.00 | 0.16 | 0.01 | 0.01 | 0.01 | 0.21 | 0.72 | 0.72 | 0.00 | 0.52 | 0.52 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1513 | 303 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 397 | 0 | 549 | 16 | 0 | 6 | 679 | 2348 | 11 | 5 | 2761 | 254 |
| Grp Sat Flow(s), veh/h | 1781 | 0 | 1585 | 1781 | 0 | 1816 | 1728 | 1702 | 1585 | 1781 | 1609 | 1585 |
| Q Serve(g_s), s | 21.9 | 0.0 | 21.6 | 1.8 | 0.0 | 0.7 | 40.1 | 49.3 | 0.4 | 0.6 | 75.1 | 19.1 |
| Cycle Q Clear(g_c), s | 21.9 | 0.0 | 21.6 | 1.8 | 0.0 | 0.7 | 40.1 | 49.3 | 0.4 | 0.6 | 75.1 | 19.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 552 | 0 | 1149 | 25 | 0 | 25 | 717 | 3676 | 1141 | 9 | 3328 | 820 |
| V/C Ratio(x) | 0.72 | 0.00 | 0.48 | 0.65 | 0.00 | 0.24 | 0.95 | 0.64 | 0.01 | 0.58 | 0.83 | 0.31 |
| Avail Cap(c), veh/h | 637 | 0 | 1225 | 34 | 0 | 35 | 752 | 3676 | 1141 | 34 | 3328 | 820 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 83.1 | 0.0 | 50.8 | 101.5 | 0.0 | 100.9 | 80.9 | 15.0 | 8.2 | 102.7 | 42.2 | 28.7 |
| Incr Delay (d2), s/veh | 3.3 | 0.0 | 0.3 | 25.0 | 0.0 | 4.8 | 20.5 | 0.9 | 0.0 | 49.7 | 2.5 | 1.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q)(50%), s/veh | 0.0 | 11.2 | 1.0 | 0.0 | 0.4 | 19.8 | 18.4 | 0.1 | 0.4 | 29.8 | 7.5 | 7.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 86.4 | 0.0 | 51.1 | 126.5 | 0.0 | 105.7 | 101.4 | 15.9 | 8.2 | 152.4 | 44.8 | 29.7 |
| LnGrp LOS | F | A | D | F | A | F | F | B | A | F | D | C |
| Approach Vol, veh/h | 946 | | | 22 | | | 3038 | | | | 3020 | |
| Approach Delay, s/veh | 65.9 | | | 120.8 | | | 35.0 | | | | 43.7 | |
| Approach LOS | E | | | F | | | C | | | | D | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 7.0 | 48.9 | 113.0 | 37.1 | | | | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 6.0 | 6.0 | 5.0 | | | | | | | |
| Max Green Setting (Gmax) & 148.0 | 4.0 | 45.0 | 107.0 | 37.0 | | | | | | | | |
| Max Q Clear Time (g_c+1) & 51.3 | 3.8 | 42.1 | 77.1 | 29.6 | | | | | | | | |
| Green Ext Time (p_c) & 0.0 | 0.0 | 0.8 | 26.0 | 2.5 | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved pedestrian interval to be less than phase max green. | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Base Year 2038 WE Peak With Mitigation

HCM 6th Signalized Intersection Summary
 1. Mokulele Hwy/Maui Veterans Hwy & Nakii Rd

10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|--|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 5 | 5 |
| Traffic Volume (veh/h) | 25 | 140 | 2555 | 45 | 105 | 2425 |
| Future Volume (veh/h) | 25 | 140 | 2555 | 45 | 105 | 2425 |
| Initial Q (Q _{sb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1707 | 1841 | 1870 | 1693 | 1767 | 1870 |
| Adj Flow Rate, veh/h | 27 | 0 | 2777 | 32 | 114 | 2636 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 13 | 4 | 2 | 14 | 9 | 2 |
| Cap, veh/h | 45 | 3693 | 1037 | 183 | 2983 | |
| Arrive On Green | 0.03 | 0.00 | 0.72 | 0.72 | 0.06 | 0.84 |
| Sat Flow, veh/h | 1626 | 1560 | 5274 | 1434 | 3264 | 3647 |
| Grp Volume(v), veh/h | 27 | 0 | 2777 | 32 | 114 | 2636 |
| Grp Sat Flow(s), veh/h | 1626 | 1560 | 1702 | 1434 | 1632 | 1777 |
| Q Serve(g_s), s | 1.4 | 0.0 | 27.4 | 0.5 | 2.8 | 38.2 |
| Cycle Q Clear(g_c), s | 1.4 | 0.0 | 27.4 | 0.5 | 2.8 | 38.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 45 | 3693 | 1037 | 183 | 2983 | |
| V/C Ratio(x) | 0.59 | 0.75 | 0.75 | 0.03 | 0.62 | 0.88 |
| Avail Cap(c), veh/h | 275 | 3941 | 1107 | 236 | 3274 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.8 | 0.0 | 7.0 | 3.2 | 38.3 | 4.1 |
| Incr Delay (d2), s/veh | 11.8 | 0.0 | 0.8 | 0.0 | 3.5 | 3.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/ft | 0.7 | 0.0 | 6.0 | 0.1 | 1.2 | 2.1 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 51.6 | 0.0 | 7.8 | 3.3 | 41.8 | 7.2 |
| LnGrp LOS | D | A | A | A | D | A |
| Approach Vol, veh/h | 27 | A | 2809 | | | 2750 |
| Approach Delay, s/veh | 51.6 | | 7.7 | | | 8.7 |
| Approach LOS | D | A | A | | | A |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 9.6 | 66.0 | | | 75.6 | 7.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 6.0 | 64.0 | | | 75.0 | 14.0 |
| Max Q Clear Time (g_c+I1), s | 4.8 | 29.4 | | | 40.2 | 3.4 |
| Green Ext Time (g_e), s | 0.0 | 28.9 | | | 29.4 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 8.4 | | | |
| HCM 6th LOS | | | A | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

HCM 6th Signalized Intersection Summary
 2. Maui Veterans Hwy & Mehameha Lp North/Kamaaina Rd

10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--|-------|------|------|-------|-------|-------|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 25 | 5 | 15 | 175 | 0 | 410 | 15 | 2190 | 125 | 315 | 2100 | 25 |
| Future Volume (veh/h) | 25 | 5 | 15 | 175 | 0 | 410 | 15 | 2190 | 125 | 315 | 2100 | 25 |
| Initial Q (Q _{sb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1900 | 1796 | 1870 | 1767 | 1900 | 1870 | 1767 | 1811 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 27 | 5 | 1 | 190 | 0 | 16 | 2380 | 77 | 342 | 2283 | 18 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 7 | 2 | 9 | 0 | 2 | 9 | 6 | 2 | 2 |
| Cap, veh/h | 37 | 43 | 36 | 236 | 136 | 28 | 3399 | 997 | 388 | 2723 | 1215 | |
| Arrive On Green | 0.02 | 0.02 | 0.02 | 0.07 | 0.00 | 0.00 | 0.02 | 0.67 | 0.67 | 0.12 | 0.77 | |
| Sat Flow, veh/h | 1810 | 1900 | 1610 | 3319 | 1870 | 1497 | 1810 | 5106 | 1497 | 3346 | 3554 | |
| Grp Volume(v), veh/h | 27 | 5 | 1 | 190 | 0 | 16 | 2380 | 77 | 342 | 2283 | 18 | |
| Grp Sat Flow(s), veh/h | 1810 | 1610 | 1659 | 1870 | 1497 | 1810 | 1702 | 1497 | 1673 | 1777 | 1585 | |
| Q Serve(g_s), s | 2.7 | 0.5 | 0.1 | 10.2 | 0.0 | 1.6 | 52.5 | 3.3 | 18.1 | 75.6 | 0.5 | |
| Cycle Q Clear(g_c), s | 2.7 | 0.5 | 0.1 | 10.2 | 0.0 | 1.6 | 52.5 | 3.3 | 18.1 | 75.6 | 0.5 | |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 37 | 43 | 36 | 236 | 136 | 28 | 3399 | 997 | 388 | 2723 | 1215 | |
| V/C Ratio(x) | 0.73 | 0.12 | 0.03 | 0.81 | 0.00 | 0.58 | 0.70 | 0.08 | 0.88 | 0.84 | 0.01 | |
| Avail Cap(c), veh/h | 196 | 158 | 134 | 691 | 343 | 50 | 3399 | 997 | 521 | 2723 | 1215 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Upstream Filter(i) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Uniform Delay (d), s/veh | 87.6 | 86.2 | 86.1 | 82.4 | 0.0 | 0.0 | 88.0 | 18.8 | 10.6 | 78.4 | 13.8 | |
| Incr Delay (d2), s/veh | 23.2 | 1.2 | 0.3 | 6.4 | 0.0 | 0.0 | 17.6 | 1.2 | 0.2 | 12.9 | 3.3 | |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| %ile BackOf(50%), veh/ft | 0.2 | 0.0 | 0.0 | 4.6 | 0.0 | 0.0 | 0.9 | 19.9 | 1.2 | 8.4 | 27.2 | |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 110.8 | 87.4 | 86.4 | 88.8 | 0.0 | 0.0 | 105.7 | 20.1 | 10.8 | 91.3 | 17.0 | |
| LnGrp LOS | F | F | F | F | A | F | C | B | F | B | A | |
| Approach Vol, veh/h | 33 | | | 190 | A | | 2473 | | | | 2643 | |
| Approach Delay, s/veh | 106.6 | | | 88.8 | | | 20.3 | | | | 26.6 | |
| Approach LOS | F | | | F | | | C | | | | C | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 26.9 | 125.8 | 17.3 | 10.0 | 8.8 | 143.9 | 8.2 | 19.1 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 77.0 | 37.5 | 15.0 | 5.0 | 100.0 | 19.5 | 33.0 | | | | | |
| Max Q Clear Time (g_c+I1), s | 54.5 | 12.2 | 2.5 | 3.6 | 77.6 | 4.7 | 0.0 | | | | | |
| Green Ext Time (g_e), s | 0.7 | 17.9 | 0.6 | 0.0 | 18.0 | 0.0 | 0.0 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | 26.4 | | | | | | | | |
| HCM 6th LOS | | | | C | | | | | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

10/24/2018

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|-------|-------|------|-------|------|------|
| Lane Configurations | W | W | T | T | W | W |
| Traffic Volume (veh/h) | 530 | 1800 | 495 | 495 | 1825 | 1825 |
| Future Volume (veh/h) | 530 | 1800 | 495 | 495 | 1825 | 1825 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1885 | 1870 | 1870 | 1885 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 576 | 0 | 1957 | 289 | 538 | 1984 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 1 | 2 | 2 | 2 | 1 | 2 |
| Cap, veh/h | 609 | 2975 | 923 | 584 | 2755 | 2755 |
| Arrive On Green | 0.17 | 0.00 | 0.58 | 0.58 | 0.17 | 0.78 |
| Sat Flow, veh/h | 3483 | 1598 | 5274 | 1585 | 3483 | 3647 |
| Grp Volume(v), veh/h | 576 | 0 | 1957 | 289 | 538 | 1984 |
| Grp Sat Flow(s), veh/h | 1742 | 1598 | 1702 | 1585 | 1742 | 1777 |
| Q Serve(g.s), s | 29.4 | 0.0 | 46.7 | 16.8 | 27.4 | 51.1 |
| Cycle Q Clear(g.c), s | 29.4 | 0.0 | 46.7 | 16.8 | 27.4 | 51.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 609 | 2975 | 923 | 584 | 2755 | 2755 |
| VC Ratio(x) | 0.95 | 0.66 | 0.31 | 0.92 | 0.72 | 0.72 |
| Avail Cap(c, a), veh/h | 610 | 2975 | 923 | 584 | 2755 | 2755 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 0.44 | 0.44 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 73.4 | 0.0 | 25.4 | 19.2 | 73.7 | 10.3 |
| Incr Delay (d2), s/veh | 23.9 | 0.0 | 0.5 | 0.4 | 17.6 | 1.7 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/ln | 0.0 | 18.4 | 6.5 | 13.5 | 17.9 | 17.9 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 97.4 | 0.0 | 25.9 | 19.6 | 91.3 | 12.0 |
| LnGrp LOS | F | C | C | B | F | B |
| Approach Vol, veh/h | 576 | A | 2246 | | 2522 | |
| Approach Delay, s/veh | 97.4 | A | 25.1 | | 28.9 | |
| Approach LOS | F | C | C | | C | |
| Timer - Assigned Phs | 1 | 2 | 6 | 8 | | |
| Phs Duration (G+Y+R), s | 34.7 | 109.4 | 36.0 | 144.0 | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | | |
| Max Green Setting (Gmax), s | 101.5 | 139.5 | 31.5 | 139.5 | | |
| Max Q Clear Time (g.c+H), s | 48.7 | 53.1 | 31.4 | 53.1 | | |
| Green Ext Time (g.c), s | 0.8 | 26.0 | 31.5 | 0.0 | | |
| Intersection Summary | | | 34.7 | | | |
| HCM 6th Ctrl Delay | | | | | | |
| HCM 6th LOS | | | | | | |
| Notes | | | | | | |

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

10/24/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | W | W | W | W | W | W | W | W | W | W | W | W |
| Traffic Volume (veh/h) | 0 | 0 | 0 | 290 | 0 | 115 | 0 | 2155 | 250 | 95 | 2250 | 0 |
| Future Volume (veh/h) | 0 | 0 | 0 | 290 | 0 | 115 | 0 | 2155 | 250 | 95 | 2250 | 0 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 0 | 0 | 0 | 315 | 0 | 38 | 0 | 2342 | 134 | 103 | 2446 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 0 | 451 | 0 | 402 | 0 | 382 | 0 | 2740 | 850 | 129 | 3364 | 1044 |
| Arrive On Green | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.24 | 0.00 | 0.54 | 0.54 | 0.07 | 0.66 | 0.00 |
| Sat Flow, veh/h | 0 | 1870 | 0 | 1418 | 0 | 1585 | 0 | 1781 | 1506 | 1585 | 1781 | 5106 |
| Grp Volume(v), veh/h | 0 | 0 | 0 | 315 | 0 | 38 | 0 | 2342 | 134 | 103 | 2446 | 0 |
| Grp Sat Flow(s), veh/h | 0 | 1870 | 0 | 1418 | 0 | 1585 | 0 | 1781 | 1702 | 1585 | 1781 | 1702 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 19.5 | 0.0 | 1.7 | 0.0 | 35.3 | 3.9 | 5.1 | 28.2 | 0.0 |
| Cycle Q Clear(g.c), s | 0.0 | 0.0 | 0.0 | 19.5 | 0.0 | 1.7 | 0.0 | 35.3 | 3.9 | 5.1 | 28.2 | 0.0 |
| Prop In Lane | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| Lane Grp Cap(c), veh/h | 0 | 451 | 0 | 402 | 0 | 382 | 0 | 2740 | 850 | 129 | 3364 | 1044 |
| VC Ratio(x) | 0.00 | 0.00 | 0.00 | 0.75 | 0.00 | 0.10 | 0.00 | 0.85 | 0.16 | 0.80 | 0.73 | 0.00 |
| Avail Cap(c, a), veh/h | 0 | 468 | 0 | 434 | 0 | 396 | 0 | 2740 | 850 | 129 | 3364 | 1044 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.73 | 0.73 | 0.54 | 0.54 | 0.00 |
| Uniform Delay (d), s/veh | 0.0 | 0.0 | 0.0 | 33.3 | 0.0 | 26.5 | 0.0 | 17.9 | 10.6 | 41.1 | 10.1 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 6.7 | 0.0 | 0.1 | 0.0 | 2.7 | 0.3 | 17.5 | 0.8 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/ln | 0.0 | 0.0 | 0.0 | 7.3 | 0.0 | 0.6 | 0.0 | 12.3 | 1.2 | 2.8 | 8.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 0.0 | 0.0 | 0.0 | 40.1 | 0.0 | 26.7 | 0.0 | 20.6 | 10.8 | 58.6 | 10.8 | 0.0 |
| LnGrp LOS | A | A | A | D | A | C | A | C | B | E | B | A |
| Approach Vol, veh/h | 0 | 353 | 0 | 353 | 0 | 2476 | 0 | 2549 | 12.8 | 12.8 | 0 | 0 |
| Approach Delay, s/veh | 0.0 | 38.6 | 0.0 | 20.0 | 0.0 | 20.0 | 0.0 | 20.0 | 12.8 | 12.8 | 0.0 | 0.0 |
| Approach LOS | | D | | C | | C | | C | B | B | | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 52.8 | 26.2 | 0.0 | 63.8 | 26.2 | 26.2 | | | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | |
| Max Green Setting (Gmax), s | 47.5 | 22.5 | 5.5 | 48.5 | 22.5 | 22.5 | | | | | | |
| Max Q Clear Time (g.c+H), s | 37.3 | 0.0 | 0.0 | 30.2 | 21.5 | 21.5 | | | | | | |
| Green Ext Time (g.c), s | 0.0 | 8.9 | 0.0 | 15.2 | 0.0 | 0.0 | | | | | | |
| Intersection Summary | | | 17.8 | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
5: Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

10/24/2018



APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Future Year 2038 AM Peak

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 340 | 0 | 385 | 5 | 0 | 5 | 410 | 2070 | 5 | 5 | 2145 | 350 |
| Future Volume (veh/h) | 340 | 0 | 385 | 5 | 0 | 5 | 410 | 2070 | 5 | 5 | 2145 | 350 |
| Initial Q (qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 370 | 0 | 355 | 5 | 0 | 1 | 446 | 2250 | 3 | 5 | 2332 | 173 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 508 | 0 | 940 | 11 | 0 | 10 | 531 | 3311 | 1028 | 9 | 3216 | 792 |
| Arrive On Green | 0.14 | 0.00 | 0.14 | 0.01 | 0.00 | 0.01 | 0.15 | 0.65 | 0.65 | 0.01 | 0.50 | 0.50 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 370 | 0 | 355 | 5 | 0 | 1 | 446 | 2250 | 3 | 5 | 2332 | 173 |
| Grp Sat Flow(s), veh/h | 1781 | 0 | 1585 | 1781 | 0 | 1585 | 1728 | 1702 | 1585 | 1781 | 1609 | 1585 |
| Q Serve(g_s), s | 11.1 | 0.0 | 9.9 | 0.3 | 0.0 | 0.1 | 14.0 | 30.8 | 0.1 | 0.3 | 31.6 | 6.8 |
| Cycle Q Clear(g_c), s | 11.1 | 0.0 | 9.9 | 0.3 | 0.0 | 0.1 | 14.0 | 30.8 | 0.1 | 0.3 | 31.6 | 6.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 508 | 0 | 940 | 11 | 0 | 10 | 531 | 3311 | 1028 | 9 | 3216 | 792 |
| V/C Ratio(X) | 0.73 | 0.00 | 0.38 | 0.46 | 0.00 | 0.10 | 0.84 | 0.68 | 0.00 | 0.55 | 0.73 | 0.22 |
| Avail Cap(c), veh/h | 1120 | 0 | 1484 | 64 | 0 | 57 | 807 | 3899 | 1210 | 64 | 3641 | 897 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 45.7 | 0.0 | 31.0 | 55.1 | 0.0 | 55.0 | 45.8 | 12.3 | 6.9 | 55.2 | 21.8 | 15.6 |
| Incr Delay (d2), s/veh | 2.0 | 0.0 | 0.3 | 27.6 | 0.0 | 4.6 | 5.0 | 0.4 | 0.0 | 42.2 | 0.6 | 0.1 |
| Initial Q Delay(Q), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), s/veh | 0.0 | 3.8 | 0.2 | 0.0 | 0.0 | 0.0 | 6.2 | 9.9 | 0.0 | 0.2 | 11.0 | 2.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d), s/veh | 47.7 | 0.0 | 31.3 | 82.7 | 0.0 | 59.6 | 50.7 | 12.7 | 6.9 | 97.4 | 22.5 | 15.8 |
| LnGrp LOS | D | A | C | F | A | E | D | B | A | F | C | B |
| Approach Vol, veh/h | 725 | | | 6 | | | 2699 | | | 2510 | | |
| Approach Delay, s/veh | 39.6 | | | 78.9 | | | 19.0 | | | 22.2 | | |
| Approach LOS | D | | | E | | | B | | | C | | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 6.6 | 78.2 | 5.7 | 23.1 | 61.7 | 20.9 | | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Stalling (Gmax) & 85.0 | 4.0 | 26.0 | 4.0 | 26.0 | 63.0 | 35.0 | | | | | | |
| Max Q Clear Time (g_c+1/2), s | 32.8 | 2.3 | 16.0 | 33.6 | 13.1 | 13.1 | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 29.5 | 0.0 | 1.2 | 22.0 | 2.8 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 1. Mokulele Hwy/Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
 02/04/2019

| Movement | WBL | WBR | NBT | NBR | SBL | SBR |
|---|------|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 5 | 5 |
| Traffic Volume (veh/h) | 75 | 265 | 2165 | 70 | 360 | 2845 |
| Future Volume (veh/h) | 75 | 265 | 2165 | 70 | 360 | 2845 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1366 | 1663 | 1870 | 1826 | 1826 | 1870 |
| Adj Flow Rate, veh/h | 82 | 0 | 2353 | 41 | 391 | 3092 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 36 | 16 | 2 | 5 | 5 | 2 |
| Cap, veh/h | 98 | 3166 | 960 | 460 | 2875 | 2875 |
| Arrive On Green | 0.08 | 0.00 | 0.62 | 0.62 | 0.14 | 0.81 |
| Sat Flow, veh/h | 1301 | 1409 | 5274 | 1547 | 3374 | 3647 |
| Grp Volume(v), veh/h | 82 | 0 | 2353 | 41 | 391 | 3092 |
| Grp Sat Flow(s), veh/h | 1301 | 1409 | 1702 | 1547 | 1687 | 1777 |
| Q Serve(g, s), s | 5.9 | 0.0 | 30.9 | 1.0 | 10.8 | 77.0 |
| Cycle Q Clear(g, c), s | 5.9 | 0.0 | 30.9 | 1.0 | 10.8 | 77.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 98 | 3166 | 960 | 460 | 2875 | 2875 |
| V/C Ratio(x) | 0.83 | 0.74 | 0.04 | 0.04 | 0.85 | 1.08 |
| Avail Cap(c, a), veh/h | 437 | 3166 | 960 | 496 | 2875 | 2875 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 43.4 | 0.0 | 12.7 | 7.1 | 40.2 | 9.1 |
| Incr Delay (d2), s/veh | 16.3 | 0.0 | 1.0 | 0.0 | 12.5 | 41.4 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%), veh/ft | 2.4 | 0.0 | 9.7 | 0.3 | 5.1 | 27.8 |
| Unsig. Movement Delay, s/veh | 59.7 | 0.0 | 13.7 | 7.1 | 52.7 | 50.5 |
| LnGrp Delay(d)s/veh | E | B | A | D | F | F |
| LnGrp LOS | E | B | A | D | F | F |
| Approach Vol, veh/h | 82 | A | 2394 | | 3483 | |
| Approach Delay, s/veh | 59.7 | | 13.6 | | 50.7 | |
| Approach LOS | E | B | B | | D | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 18.0 | 65.0 | | | 83.0 | 12.2 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Selling (Gmax), s | 14.0 | 58.0 | | | 77.0 | 32.0 |
| Max Q Clear Time (g, c+1), s | 12.8 | 32.9 | | | 79.0 | 7.9 |
| Green Ext Time (p, c), s | 0.2 | 19.2 | | | 0.0 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | 35.9 | | | | | |
| HCM 6th LOS | D | | | | | |
| Notes | | | | | | |
| Unsignalized Delay for [WBRT] is excluded from calculations of the approach delay and intersection delay. | | | | | | |

HCM 6th Signalized Intersection Summary
 2. Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|-------|-------|------|------|------|-------|-------|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 30 | 5 | 5 | 110 | 5 | 2095 | 195 | 390 | 2425 | 95 | 95 | 95 |
| Future Volume (veh/h) | 30 | 5 | 5 | 110 | 5 | 2095 | 195 | 390 | 2425 | 95 | 95 | 95 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1885 | 1900 | 1559 | 1870 | 1470 | 1900 | 1870 | 1604 | 1544 | 1870 | 1885 |
| Adj Flow Rate, veh/h | 33 | 5 | 5 | 54 | 5 | 5 | 2277 | 141 | 424 | 2636 | 78 | 78 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 1 | 0 | 23 | 2 | 29 | 0 | 2 | 20 | 24 | 2 | 1 |
| Cap, veh/h | 43 | 47 | 40 | 82 | 65 | 11 | 3357 | 893 | 469 | 2899 | 1303 | 1303 |
| Arrive On Green | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.00 | 0.01 | 0.66 | 0.16 | 0.82 | 0.82 | 0.82 |
| Sat Flow, veh/h | 1810 | 1885 | 1610 | 2881 | 1870 | 1246 | 1810 | 5106 | 1359 | 2853 | 3554 | 1598 |
| Grp Volume(v), veh/h | 33 | 5 | 5 | 54 | 5 | 5 | 2277 | 141 | 424 | 2636 | 78 | 78 |
| Grp Sat Flow(s), veh/h | 1810 | 1885 | 1610 | 1440 | 1870 | 1246 | 1810 | 1702 | 1359 | 1427 | 1777 | 1598 |
| Q Serve(g, s), s | 3.3 | 0.5 | 0.1 | 3.3 | 0.5 | 0.0 | 0.5 | 49.6 | 7.1 | 26.2 | 95.3 | 1.7 |
| Cycle Q Clear(g, c), s | 3.3 | 0.5 | 0.1 | 3.3 | 0.5 | 0.0 | 0.5 | 49.6 | 7.1 | 26.2 | 95.3 | 1.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 43 | 47 | 40 | 82 | 65 | 11 | 3357 | 893 | 469 | 2899 | 1303 | 1303 |
| V/C Ratio(x) | 0.77 | 0.11 | 0.03 | 0.66 | 0.09 | 0.45 | 0.68 | 0.16 | 0.90 | 0.91 | 0.06 | 0.06 |
| Avail Cap(c, a), veh/h | 206 | 157 | 134 | 616 | 343 | 50 | 3357 | 893 | 697 | 2899 | 1303 | 1303 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 87.4 | 65.8 | 85.7 | 86.6 | 85.0 | 0.0 | 89.1 | 19.1 | 11.8 | 73.8 | 11.8 | 3.2 |
| Incr Delay (d2), s/veh | 24.1 | 1.0 | 0.3 | 8.7 | 0.7 | 0.0 | 25.9 | 1.1 | 0.4 | 11.0 | 5.5 | 0.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%), veh/ft | 8 | 0.2 | 0.0 | 1.4 | 0.2 | 0.0 | 0.3 | 18.9 | 2.3 | 10.2 | 31.1 | 0.5 |
| Unsig. Movement Delay, s/veh | 111.5 | 86.8 | 85.9 | 95.2 | 85.7 | 0.0 | 115.0 | 20.2 | 12.2 | 84.8 | 17.3 | 3.3 |
| LnGrp Delay(d)s/veh | F | F | F | F | F | F | F | F | F | F | B | A |
| LnGrp LOS | F | F | F | F | F | F | F | F | F | F | B | A |
| Approach Vol, veh/h | 39 | | | 59 | A | 2423 | | | | 3138 | | |
| Approach Delay, s/veh | 107.7 | | | 94.4 | | 19.9 | | | | 26.1 | | |
| Approach LOS | F | | | F | | B | | | | C | | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 35.6 | 124.3 | 9.6 | 10.4 | 7.1 | 152.8 | 8.8 | 11.3 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Selling (Gmax), s | 60.0 | 38.5 | 15.0 | 5.0 | 99.0 | 20.5 | 33.0 | | | | | |
| Max Q Clear Time (g, c+1), s | 51.6 | 5.3 | 2.5 | 2.5 | 97.3 | 5.3 | 2.5 | | | | | |
| Green Ext Time (p, c), s | 1.4 | 7.4 | 0.2 | 0.0 | 1.7 | 0.0 | 0.0 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 24.7 | | | | | | | | | | | |
| HCM 6th LOS | C | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [WBRT] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|--|------|------|------|-------|------|------|-------|------|------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 45 | 5 | 35 | 85 | 10 | 85 | 90 | 2155 | 250 | 2120 | 110 | 110 |
| Future Volume (veh/h) | 45 | 5 | 35 | 85 | 10 | 85 | 90 | 2155 | 250 | 2120 | 110 | 110 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1781 | 1870 | 1767 | 1870 | 1870 | 1856 | 1856 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 49 | 5 | 1 | 92 | 11 | 0 | 98 | 2342 | 167 | 272 | 2304 | 117 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 8 | 2 | 9 | 2 | 2 | 3 | 3 | 2 | 2 |
| Cap, veh/h | 84 | 48 | 40 | 580 | 332 | 0 | 2136 | 658 | 977 | 3620 | 183 | 183 |
| Arrive On Green | 0.02 | 0.03 | 0.03 | 0.18 | 0.18 | 0.00 | 0.00 | 0.42 | 0.42 | 0.29 | 0.73 | 0.73 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 3291 | 1870 | 1497 | 0 | 5106 | 1572 | 3428 | 4978 | 251 |
| Grp Volume(v), veh/h | 49 | 5 | 1 | 92 | 11 | 0 | 0 | 2342 | 167 | 272 | 1570 | 851 |
| Grp Sat Flow(s), veh/h | 1728 | 1870 | 1585 | 1646 | 1870 | 1497 | 0 | 1702 | 1572 | 1714 | 1702 | 1825 |
| Q Serve(g.s), s | 2.7 | 0.5 | 0.1 | 4.5 | 0.9 | 0.0 | 0.0 | 79.5 | 8.1 | 11.7 | 44.4 | 45.3 |
| Cycle O Clear(g.c), s | 2.7 | 0.5 | 0.1 | 4.5 | 0.9 | 0.0 | 0.0 | 79.5 | 8.1 | 11.7 | 44.4 | 45.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.14 |
| Lane Grp Cap(c), veh/h | 84 | 48 | 40 | 580 | 332 | 0 | 2136 | 658 | 977 | 2475 | 1327 | 1327 |
| VC Ratio(x) | 0.58 | 0.10 | 0.02 | 0.16 | 0.03 | 0.00 | 1.10 | 0.25 | 0.28 | 0.63 | 0.64 | 0.64 |
| Avail Cap(c), veh/h | 646 | 261 | 221 | 580 | 332 | 0 | 2136 | 658 | 977 | 2475 | 1327 | 1327 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.61 | 0.61 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 91.7 | 90.5 | 90.3 | 66.3 | 64.6 | 0.0 | 0.0 | 55.2 | 13.6 | 52.7 | 13.1 | 13.3 |
| Incr Delay (d2), s/veh | 6.2 | 1.0 | 0.2 | 0.6 | 0.0 | 0.0 | 0.0 | 48.5 | 0.6 | 0.2 | 1.3 | 2.4 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/ln | 3 | 0.3 | 0.1 | 2.0 | 0.5 | 0.0 | 0.0 | 42.8 | 3.1 | 5.1 | 16.2 | 18.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d), s/veh | 98.0 | 91.4 | 90.5 | 66.9 | 64.7 | 0.0 | 0.0 | 103.8 | 14.2 | 52.9 | 14.4 | 15.6 |
| LnGrp LOS | F | F | F | E | E | A | F | B | D | B | B | B |
| Approach Vol, veh/h | 55 | 103 | A | 2509 | | | | 2693 | | | | |
| Approach Delay, s/veh | 97.3 | 66.7 | 97.8 | | | | | 18.7 | | | | |
| Approach LOS | F | E | F | E | F | F | F | B | | | | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 84.0 | 38.0 | 9.3 | 0.0 | 142.7 | 9.1 | 38.2 | | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | |
| Max Green Setting (Gmax), s | 79.5 | 33.5 | 26.5 | 5.0 | 106.5 | 35.5 | 24.5 | | | | | |
| Max Q Clear Time (g_c+llg), s | 81.5 | 6.5 | 2.5 | 0.0 | 47.3 | 4.7 | 2.9 | | | | | |
| Green Ext Time (g_e), s | 0.6 | 0.0 | 0.3 | 0.0 | 33.4 | 0.1 | 0.0 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 57.4 | | | | | | | | | | | |
| HCM 6th LOS | E | | | | | | | | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|------|------|------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 10 | 5 | 45 | 65 | 5 | 40 | 140 | 2445 | 155 | 70 | 2125 | 45 |
| Future Volume (veh/h) | 10 | 5 | 45 | 65 | 5 | 40 | 140 | 2445 | 155 | 70 | 2125 | 45 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 11 | 5 | 1 | 71 | 5 | 1 | 152 | 2658 | 109 | 76 | 2310 | 31 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 83 | 28 | 3 | 170 | 7 | 94 | 109 | 3757 | 1166 | 98 | 3726 | 1157 |
| Arrive On Green | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.74 | 0.74 | 0.06 | 0.73 | 0.73 |
| Sat Flow, veh/h | 290 | 467 | 47 | 1574 | 111 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 17 | 0 | 0 | 76 | 0 | 1 | 152 | 2658 | 109 | 76 | 2310 | 31 |
| Grp Sat Flow(s), veh/h | 804 | 0 | 0 | 1685 | 0 | 1585 | 1781 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 5.5 | 25.8 | 1.8 | 3.8 | 20.1 | 0.5 |
| Cycle O Clear(g.c), s | 3.8 | 0.0 | 0.0 | 3.8 | 0.0 | 0.1 | 5.5 | 25.8 | 1.8 | 3.8 | 20.1 | 0.5 |
| Prop In Lane | 0.65 | 0.06 | 0.93 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 113 | 0 | 0 | 177 | 0 | 94 | 109 | 3757 | 1166 | 98 | 3726 | 1157 |
| VC Ratio(x) | 0.15 | 0.00 | 0.00 | 0.43 | 0.00 | 0.01 | 1.40 | 0.71 | 0.09 | 0.77 | 0.62 | 0.03 |
| Avail Cap(c), veh/h | 219 | 0 | 0 | 275 | 0 | 203 | 109 | 3757 | 1166 | 188 | 3726 | 1157 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.73 | 0.73 |
| Uniform Delay (d), s/veh | 40.3 | 0.0 | 0.0 | 41.6 | 0.0 | 39.9 | 42.3 | 6.6 | 3.4 | 42.0 | 6.0 | 3.4 |
| Incr Delay (d2), s/veh | 0.6 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 224.6 | 1.1 | 0.2 | 9.1 | 0.6 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/ln | 4 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 9.1 | 6.0 | 0.4 | 1.8 | 4.7 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d), s/veh | 40.9 | 0.0 | 0.0 | 43.3 | 0.0 | 39.9 | 266.9 | 7.7 | 3.5 | 51.1 | 6.6 | 3.4 |
| LnGrp LOS | D | A | A | D | A | D | F | A | A | D | A | A |
| Approach Vol, veh/h | 17 | | | 77 | | | 2919 | | | 2417 | | |
| Approach Delay, s/veh | 40.9 | | | 43.2 | | | 21.0 | | | 7.9 | | |
| Approach LOS | D | D | D | D | D | D | C | | | A | | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 91.5 | 70.7 | 9.8 | 10.0 | 70.2 | 9.8 | | | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | |
| Max Green Setting (Gmax), s | 55.5 | 11.5 | 5.5 | 59.5 | 11.5 | 11.5 | | | | | | |
| Max Q Clear Time (g_c+llg), s | 27.8 | 5.8 | 7.5 | 22.1 | 5.8 | 5.8 | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 23.3 | 0.0 | 0.0 | 25.2 | 0.1 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 15.6 | | | | | | | | | | | |
| HCM 6th LOS | B | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 5: Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|-------|------|------|------|------|------|-------|------|------|
| Lane Configurations | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 |
| Traffic Volume (veh/h) | 570 | 5 | 450 | 10 | 0 | 5 | 550 | 2330 | 10 | 5 | 1770 | 140 |
| Future Volume (veh/h) | 570 | 5 | 450 | 10 | 0 | 5 | 550 | 2330 | 10 | 5 | 1770 | 140 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 624 | 0 | 367 | 11 | 0 | 1 | 598 | 2533 | 7 | 5 | 1924 | 59 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 704 | 0 | 1240 | 18 | 0 | 16 | 668 | 3301 | 1025 | 9 | 2948 | 726 |
| Arrive On Green | 0.20 | 0.00 | 0.20 | 0.01 | 0.00 | 0.01 | 0.19 | 0.65 | 0.65 | 0.00 | 0.46 | 0.46 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 624 | 0 | 367 | 11 | 0 | 1 | 598 | 2533 | 7 | 5 | 1924 | 59 |
| Grp Sat Flow(s), veh/hln | 1781 | 0 | 1585 | 1781 | 0 | 1585 | 1728 | 1702 | 1585 | 1781 | 1609 | 1585 |
| Q Serve(g_s), s | 26.7 | 0.0 | 12.5 | 1.0 | 0.0 | 0.1 | 26.5 | 54.5 | 0.2 | 0.4 | 36.2 | 3.3 |
| Cycle Q Clear(g_c), s | 26.7 | 0.0 | 12.5 | 1.0 | 0.0 | 0.1 | 26.5 | 54.5 | 0.2 | 0.4 | 36.2 | 3.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 704 | 0 | 1240 | 18 | 0 | 16 | 668 | 3301 | 1025 | 9 | 2948 | 726 |
| V/C Ratio(X) | 0.89 | 0.00 | 0.30 | 0.59 | 0.00 | 0.06 | 0.89 | 0.77 | 0.01 | 0.56 | 0.65 | 0.08 |
| Avail Cap(c), veh/h | 796 | 0 | 1321 | 159 | 0 | 142 | 926 | 4333 | 1345 | 68 | 3982 | 981 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 61.1 | 0.0 | 32.9 | 77.2 | 0.0 | 76.8 | 61.7 | 19.4 | 9.8 | 77.8 | 32.8 | 23.9 |
| Incr Delay (d2), s/veh | 108 | 0.0 | 0.1 | 26.9 | 0.0 | 1.5 | 8.6 | 0.6 | 0.0 | 45.6 | 0.2 | 0.0 |
| Initial Q Delay(Q), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(95%), veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d), s/veh | 72.0 | 0.0 | 33.0 | 104.1 | 0.0 | 78.3 | 70.3 | 20.1 | 9.8 | 123.4 | 33.1 | 23.9 |
| LnGrp LOS | E | A | C | F | A | E | E | C | A | F | C | C |
| Approach Vol, veh/h | 991 | | | 12 | | | 3138 | | | 1988 | | |
| Approach Delay, s/veh | 57.5 | | | 101.9 | | | 29.6 | | | 33.0 | | |
| Approach LOS | E | | | F | | | C | | | C | | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 6.8 | 107.3 | 6.6 | 36.3 | 77.8 | 36.0 | | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax) & 133.0 | 14.0 | 42.0 | 14.0 | 42.0 | 97.0 | 35.0 | | | | | | |
| Max Q Clear Time (g_c+1/2), s | 3.0 | 28.5 | 3.0 | 28.5 | 38.2 | 28.7 | | | | | | |
| Green Ext Time (p_c), s | 0.0 | 44.8 | 0.0 | 1.8 | 24.0 | 2.3 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |

User approved volume balancing among the lanes for turning movement.

HCM 6th TWSC
 9: Maui Veterans Hwy & DLNR Drwy 1

DHHL Pulehunui TIAR
 02/04/2019

| Intersection | 1,2 | | | | | | | | | | | |
|--------------------------|--------|--------|--------|--------|------|------|--|--|--|--|--|--|
| In Delay, s/veh | WBL | WBR | NBT | NBR | SBL | SBT | | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | | | | | | |
| Lane Configurations | 0 | 65 | 2670 | 25 | 0 | 2235 | | | | | | |
| Traffic Vol, veh/h | 0 | 65 | 2670 | 25 | 0 | 2235 | | | | | | |
| Future Vol, veh/h | 0 | 65 | 2670 | 25 | 0 | 2235 | | | | | | |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Sign Control | Stop | Stop | Free | Free | Free | Free | | | | | | |
| RT Channelized | - | None | - | None | - | None | | | | | | |
| Storage Length | - | 0 | - | 0 | - | 0 | | | | | | |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Grade, % | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | | | | | | |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | |
| Mvmt Flow | 0 | 71 | 2902 | 27 | 0 | 2429 | | | | | | |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | | | | | | | |
| Conflicting Flow All | - | 1451 | 0 | 0 | - | - | | | | | | |
| Stage 1 | - | - | - | - | - | - | | | | | | |
| Stage 2 | - | - | - | - | - | - | | | | | | |
| Critical Hwy | - | 7.14 | - | - | - | - | | | | | | |
| Critical Hwy Stg 1 | - | - | - | - | - | - | | | | | | |
| Critical Hwy Stg 2 | - | - | - | - | - | - | | | | | | |
| Follow-up Hwy | - | 3.92 | - | - | - | - | | | | | | |
| Pd Cap-1 Maneuver | 0 | 103 | - | - | 0 | - | | | | | | |
| Stage 1 | 0 | - | - | - | 0 | - | | | | | | |
| Stage 2 | 0 | - | - | - | 0 | - | | | | | | |
| Platoon blocked, % | - | - | - | - | - | - | | | | | | |
| Mov Cap-1 Maneuver | - | 103 | - | - | - | - | | | | | | |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | | | | | | |
| Stage 1 | - | - | - | - | - | - | | | | | | |
| Stage 2 | - | - | - | - | - | - | | | | | | |
| Approach | WB | NB | SB | | | | | | | | | |
| HCM Control Delay, s | 94.9 | 0 | 0 | | | | | | | | | |
| HCM LOS | F | | | | | | | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT | | | | | | | | |
| Capacity (veh/h) | - | - | 103 | - | | | | | | | | |
| HCM Lane V/C Ratio | - | - | 0.686 | - | | | | | | | | |
| HCM Control Delay (s) | - | - | 94.9 | - | | | | | | | | |
| HCM Lane LOS | - | - | F | - | | | | | | | | |
| HCM 95th %ile Q(veh) | - | - | 3.5 | - | | | | | | | | |

HCM 6th Signalized Intersection Summary
 10: Maui Veterans Hwy & DLNR Drwy 2

DHHL Pulehunui TIAR
 02/04/2019

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|------|------|------|------|-------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 175 | 95 | 2600 | 240 | 340 | 1895 |
| Future Volume (veh/h) | 175 | 95 | 2600 | 240 | 340 | 1895 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 190 | 30 | 2826 | 164 | 370 | 2060 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 217 | 193 | 2915 | 905 | 358 | 4121 |
| Arrive On Green | 0.12 | 0.12 | 0.57 | 0.57 | 0.20 | 0.81 |
| Sat Flow, veh/h | 1781 | 1585 | 5274 | 1585 | 1781 | 5274 |
| Grp Volume(v), veh/h | 190 | 30 | 2826 | 164 | 370 | 2060 |
| Grp Sat Flow(s), veh/h | 1781 | 1585 | 1702 | 1585 | 1781 | 1702 |
| Q Serve(g_s), s | 13.3 | 2.2 | 67.5 | 6.3 | 25.5 | 16.6 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 217 | 193 | 2915 | 905 | 358 | 4121 |
| V/C Ratio(X) | 0.87 | 0.16 | 0.97 | 0.18 | 1.03 | 0.50 |
| Avail Cap(c_a), veh/h | 259 | 231 | 2915 | 905 | 358 | 4121 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 54.8 | 49.9 | 26.2 | 13.0 | 50.7 | 4.0 |
| Incr Delay (d2), s/veh | 23.6 | 0.4 | 10.6 | 0.1 | 56.8 | 0.4 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), s/veh | 7.4 | 0.9 | 27.3 | 2.1 | 16.7 | 3.9 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 78.4 | 50.3 | 36.7 | 13.1 | 107.5 | 4.4 |
| LnGrp LOS | E | D | D | B | F | A |
| Approach Vol, veh/h | 220 | 2990 | | | 2430 | |
| Approach Delay, s/veh | 74.5 | 35.4 | | | 20.1 | |
| Approach LOS | E | D | | | C | |
| Timer - Assigned PHS | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 30.0 | 77.0 | | | 107.0 | 20.0 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | | 4.5 | 4.5 |
| Max Green Sailing (Gmax), s | 25.5 | 72.5 | | | 102.5 | 18.5 |
| Max Q Clear Time (g_c+1T), s | 27.5 | 69.5 | | | 18.6 | 15.3 |
| Green Ext Time (p_c), s | 0.0 | 2.9 | | | 29.9 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 30.4 | | | |
| HCM 6th LOS | | | C | | | |

HCM 6th TWSC
 11: Maui Veterans Hwy & DLNR Drwy 3

DHHL Pulehunui TIAR
 02/04/2019

| Intersection | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|--------|-----------|--------|--------|------|------|
| In Delay, s/veh | | | | | | |
| Movement | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Vol, veh/h | 0 | 20 | 2820 | 80 | 0 | 2070 |
| Future Vol, veh/h | 0 | 20 | 2820 | 80 | 0 | 2070 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 500 | - | - |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 |
| Grade, % | 0 | - | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 22 | 3065 | 87 | 0 | 2250 |
| Major/Minor | Minor1 | Major1 | Major1 | Minor2 | | |
| Conflicting Flow All | - | 1533 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pl Cap-1 Maneuver | 0 | 90 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 90 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | SB | | |
| HCM Control Delay, s | 57.3 | 0 | 0 | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR/WBLnt | SBT | | | |
| Capacity (veh/h) | - | - | 90 | - | | |
| HCM Lane V/C Ratio | - | - | 0.242 | - | | |
| HCM Control Delay (s) | - | - | 57.3 | - | | |
| HCM Lane LOS | - | - | F | - | | |
| HCM 95th %tile Q(veh) | - | - | 0.9 | - | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Future Year 2038 PM Peak

HCM 6th Signalized Intersection Summary
1. Mokulele Hwy/Maui Veterans Hwy & Nakii Rd



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|--|------|------|------|-------|------|
| Lane Configurations | 75 | 385 | 3500 | 70 | 180 | 3030 |
| Traffic Volume (veh/h) | 75 | 385 | 3500 | 70 | 180 | 3030 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Q ₀), veh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A _{pb}) | No | No | No | No | No | No |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/hIn | 1841 | 1856 | 1870 | 1648 | 1752 | 1870 |
| Adj Flow Rate, veh/h | 82 | 0 | 3804 | 52 | 196 | 3293 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 4 | 3 | 2 | 17 | 10 | 2 |
| Cap, veh/h | 104 | 3715 | 1016 | 248 | 3009 | |
| Arrive On Green | 0.06 | 0.00 | 0.73 | 0.73 | 0.08 | 0.85 |
| Sat Flow, veh/h | 1753 | 1572 | 5274 | 1397 | 3237 | 3647 |
| Grp Volume(v), veh/h | 82 | 0 | 3804 | 52 | 196 | 3293 |
| Grp Sat Flow(s), veh/hIn | 1753 | 1572 | 1702 | 1397 | 1618 | 1777 |
| Q Serve(g.s), s | 5.4 | 0.0 | 85.1 | 1.2 | 7.0 | 99.0 |
| Cycle Q Clear(g.c), s | 5.4 | 0.0 | 85.1 | 1.2 | 7.0 | 99.0 |
| Prop In Lane | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Lane Grp Cap(c), veh/h | 104 | 3715 | 1016 | 248 | 3009 | |
| VC Ratio(X) | 0.79 | | 1.02 | 0.05 | 0.79 | 1.09 |
| Avail Cap(c _a), veh/h | 150 | | 3715 | 1016 | 249 | 3009 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 54.3 | 0.0 | 15.9 | 4.5 | 53.1 | 9.0 |
| Incr Delay (d2), s/veh | 16.2 | 0.0 | 21.3 | 0.0 | 15.7 | 48.5 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/In | 2.9 | 0.0 | 31.4 | 0.3 | 3.3 | 34.4 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 70.5 | 0.0 | 37.2 | 4.5 | 68.8 | 57.5 |
| LnGrp LOS | E | | F | A | E | F |
| Approach Vol, veh/h | 82 | A | 3856 | | 3489 | |
| Approach Delay, s/veh | 70.5 | | 36.8 | | 58.1 | |
| Approach LOS | E | D | E | | E | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 13.9 | 91.1 | | | 105.0 | 11.9 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 9.0 | 85.0 | | | 99.0 | 10.0 |
| Max Q Clear Time (g_c+H), s | 9.0 | 87.1 | | | 101.0 | 7.4 |
| Green Ext Time (g_e), s | 0.0 | 0.0 | | | 0.0 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 47.2 | | | |
| HCM 6th LOS | | | D | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | |

HCM 6th Signalized Intersection Summary
 2: Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|-------|------|------|-------|-------|-------|-------|------|-------|-------|------|
| Lane Configurations | 125 | 5 | 15 | 220 | 15 | 480 | 15 | 2940 | 100 | 235 | 2650 | 80 |
| Traffic Volume (veh/h) | 125 | 5 | 15 | 220 | 15 | 480 | 15 | 2940 | 100 | 235 | 2650 | 80 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Q _{bb}), veh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1900 | 1900 | 1648 | 1900 | 1693 | 1900 | 1870 | 1693 | 1737 | 1870 | 1885 | 1885 |
| Adj Flow Rate, veh/h | 136 | 5 | 1 | 239 | 16 | 0 | 16 | 3196 | 64 | 255 | 2880 | 59 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 17 | 0 | 14 | 0 | 2 | 14 | 11 | 2 | 1 |
| Cap, veh/h | 156 | 53 | 45 | 283 | 66 | 28 | 3392 | 953 | 289 | 2627 | 1181 | 1181 |
| Arrive On Green | 0.09 | 0.03 | 0.03 | 0.09 | 0.03 | 0.00 | 0.02 | 0.66 | 0.66 | 0.09 | 0.74 | 0.74 |
| Sat Flow, veh/h | 1810 | 1900 | 1610 | 3045 | 1900 | 1434 | 1810 | 5106 | 1434 | 3209 | 3554 | 1598 |
| Grp Volume(v), veh/h | 136 | 5 | 1 | 239 | 16 | 0 | 16 | 3196 | 64 | 255 | 2880 | 59 |
| Grp Sat Flow(s), veh/hln | 1810 | 1900 | 1610 | 3045 | 1900 | 1434 | 1810 | 1702 | 1434 | 1605 | 1777 | 1598 |
| Q Serve(g.s), s | 13.4 | 0.5 | 0.1 | 13.9 | 1.5 | 0.0 | 1.6 | 101.1 | 2.8 | 14.1 | 133.0 | 1.8 |
| Cycle O Clear(g.c), s | 13.4 | 0.5 | 0.1 | 13.9 | 1.5 | 0.0 | 1.6 | 101.1 | 2.8 | 14.1 | 133.0 | 1.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 156 | 53 | 45 | 283 | 66 | 28 | 3392 | 953 | 289 | 2627 | 1181 | 1181 |
| VC Ratio(x) | 0.87 | 0.09 | 0.02 | 0.85 | 0.24 | 0.58 | 0.94 | 0.07 | 0.88 | 1.10 | 0.05 | 0.05 |
| Avail Cap(c), veh/h | 196 | 158 | 134 | 634 | 348 | 50 | 3392 | 953 | 303 | 2627 | 1181 | 1181 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 81.3 | 85.3 | 85.1 | 80.4 | 84.6 | 0.0 | 88.0 | 27.1 | 10.6 | 80.9 | 23.5 | 6.4 |
| Incr Delay (d2), s/veh | 28.0 | 0.8 | 0.2 | 6.9 | 1.9 | 0.0 | 17.6 | 6.8 | 0.1 | 24.1 | 50.2 | 0.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), s/veh | 5.0 | 0.2 | 0.0 | 5.8 | 0.8 | 0.0 | 0.9 | 39.9 | 1.0 | 6.8 | 66.1 | 0.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 109.3 | 86.1 | 85.3 | 87.2 | 86.5 | 0.0 | 105.7 | 34.0 | 10.8 | 105.0 | 73.6 | 6.4 |
| LnGrp LOS | F | F | F | F | F | F | F | C | B | F | F | A |
| Approach Vol, veh/h | 142 | | | 265 | | | 3276 | | | | 3194 | |
| Approach Delay, s/veh | 108.4 | | | 87.2 | | | 33.9 | | | | 74.9 | |
| Approach LOS | F | | | F | | | C | | | | E | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 22.2 | 125.6 | 21.2 | 11.0 | 8.8 | 139.0 | 20.0 | 12.2 | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 88.0 | 37.5 | 15.0 | 5.0 | 100.0 | 19.5 | 33.0 | | | | | |
| Max Q Clear Time (g.c+llg), s | 103.1 | 15.9 | 2.5 | 3.6 | 135.0 | 15.4 | 3.5 | | | | | |
| Green Ext Time (p.c), s | 0.1 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved pedestrian interval to be less than phase max green. | | | | | | | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|-------|-------|------|-------|-------|-------|------|------|-------|------|------|
| Lane Configurations | 195 | 20 | 150 | 445 | 45 | 450 | 110 | 2390 | 320 | 320 | 2440 | 145 |
| Traffic Volume (veh/h) | 195 | 20 | 150 | 445 | 45 | 450 | 110 | 2390 | 320 | 320 | 2440 | 145 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Q _{bb}), veh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 212 | 22 | 84 | 484 | 49 | 0 | 120 | 2598 | 190 | 348 | 2652 | 154 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 268 | 120 | 102 | 529 | 267 | 47 | 2944 | 914 | 384 | 3269 | 187 | 187 |
| Arrive On Green | 0.07 | 0.06 | 0.06 | 0.15 | 0.14 | 0.00 | 0.03 | 0.58 | 0.58 | 0.11 | 0.66 | 0.66 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 3456 | 1870 | 1585 | 1781 | 5106 | 1585 | 3456 | 4941 | 282 |
| Grp Volume(v), veh/h | 212 | 22 | 84 | 484 | 49 | 0 | 120 | 2598 | 190 | 348 | 1814 | 92 |
| Grp Sat Flow(s), veh/hln | 1728 | 1870 | 1585 | 1728 | 1870 | 1585 | 1781 | 1702 | 1585 | 1728 | 1702 | 1820 |
| Q Serve(g.s), s | 11.5 | 2.1 | 9.9 | 26.2 | 4.4 | 0.0 | 5.0 | 83.3 | 11.0 | 18.9 | 73.3 | 7.2 |
| Cycle O Clear(g.c), s | 11.5 | 2.1 | 9.9 | 26.2 | 4.4 | 0.0 | 5.0 | 83.3 | 11.0 | 18.9 | 73.3 | 7.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 268 | 120 | 102 | 529 | 267 | 47 | 2944 | 914 | 384 | 3269 | 1204 | 1204 |
| VC Ratio(x) | 0.82 | 0.18 | 0.83 | 0.91 | 0.18 | 2.56 | 0.88 | 0.21 | 0.91 | 0.81 | 0.82 | 0.82 |
| Avail Cap(c), veh/h | 646 | 261 | 221 | 609 | 267 | 47 | 2944 | 914 | 409 | 2252 | 1204 | 1204 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 86.7 | 84.2 | 87.8 | 79.2 | 71.7 | 0.0 | 92.5 | 34.7 | 19.3 | 83.5 | 23.3 | 23.9 |
| Incr Delay (d2), s/veh | 6.5 | 0.7 | 15.1 | 17.0 | 0.3 | 0.0 | 711.3 | 0.7 | 0.1 | 22.5 | 3.2 | 6.5 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), s/veh | 4.1 | 4.6 | 13.0 | 2.2 | 0.0 | 11.6 | 33.3 | 4.2 | 9.6 | 28.8 | 33.4 | 33.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 93.1 | 84.9 | 103.0 | 96.2 | 72.0 | 0.0 | 803.8 | 35.3 | 19.4 | 106.0 | 26.5 | 30.4 |
| LnGrp LOS | F | F | F | F | F | F | F | D | B | F | C | C |
| Approach Vol, veh/h | 318 | | | 533 | | | 2908 | | | | 3154 | |
| Approach Delay, s/veh | 95.2 | | | 94.0 | | | 66.0 | | | | 36.5 | |
| Approach LOS | F | | | F | | | E | | | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 25.6 | 114.1 | 33.6 | 16.7 | 9.5 | 130.2 | 18.7 | 31.6 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 79.5 | 33.5 | 26.5 | 5.0 | 106.5 | 35.5 | 24.5 | | | | | |
| Max Q Clear Time (g.c+llg), s | 85.3 | 28.2 | 11.9 | 7.0 | 79.2 | 13.5 | 6.4 | | | | | |
| Green Ext Time (p.c), s | 0.2 | 0.0 | 0.9 | 0.3 | 0.0 | 23.1 | 0.7 | 0.1 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|-------|------|------|-------|------|------|------|------|------|------|-------|------|
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 50 | 15 | 195 | 245 | 15 | 100 | 125 | 2650 | 170 | 60 | 2935 | 20 |
| Future Volume (veh/h) | 50 | 15 | 195 | 245 | 15 | 100 | 125 | 2650 | 170 | 60 | 2935 | 20 |
| Initial Q (Obs.) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 54 | 16 | 146 | 266 | 16 | 60 | 136 | 2880 | 118 | 65 | 3190 | 10 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 25 | 18 | 38 | 180 | 8 | 480 | 156 | 2944 | 914 | 81 | 2729 | 847 |
| Arrive On Green | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.58 | 0.58 | 0.05 | 0.53 | 0.53 |
| Sat Flow, veh/h | 0 | 59 | 124 | 467 | 28 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 216 | 0 | 0 | 282 | 0 | 60 | 136 | 2880 | 118 | 65 | 3190 | 10 |
| Grp Sat Flow(s), veh/hln | 184 | 0 | 0 | 495 | 0 | 1585 | 1781 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 13.6 | 98.6 | 6.1 | 6.5 | 96.2 | 0.5 |
| Cycle Q Clear(g.c), s | 54.5 | 0.0 | 0.0 | 54.5 | 0.0 | 4.9 | 13.6 | 98.6 | 6.1 | 6.5 | 96.2 | 0.5 |
| Prop In Lane | 0.25 | 0.68 | 0.94 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 81 | 0 | 0 | 189 | 0 | 480 | 156 | 2944 | 914 | 81 | 2729 | 847 |
| VC Ratio(x) | 2.68 | 0.00 | 0.00 | 1.50 | 0.00 | 0.13 | 0.87 | 0.98 | 0.13 | 0.80 | 1.17 | 0.01 |
| Avail Cap(c), veh/h | 81 | 0 | 0 | 189 | 0 | 480 | 272 | 2944 | 914 | 114 | 2729 | 847 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.20 | 0.20 | 0.20 |
| Uniform Delay (d), s/veh | 54.5 | 0.0 | 0.0 | 68.4 | 0.0 | 45.5 | 81.1 | 37.0 | 17.4 | 85.1 | 41.9 | 19.6 |
| Incr Delay (d2), s/veh | 790.6 | 0.0 | 0.0 | 248.6 | 0.0 | 0.1 | 13.5 | 12.2 | 0.3 | 5.5 | 76.9 | 0.0 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%)veh/ln | 0.0 | 0.0 | 0.0 | 21.9 | 0.0 | 2.0 | 6.8 | 42.2 | 2.3 | 3.1 | 57.9 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 845.1 | 0.0 | 0.0 | 316.9 | 0.0 | 45.6 | 94.6 | 49.2 | 17.7 | 90.6 | 118.8 | 19.6 |
| LnGrp LOS | F | A | A | F | A | D | F | D | B | F | F | B |
| Approach Vol, veh/h | 216 | | | 342 | | | 3134 | | | | 3265 | |
| Approach Delay, s/veh | 845.1 | | | 269.3 | | | 50.0 | | | | 117.9 | |
| Approach LOS | F | | | F | | | D | | | | F | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 108.3 | 59.0 | 20.3 | 100.7 | 59.0 | | | | | | | |
| Change Period (Y+Rc), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | |
| Max Green Selling (Gmax), s | 100.5 | 54.5 | 27.5 | 84.5 | 54.5 | | | | | | | |
| Max Q Clear Time (g_c+1/3), s | 100.6 | 56.5 | 15.6 | 98.2 | 56.5 | | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 117.3 | | | | | | | | | | | |
| HCM 6th LOS | F | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 5: Piliani Hwy/Maui Veterans Hwy & N Kihei Rd/Monsanto Drwy

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|--------|------|------|-------|------|-------|-------|------|------|-------|------|------|
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 460 | 0 | 530 | 15 | 15 | 625 | 2380 | 15 | 5 | 2915 | 610 | 610 |
| Future Volume (veh/h) | 460 | 0 | 530 | 15 | 15 | 625 | 2380 | 15 | 5 | 2915 | 610 | 610 |
| Initial Q (Obs.) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 500 | 0 | 549 | 16 | 5 | 1 | 679 | 2587 | 11 | 5 | 3168 | 398 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 564 | 0 | 1150 | 25 | 21 | 4 | 706 | 3668 | 1139 | 9 | 3338 | 822 |
| Arrive On Green | 0.16 | 0.00 | 0.16 | 0.01 | 0.01 | 0.01 | 0.20 | 0.72 | 0.72 | 0.00 | 0.52 | 0.52 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1513 | 303 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 500 | 0 | 549 | 16 | 0 | 6 | 679 | 2587 | 11 | 5 | 3168 | 398 |
| Grp Sat Flow(s), veh/hln | 1781 | 0 | 1585 | 1781 | 0 | 1816 | 1728 | 1702 | 1585 | 1781 | 1609 | 1585 |
| Q Serve(g.s), s | 28.9 | 0.0 | 28.0 | 1.9 | 0.0 | 0.7 | 40.9 | 60.8 | 0.4 | 0.6 | 98.0 | 33.9 |
| Cycle Q Clear(g.c), s | 28.9 | 0.0 | 28.0 | 1.9 | 0.0 | 0.7 | 40.9 | 60.8 | 0.4 | 0.6 | 98.0 | 33.9 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 564 | 0 | 1150 | 25 | 21 | 4 | 706 | 3668 | 1139 | 9 | 3338 | 822 |
| VC Ratio(x) | 0.89 | 0.00 | 0.48 | 0.65 | 0.00 | 0.24 | 0.96 | 0.71 | 0.01 | 0.58 | 0.95 | 0.48 |
| Avail Cap(c), veh/h | 627 | 0 | 1206 | 34 | 0 | 35 | 707 | 3668 | 1139 | 34 | 3338 | 822 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 86.6 | 0.0 | 51.6 | 103.1 | 0.0 | 102.5 | 82.8 | 16.9 | 8.4 | 104.3 | 47.9 | 32.5 |
| Incr Delay (d2), s/veh | 13.4 | 0.0 | 0.3 | 25.6 | 0.0 | 4.8 | 24.7 | 1.2 | 0.0 | 49.9 | 7.5 | 2.0 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%)veh/ln | 5 | 0.0 | 11.4 | 1.1 | 0.0 | 0.4 | 20.5 | 22.9 | 0.1 | 0.4 | 40.0 | 13.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 1000.0 | 0.0 | 51.9 | 128.7 | 0.0 | 107.4 | 107.5 | 18.1 | 8.4 | 154.3 | 55.5 | 34.5 |
| LnGrp LOS | F | A | D | F | A | F | F | B | A | F | E | C |
| Approach Vol, veh/h | 1049 | | | 22 | | | 3277 | | | | 3571 | |
| Approach Delay, s/veh | 74.8 | | | 122.9 | | | 36.5 | | | | 53.3 | |
| Approach LOS | E | | | F | | | D | | | | D | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 156.9 | 7.9 | 48.9 | 115.0 | 38.3 | | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | | | | |
| Max Green Selling (Gmax), s | 148.0 | 4.0 | 43.0 | 109.0 | 37.0 | | | | | | | |
| Max Q Clear Time (g_c+1/3), s | 148.6 | 3.9 | 42.9 | 100.0 | 30.9 | | | | | | | |
| Green Ext Time (g_e), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 49.4 | | | | | | | | | | | |
| HCM 6th LOS | D | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved pedestrian interval to be less than phase max green. | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

| Intersection | WBL | WBR | NBT | NBR | SBL | SBT |
|---|-----|-----|-----|-----|-----|-----|
| Int Delay, s/veh | | | | | | |
| Initial Delay, s/veh | | | | | | |
| Initial Q (Q _{sb}), veh | | | | | | |
| Ped-Bike Adj(A _{pb}), % | | | | | | |
| Parking Bus, Adj | | | | | | |
| Work Zone On Approach | | | | | | |
| Adj Sat Flow, veh/h | | | | | | |
| Adj Flow Rate, veh/h | | | | | | |
| Peak Hour Factor | | | | | | |
| Percent Heavy Veh, % | | | | | | |
| Cap, veh/h | | | | | | |
| Arrive On Green | | | | | | |
| Sat Flow, veh/h | | | | | | |
| Grp Volume(v), veh/h | | | | | | |
| Grp Sat Flow(s), veh/h | | | | | | |
| Q Serve(g.s), s | | | | | | |
| Cycle Q Clear(Q _c), s | | | | | | |
| Prop In Lane | | | | | | |
| Lane Grp Cap(c), veh/h | | | | | | |
| VC Ratio(X) | | | | | | |
| Avail Cap(c _a), veh/h | | | | | | |
| HCM Platoon Ratio | | | | | | |
| Upstream Filter(i) | | | | | | |
| Uniform Delay (d), s/veh | | | | | | |
| Incr Delay (d ₂), s/veh | | | | | | |
| %ile BackOfQ(50%), veh/h | | | | | | |
| Initial Q Delay(Q ₃), s/veh | | | | | | |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d _l), s/veh | | | | | | |
| LnGrp LOS | | | | | | |
| Approach Vol, veh/h | | | | | | |
| Approach Delay, s/veh | | | | | | |
| Approach LOS | | | | | | |
| Timer - Assigned Phs | | | | | | |
| Phs Duration (G+Y+Rc), s | | | | | | |
| Change Period (Y+Rc), s | | | | | | |
| Max Green Setting (Gmax), s | | | | | | |
| Max Q Clear Time (Q _{c+H}), s | | | | | | |
| Green Ext Time (g _c), s | | | | | | |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | | | | |
| HCM 6th LOS | | | | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|------|------|-------|------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 250 | 150 | 2725 | 95 | 120 | 3250 |
| Future Volume (veh/h) | 250 | 150 | 2725 | 95 | 120 | 3250 |
| Initial Q (Q _{sb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}), % | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 272 | 40 | 2962 | 62 | 130 | 3533 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 300 | 267 | 3254 | 1010 | 155 | 3881 |
| Arrive On Green | 0.17 | 0.17 | 0.64 | 0.64 | 0.09 | 0.76 |
| Sat Flow, veh/h | 1781 | 1585 | 5274 | 1585 | 1781 | 5274 |
| Grp Volume(v), veh/h | 1781 | 1585 | 1702 | 1585 | 1781 | 1702 |
| Grp Sat Flow(s), veh/h | 189 | 2.7 | 63.1 | 1.9 | 9.0 | 67.8 |
| Q Serve(g.s), s | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Cycle Q Clear(Q _c), s | 189 | 2.7 | 63.1 | 1.9 | 9.0 | 67.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 300 | 267 | 3254 | 1010 | 155 | 3881 |
| VC Ratio(X) | 0.91 | 0.15 | 0.91 | 0.06 | 0.84 | 0.91 |
| Avail Cap(c _a), veh/h | 347 | 309 | 3266 | 1014 | 163 | 3915 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.4 | 44.6 | 19.7 | 8.6 | 56.6 | 11.8 |
| Incr Delay (d ₂), s/veh | 24.4 | 0.3 | 4.3 | 0.0 | 29.5 | 3.7 |
| %ile BackOfQ(50%), veh/h | 10.4 | 1.1 | 22.8 | 0.6 | 5.2 | 19.9 |
| Initial Q Delay(Q ₃), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | 75.7 | 44.9 | 24.0 | 8.6 | 86.1 | 15.4 |
| LnGrp Delay(d _l), s/veh | E | D | C | A | F | B |
| LnGrp LOS | E | D | C | A | F | B |
| Approach Vol, veh/h | 312 | 3024 | 3024 | 312 | 3663 | 3663 |
| Approach Delay, s/veh | 71.8 | 23.7 | 23.7 | 71.9 | 17.9 | 17.9 |
| Approach LOS | E | C | C | B | B | B |
| Timer - Assigned Phs | 1 | 2 | 2 | 6 | 8 | 8 |
| Phs Duration (G+Y+Rc), s | 15.4 | 84.7 | 100.2 | 25.7 | 25.7 | 25.7 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | 11.5 | 80.5 | 96.5 | 24.5 | 24.5 | 24.5 |
| Max Q Clear Time (Q _{c+H}), s | 11.0 | 65.1 | 69.8 | 20.9 | 20.9 | 20.9 |
| Green Ext Time (g _c), s | 0.0 | 14.5 | 25.8 | 0.3 | 0.3 | 0.3 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 22.8 | | | |
| HCM 6th LOS | | | C | | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS

- Future Year 2038 WE Peak

| | | | | | | | | | | |
|--------------------------|--------|---------|---------|--------|------|---------|--|--|--|--|
| Intersection | 0.2 | | | | | | | | | |
| Int Delay, s/veh | 0.2 | | | | | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | | | | |
| Lane Configurations | | ↑ ↑ ↑ ↑ | ↑ ↑ ↑ ↑ | ↑ | ↑ | ↑ ↑ ↑ ↑ | | | | |
| Traffic Vol, veh/h | 0 | 25 | 2795 | 25 | 0 | 3500 | | | | |
| Future Vol, veh/h | 0 | 25 | 2795 | 25 | 0 | 3500 | | | | |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Sign Control | Stop | Stop | Free | Free | Free | Free | | | | |
| RT Channelized | - | None | - | None | - | None | | | | |
| Storage Length | - | 0 | - | 0 | - | 0 | | | | |
| Veh in Median Storage, # | 0 | - | 0 | - | 0 | - | | | | |
| Grade, % | 0 | - | 0 | - | 0 | - | | | | |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | | | | |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | | | | |
| Mvmt Flow | 0 | 27 | 3038 | 27 | 0 | 3804 | | | | |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | | | | | |
| Conflicting Flow All | - | 1519 | 0 | 0 | - | - | | | | |
| Stage 1 | - | - | - | - | - | - | | | | |
| Stage 2 | - | - | - | - | - | - | | | | |
| Critical Hdwy | - | 7.14 | - | - | - | - | | | | |
| Critical Hdwy Slg 1 | - | - | - | - | - | - | | | | |
| Critical Hdwy Slg 2 | - | - | - | - | - | - | | | | |
| Follow-up Hdwy | - | 3.92 | - | - | - | - | | | | |
| Pl Cap-1 Maneuver | 0 | 92 | - | - | 0 | - | | | | |
| Stage 1 | 0 | - | - | - | 0 | - | | | | |
| Stage 2 | 0 | - | - | - | 0 | - | | | | |
| Platoon blocked, % | - | - | - | - | - | - | | | | |
| Mov Cap-1 Maneuver | - | 92 | - | - | - | - | | | | |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | | | | |
| Stage 1 | - | - | - | - | - | - | | | | |
| Stage 2 | - | - | - | - | - | - | | | | |
| Approach | WB | NB | SB | | | | | | | |
| HCM Control Delay, s | 59.8 | 0 | 0 | | | | | | | |
| HCM LOS | F | | | | | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR | WBL | n1 | SBT | | | | | |
| Capacity (veh/h) | - | - | 92 | - | - | | | | | |
| HCM Lane V/C Ratio | - | - | 0.295 | - | - | | | | | |
| HCM Control Delay (s) | - | - | 59.8 | - | - | | | | | |
| HCM Lane LOS | - | - | F | - | - | | | | | |
| HCM 95th %ile Q(veh) | - | - | 1.1 | - | - | | | | | |

HCM 6th Signalized Intersection Summary
 1. Mokulele Hwy/Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
 02/04/2019

| Movement | WBL | WBR | NBT | NBR | SBL | SBR |
|---|------|------|------|------|------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 25 | 140 | 3110 | 45 | 105 | 2855 |
| Future Volume (veh/h) | 25 | 140 | 3110 | 45 | 105 | 2855 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1707 | 1841 | 1870 | 1693 | 1767 | 1870 |
| Adj Flow Rate, veh/h | 27 | 0 | 3380 | 32 | 114 | 3103 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 13 | 4 | 2 | 14 | 9 | 2 |
| Cap, veh/h | 45 | 3768 | 1058 | 175 | 3014 | 2 |
| Arrive On Green | 0.03 | 0.00 | 0.74 | 0.74 | 0.05 | 0.85 |
| Sat Flow, veh/h | 1626 | 1560 | 5274 | 1434 | 3264 | 3647 |
| Grp Volume(v), veh/h | 27 | 0 | 3380 | 32 | 114 | 3103 |
| Grp Sat Flow(s), veh/h | 1626 | 1560 | 1702 | 1434 | 1632 | 1777 |
| Q Serve(g, s), s | 1.5 | 0.0 | 45.4 | 0.5 | 3.0 | 75.0 |
| Cycle Q Clear(g, c), s | 1.5 | 0.0 | 45.4 | 0.5 | 3.0 | 75.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 45 | 3768 | 1058 | 175 | 3014 | 2 |
| V/C Ratio(x) | 0.61 | 0.90 | 0.03 | 0.03 | 0.65 | 1.03 |
| Avail Cap(c, a), veh/h | 257 | 3768 | 1058 | 221 | 3014 | 2 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 42.5 | 0.0 | 9.0 | 3.1 | 41.0 | 6.7 |
| Incr Delay (d2), s/veh | 12.5 | 0.0 | 3.3 | 0.0 | 4.4 | 24.5 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/veh | 0.7 | 0.0 | 10.7 | 0.1 | 1.3 | 12.2 |
| Unsig. Movement Delay, s/veh | 55.0 | 0.0 | 12.2 | 3.1 | 45.5 | 31.2 |
| LnGrp Delay(d)s/veh | E | B | A | D | F | F |
| LnGrp LOS | E | B | A | D | F | F |
| Approach Vol, veh/h | 27 | A | 3412 | | 3217 | |
| Approach Delay, s/veh | 55.0 | A | 12.2 | | 31.8 | |
| Approach LOS | E | B | B | | C | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 |
| Phs Duration (G+Y+Rc), s | 9.7 | 71.3 | | | 81.0 | 7.4 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 6.0 | 64.0 | | | 75.0 | 14.0 |
| Max Q Clear Time (g_c+1t), s | 5.0 | 47.4 | | | 77.0 | 3.5 |
| Green Ext Time (p_c), s | 0.0 | 16.1 | | | 0.0 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | 21.8 | | | | | |
| HCM 6th LOS | C | | | | | |
| Notes | | | | | | |
| Unsignalized Delay for [WBRT] is excluded from calculations of the approach delay and intersection delay. | | | | | | |

HCM 6th Signalized Intersection Summary
 2. Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|-------|-------|------|------|-------|-------|-------|------|------|------|-------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 140 | 10 | 20 | 175 | 20 | 410 | 15 | 2630 | 125 | 315 | 2435 | 120 |
| Future Volume (veh/h) | 140 | 10 | 20 | 175 | 20 | 410 | 15 | 2630 | 125 | 315 | 2435 | 120 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pbT}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1900 | 1900 | 1900 | 1796 | 1870 | 1767 | 1900 | 1870 | 1767 | 1811 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 152 | 11 | 1 | 190 | 22 | 0 | 16 | 2859 | 75 | 342 | 2647 | 95 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 7 | 2 | 9 | 0 | 2 | 9 | 6 | 2 | 2 |
| Cap, veh/h | 171 | 98 | 83 | 236 | 52 | 28 | 3252 | 953 | 388 | 2620 | 1169 | 2 |
| Arrive On Green | 0.09 | 0.05 | 0.05 | 0.07 | 0.03 | 0.00 | 0.02 | 0.64 | 0.64 | 0.12 | 0.74 | 0.74 |
| Sat Flow, veh/h | 1810 | 1900 | 1610 | 3319 | 1870 | 1497 | 1810 | 5106 | 1497 | 3346 | 3554 | 1585 |
| Grp Volume(v), veh/h | 152 | 11 | 1 | 190 | 22 | 0 | 16 | 2859 | 75 | 342 | 2647 | 95 |
| Grp Sat Flow(s), veh/h | 1810 | 1900 | 1610 | 1659 | 1870 | 1497 | 1810 | 1702 | 1497 | 1673 | 1777 | 1585 |
| Q Serve(g, s), s | 14.9 | 1.0 | 0.1 | 10.2 | 2.1 | 0.0 | 1.6 | 83.2 | 3.4 | 18.1 | 132.7 | 3.0 |
| Cycle Q Clear(g, c), s | 14.9 | 1.0 | 0.1 | 10.2 | 2.1 | 0.0 | 1.6 | 83.2 | 3.4 | 18.1 | 132.7 | 3.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 171 | 98 | 83 | 236 | 52 | 28 | 3252 | 953 | 388 | 2620 | 1169 | 2 |
| V/C Ratio(x) | 0.89 | 0.11 | 0.01 | 0.81 | 0.42 | 0.58 | 0.88 | 0.88 | 0.88 | 1.01 | 0.88 | 0.08 |
| Avail Cap(c, a), veh/h | 196 | 158 | 134 | 691 | 343 | 50 | 3252 | 953 | 521 | 2620 | 1169 | 2 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 80.5 | 81.5 | 81.0 | 82.4 | 86.1 | 0.0 | 88.0 | 27.0 | 12.5 | 78.4 | 23.6 | 6.6 |
| Incr Delay (d2), s/veh | 32.8 | 0.5 | 0.1 | 6.4 | 5.4 | 0.0 | 17.6 | 3.8 | 0.2 | 12.9 | 20.1 | 0.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/veh | 0.5 | 0.0 | 0.0 | 4.6 | 1.1 | 0.0 | 0.9 | 32.8 | 1.2 | 8.4 | 55.1 | 1.1 |
| Unsig. Movement Delay, s/veh | 113.3 | 82.0 | 81.1 | 88.8 | 91.5 | 0.0 | 105.7 | 30.7 | 12.7 | 91.3 | 43.8 | 6.7 |
| LnGrp Delay(d)s/veh | F | F | F | F | F | F | F | F | F | F | F | F |
| LnGrp LOS | F | F | F | F | F | F | F | F | F | F | F | F |
| Approach Vol, veh/h | 164 | | | 212 | A | | 2950 | | | 3084 | | |
| Approach Delay, s/veh | 111.0 | | | 89.1 | | | 30.7 | | | 47.9 | | |
| Approach LOS | F | | | F | | | C | | | D | | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 26.9 | 120.6 | 17.3 | 15.2 | 8.8 | 138.7 | 21.5 | 11.0 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 77.0 | 37.5 | 15.0 | 5.0 | 100.0 | 19.5 | 33.0 | | | | | |
| Max Q Clear Time (g_c+1t), s | 85.2 | 12.2 | 3.0 | 3.6 | 134.7 | 16.9 | 4.1 | | | | | |
| Green Ext Time (p_c), s | 0.7 | 0.0 | 0.6 | 0.0 | 0.0 | 0.1 | 0.1 | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 43.0 | | | | | | | | | | | |
| HCM 6th LOS | D | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [WBRT] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3: Maui Veterans Hwy & DLNR Access

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|------|------|-------|-------|-------|-------|--------|------|-------|------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 225 | 20 | 175 | 530 | 55 | 530 | 170 | 2020 | 495 | 495 | 1935 | 225 |
| Future Volume (veh/h) | 225 | 20 | 175 | 530 | 55 | 530 | 170 | 2020 | 495 | 495 | 1935 | 225 |
| Initial Q (Obs.) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1885 | 1870 | 1885 | 1870 | 1870 | 1870 | 1885 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 245 | 22 | 105 | 576 | 60 | 0 | 185 | 2196 | 270 | 538 | 2103 | 237 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 292 | 145 | 123 | 608 | 314 | 47 | 2488 | 772 | 578 | 2922 | 325 | 2 |
| Arrive On Green | 0.08 | 0.08 | 0.08 | 0.17 | 0.17 | 0.00 | 0.03 | 0.49 | 0.49 | 0.17 | 0.63 | 0.63 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 3483 | 1870 | 1598 | 1781 | 5106 | 1585 | 3483 | 4663 | 518 |
| Grp Sat Flow(s), veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Q Serve(g.s), s | 13.3 | 2.1 | 12.4 | 31.1 | 5.2 | 0.0 | 5.0 | 73.5 | 20.0 | 29.0 | 57.7 | 59.7 |
| Cycle Q Clear(g.c), s | 13.3 | 2.1 | 12.4 | 31.1 | 5.2 | 0.0 | 5.0 | 73.5 | 20.0 | 29.0 | 57.7 | 59.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.29 |
| Lane Grp Cap(c), veh/h | 292 | 145 | 123 | 608 | 314 | 47 | 2488 | 772 | 578 | 2134 | 1114 | 2 |
| VC Ratio(x) | 0.84 | 0.15 | 0.85 | 0.95 | 0.19 | 3.95 | 0.88 | 0.35 | 0.93 | 0.72 | 0.73 | 0.73 |
| Avail Cap(c), veh/h | 646 | 261 | 221 | 614 | 314 | 47 | 2488 | 772 | 614 | 2134 | 1114 | 2 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.15 | 0.15 | 0.15 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 85.7 | 81.8 | 86.6 | 77.5 | 68.0 | 0.0 | 92.5 | 43.8 | 30.1 | 78.2 | 24.0 | 24.4 |
| Incr Delay (d2), s/veh | 6.4 | 0.5 | 15.2 | 23.8 | 0.3 | 0.0 | 1333.6 | 0.8 | 0.2 | 20.5 | 2.1 | 4.2 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%)veh/m2 | 1.0 | 5.7 | 16.1 | 2.6 | 0.0 | 0.0 | 19.7 | 30.4 | 7.9 | 14.5 | 23.0 | 25.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 92.1 | 82.3 | 101.7 | 101.3 | 68.3 | 0.0 | 142.6 | 44.6 | 30.3 | 98.7 | 26.1 | 28.6 |
| LnGrp LOS | F | F | F | F | E | F | D | C | F | C | C | C |
| Approach Vol, veh/h | 372 | | | 636 | A | | | | 2651 | | 2878 | |
| Approach Delay, s/veh | 94.2 | | | 98.2 | | | | | 139.6 | | 40.4 | |
| Approach LOS | F | | | F | | | | | F | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 36.0 | 97.1 | 37.7 | 19.2 | 9.5 | 123.6 | 20.6 | 36.4 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 68.5 | 33.5 | 26.5 | 5.0 | 106.5 | 35.5 | 24.5 | | | | | |
| Max Q Clear Time (g_c+1/3), s | 75.5 | 33.1 | 14.4 | 7.0 | 61.7 | 15.3 | 7.2 | | | | | |
| Green Ext Time (p_c), s | 0.6 | 0.0 | 0.1 | 0.3 | 0.0 | 27.3 | 0.8 | 0.2 | | | | |
| Intersection Summary | E | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 89.3 | | | | | | | | | | | |
| HCM 6th LOS | F | | | | | | | | | | | |

Notes
 Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|-------|------|------|-------|------|------|-------|------|------|------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 50 | 15 | 215 | 290 | 20 | 115 | 190 | 2485 | 250 | 95 | 2505 | 35 |
| Future Volume (veh/h) | 50 | 15 | 215 | 290 | 20 | 115 | 190 | 2485 | 250 | 95 | 2505 | 35 |
| Initial Q (Obs.) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 54 | 16 | 141 | 315 | 22 | 45 | 207 | 2701 | 133 | 103 | 2723 | 18 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap. veh/h | 60 | 34 | 69 | 216 | 10 | 396 | 109 | 2695 | 837 | 129 | 2752 | 854 |
| Arrive On Green | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.06 | 0.53 | 0.53 | 0.07 | 0.54 | 0.54 |
| Sat Flow, veh/h | 0 | 138 | 278 | 556 | 39 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1585 |
| Grp Volume(v), veh/h | 211 | 0 | 0 | 337 | 0 | 45 | 207 | 2701 | 133 | 103 | 2723 | 18 |
| Grp Sat Flow(s), veh/hln | 416 | 0 | 0 | 595 | 0 | 1585 | 1781 | 1702 | 1585 | 1781 | 1702 | 1585 |
| Q Serve(g.s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 5.5 | 47.5 | 3.9 | 5.1 | 47.4 | 0.5 |
| Cycle Q Clear(g.c), s | 22.5 | 0.0 | 0.0 | 22.5 | 0.0 | 2.0 | 5.5 | 47.5 | 3.9 | 5.1 | 47.4 | 0.5 |
| Prop In Lane | 0.26 | 0.67 | 0.93 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 154 | 0 | 0 | 226 | 0 | 396 | 109 | 2695 | 837 | 129 | 2752 | 854 |
| VC Ratio(x) | 1.37 | 0.00 | 0.00 | 1.49 | 0.00 | 0.11 | 1.90 | 1.00 | 0.16 | 0.80 | 0.99 | 0.02 |
| Avail Cap(c), veh/h | 154 | 0 | 0 | 226 | 0 | 396 | 109 | 2695 | 837 | 129 | 2752 | 854 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.7 | 0.0 | 0.0 | 37.6 | 0.0 | 26.1 | 42.3 | 21.2 | 11.0 | 41.1 | 20.5 | 9.7 |
| Incr Delay (d2), s/veh | 201.3 | 0.0 | 0.0 | 242.4 | 0.0 | 0.1 | 438.0 | 17.9 | 0.4 | 13.4 | 8.7 | 0.0 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%)veh/m2 | 0.0 | 0.0 | 0.0 | 20.2 | 0.0 | 0.7 | 15.6 | 20.1 | 1.3 | 2.6 | 17.7 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 233.1 | 0.0 | 0.0 | 280.0 | 0.0 | 26.2 | 480.3 | 39.1 | 11.4 | 54.5 | 29.2 | 9.7 |
| LnGrp LOS | F | A | A | F | A | C | F | B | D | C | C | A |
| Approach Vol, veh/h | 211 | | | 382 | | | | | 3041 | | 2844 | |
| Approach Delay, s/veh | 233.1 | | | 250.1 | | | | | 67.9 | | 30.0 | |
| Approach LOS | F | | | F | | | | | E | | C | |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 52.0 | 27.0 | 10.0 | 53.0 | 27.0 | | | | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | |
| Max Green Setting (Gmax), s | 47.5 | 22.5 | 5.5 | 48.5 | 22.5 | | | | | | | |
| Max Q Clear Time (g_c+1/3), s | 49.5 | 24.5 | 7.5 | 49.4 | 24.5 | | | | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | |
| Intersection Summary | E | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 67.4 | | | | | | | | | | | |
| HCM 6th LOS | E | | | | | | | | | | | |

Notes
 Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
 5: Piliani Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

HCM 6th TWSC
 9: Maui Veterans Hwy & DLNR Access Drwy 1

DHHL Pulehunui TIAR
 02/04/2019

DHHL Pulehunui TIAR
 02/04/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 470 | 0 | 385 | 5 | 0 | 5 | 410 | 2370 | 5 | 5 | 2520 | 525 |
| Future Volume (veh/h) | 470 | 0 | 385 | 5 | 0 | 5 | 410 | 2370 | 5 | 5 | 2520 | 525 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 511 | 0 | 358 | 5 | 0 | 1 | 446 | 2576 | 3 | 5 | 2739 | 251 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 636 | 0 | 1041 | 11 | 0 | 10 | 518 | 3248 | 1008 | 9 | 3161 | 779 |
| Arrive On Green | 0.18 | 0.00 | 0.18 | 0.01 | 0.00 | 0.01 | 0.15 | 0.64 | 0.64 | 0.01 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 511 | 0 | 358 | 5 | 0 | 1 | 446 | 2576 | 3 | 5 | 2739 | 251 |
| Grp Sat Flow(s),veh/hln | 1781 | 0 | 1585 | 1781 | 0 | 1585 | 1728 | 1702 | 1585 | 1781 | 1609 | 1585 |
| Q Serve(g_s), s | 17.4 | 0.0 | 10.8 | 0.4 | 0.0 | 0.1 | 15.9 | 46.8 | 0.1 | 0.4 | 47.6 | 12.1 |
| Cycle Q Clear(g_c), s | 17.4 | 0.0 | 10.8 | 0.4 | 0.0 | 0.1 | 15.9 | 46.8 | 0.1 | 0.4 | 47.6 | 12.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 636 | 0 | 1041 | 11 | 0 | 10 | 518 | 3248 | 1008 | 9 | 3161 | 779 |
| V/C Ratio(X) | 0.80 | 0.00 | 0.34 | 0.47 | 0.00 | 0.10 | 0.86 | 0.79 | 0.00 | 0.55 | 0.87 | 0.32 |
| Avail Cap(c), veh/h | 988 | 0 | 1354 | 56 | 0 | 50 | 712 | 3438 | 1067 | 56 | 3211 | 791 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 49.7 | 0.0 | 32.1 | 62.5 | 0.0 | 62.4 | 52.4 | 16.9 | 8.4 | 62.6 | 28.4 | 19.4 |
| Incr Delay (d2), s/veh | 2.7 | 0.0 | 0.2 | 28.4 | 0.0 | 4.7 | 7.9 | 1.3 | 0.0 | 43.3 | 2.7 | 0.2 |
| Initial Q Delay(Q),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 0.0 | 4.2 | 0.2 | 0.0 | 0.0 | 7.3 | 16.3 | 0.0 | 0.3 | 17.6 | 4.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 52.5 | 0.0 | 32.3 | 91.0 | 0.0 | 67.1 | 60.3 | 18.1 | 8.4 | 105.9 | 31.2 | 19.6 |
| LnGrp LOS | D | A | C | F | A | E | E | B | A | F | C | B |
| Approach Vol, veh/h | 869 | | | 6 | | | | | | | 2995 | |
| Approach Delay, s/veh | 44.2 | | | 87.0 | | | | | | | 30.3 | |
| Approach LOS | D | | | F | | | | | | | C | |
| Timer - Assigned PHS | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 66.3 | | | 5.8 | 24.9 | 68.0 | | | | | 27.5 | |
| Change Period (Y+R), s | 6.0 | | | 5.0 | 6.0 | 6.0 | | | | | 5.0 | |
| Max Green Sailing (Gmax) & | 85.0 | | | 4.0 | 26.0 | 63.0 | | | | | 35.0 | |
| Max Q Clear Time (g_c+I2), s | 48.8 | | | 2.4 | 17.9 | 49.6 | | | | | 19.4 | |
| Green Ext Time (p_c), s | 0.0 | | | 0.0 | 1.0 | 12.4 | | | | | 3.2 | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | 29.5 | |
| HCM 6th LOS | | | | | | | | | | | C | |

Notes
 User approved volume balancing among the lanes for turning movement.
 FY 2038 WE Peak
 Austin, Tsutsumi, & Assoc.
 Synchro 10 Report
 Page 5

| Intersection | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|--------|--------|--------|--------|------|------|
| Ini Delay, s/veh | 1.7 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 |
| Traffic Vol, veh/h | 0 | 70 | 2855 | 10 | 0 | 3005 |
| Future Vol, veh/h | 0 | 70 | 2855 | 10 | 0 | 3005 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 0 | - | 0 |
| Veh in Median Storage, # | 0 | - | 0 | - | 0 | - |
| Grade, % | 0 | - | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 76 | 3103 | 11 | 0 | 3266 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | - | 1552 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.14 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.92 | - | - | - | - |
| Pd Cap-1 Maneuver | 0 | 88 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 88 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | | | |
| HCM Control Delay, s | 145.2 | 0 | 0 | | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBT | | |
| Capacity (veh/h) | - | - | 88 | - | | |
| HCM Lane V/C Ratio | - | - | 0.865 | - | | |
| HCM Control Delay (s) | - | - | 145.2 | - | | |
| HCM Lane LOS | - | - | F | - | | |
| HCM 95th %ile Q(veh) | - | - | 4.6 | - | | |

FY 2038 WE Peak
 Austin, Tsutsumi, & Assoc.
 Synchro 10 Report
 Page 6

HCM 6th Signalized Intersection Summary
 10: Maui Veterans Hwy & DLNR Access Drwy 2

DHHL Pulehunui TIAR
 02/04/2019

| | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|------|------|------|------|-------|------|
| Movement | | | | | | |
| Lane Configurations | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
| Traffic Volume (veh/h) | 215 | 125 | 2740 | 90 | 125 | 2880 |
| Future Volume (veh/h) | 215 | 125 | 2740 | 90 | 125 | 2880 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 234 | 11 | 2978 | 72 | 136 | 3130 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 261 | 232 | 3370 | 1046 | 161 | 4007 |
| Arrive On Green | 0.15 | 0.15 | 0.66 | 0.66 | 0.09 | 0.78 |
| Sat Flow, veh/h | 1781 | 1885 | 5274 | 1585 | 1781 | 5274 |
| Grp Volume(v), veh/h | 234 | 11 | 2978 | 72 | 136 | 3130 |
| Grp Sat Flow(s), veh/h | 1781 | 1885 | 1702 | 1585 | 1781 | 1702 |
| Q Serve(g_s), s | 16.9 | 0.8 | 62.3 | 2.1 | 9.8 | 44.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 261 | 232 | 3370 | 1046 | 161 | 4007 |
| V/C Ratio(x) | 0.90 | 0.05 | 0.88 | 0.07 | 0.84 | 0.78 |
| Avail Cap(c_a), veh/h | 320 | 284 | 3451 | 1071 | 197 | 4192 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 54.9 | 48.0 | 18.2 | 7.9 | 58.6 | 7.8 |
| Incr Delay (d2), s/veh | 23.1 | 0.1 | 3.0 | 0.0 | 23.4 | 1.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), s/veh | 9.3 | 0.3 | 22.0 | 0.7 | 5.4 | 11.8 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 78.0 | 48.1 | 21.2 | 8.0 | 82.0 | 8.8 |
| LnGrp LOS | E | D | C | A | F | A |
| Approach Vol, veh/h | 245 | 3050 | | | 3266 | |
| Approach Delay, s/veh | 76.6 | 20.9 | | | 11.8 | |
| Approach LOS | E | C | | | B | |
| Timer - Assigned PHS | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+R), s | 16.3 | 90.9 | | | 107.2 | 23.7 |
| Change Period (Y+R), s | 4.5 | 4.5 | | | 4.5 | 4.5 |
| Max Green Selling (Gmax), s | 14.5 | 88.5 | | | 107.5 | 23.5 |
| Max Q Clear Time (g_c+1T), s | 11.8 | 64.3 | | | 46.7 | 18.9 |
| Green Ext Time (p_c), s | 0.1 | 22.1 | | | 51.8 | 0.3 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 18.5 | | | |
| HCM 6th LOS | | | B | | | |

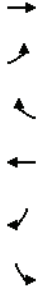
HCM 6th TWSC
 11: Maui Veterans Hwy & DLNR Access Drwy 3

DHHL Pulehunui TIAR
 02/04/2019

| | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|--------|-----------|--------|--------|------|------|
| Intersection | | | | | | |
| In Delay, s/veh | | | | | | 0.3 |
| Movement | | | | | | |
| Lane Configurations | ↖ | ↗ | ↖ | ↗ | ↖ | ↗ |
| Traffic Vol, veh/h | 0 | 25 | 2805 | 30 | 0 | 3090 |
| Future Vol, veh/h | 0 | 25 | 2805 | 30 | 0 | 3090 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | | Stop | Free | Free | Free | Free |
| RT Channelized | | None | None | None | None | None |
| Storage Length | | 0 | 0 | 500 | | |
| Veh in Median Storage, # | | 0 | 0 | 0 | 0 | 0 |
| Grade, % | | 0 | 0 | 0 | 0 | 0 |
| Peak Hour Factor | 2 | 2 | 2 | 2 | 2 | 2 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 27 | 3049 | 33 | 0 | 3359 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | | 1525 | 0 | 0 | | |
| Stage 1 | | | | | | |
| Stage 2 | | | | | | |
| Critical Hdwy | | 7.14 | | | | |
| Critical Hdwy Stg 1 | | | | | | |
| Critical Hdwy Stg 2 | | | | | | |
| Follow-up Hdwy | | 3.92 | | | | |
| Pl Cap-1 Maneuver | 0 | 91 | | | 0 | |
| Stage 1 | 0 | | | | 0 | |
| Stage 2 | 0 | | | | 0 | |
| Platoon blocked, % | | | | | | |
| Mov Cap-1 Maneuver | | 91 | | | | |
| Mov Cap-2 Maneuver | | | | | | |
| Stage 1 | | | | | | |
| Stage 2 | | | | | | |
| Approach | WB | NB | SB | | | |
| HCM Control Delay, s | 60.6 | 0 | 0 | | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR/WBLnt | SBT | | | |
| Capacity (veh/h) | | | 91 | | | |
| HCM Lane V/C Ratio | | | 0.299 | | | |
| HCM Control Delay (s) | | | 60.6 | | | |
| HCM Lane LOS | | | F | | | |
| HCM 95th %ile Q(veh) | | | 1.1 | | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Future Year 2038 AM Peak With Mitigation

HCM 6th Signalized Intersection Summary
1: Maui Veterans Hwy & Nakli Rd



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--|------|------|------|------|-------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 5 | 4 |
| Traffic Volume (veh/h) | 75 | 265 | 2165 | 70 | 360 | 2845 |
| Future Volume (veh/h) | 75 | 265 | 2165 | 70 | 360 | 2845 |
| Initial Q (Q _{sb}) veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1366 | 1663 | 1870 | 1826 | 1826 | 1870 |
| Adj Flow Rate, veh/h | 82 | 0 | 2353 | 48 | 391 | 3092 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 36 | 16 | 2 | 5 | 5 | 2 |
| Cap, veh/h | 98 | 3380 | 1024 | 468 | 4286 | |
| Arrive On Green | 0.08 | 0.00 | 0.66 | 0.66 | 0.14 | 0.84 |
| Sat Flow, veh/h | 1301 | 1409 | 5274 | 1547 | 3374 | 5274 |
| Grp Volume(v), veh/h | 82 | 0 | 2353 | 48 | 391 | 3092 |
| Grp Sat Flow(s), veh/hln | 1301 | 1409 | 1702 | 1547 | 1687 | 1702 |
| Q Serve(g.s), s | 8.0 | 0.0 | 37.2 | 1.4 | 14.5 | 31.8 |
| Cycle Q Clear(g.c), s | 8.0 | 0.0 | 37.2 | 1.4 | 14.5 | 31.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 98 | 3380 | 1024 | 468 | 4286 | |
| VC Ratio(X) | 0.84 | 0.70 | 0.05 | 0.84 | 0.72 | |
| Avail Cap(c _a), veh/h | 384 | 3380 | 1024 | 1100 | 5192 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 58.8 | 0.0 | 13.7 | 7.6 | 54.0 | 4.2 |
| Incr Delay (d2), s/veh | 16.7 | 0.0 | 0.6 | 0.0 | 4.0 | 0.4 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/ln | 3.1 | 0.0 | 12.6 | 0.4 | 6.3 | 5.9 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) _l /s/veh | 75.5 | 0.0 | 14.3 | 7.6 | 58.0 | 4.6 |
| LnGrp LOS | E | B | A | A | E | A |
| Approach Vol, veh/h | 82 | A | 2401 | | 3483 | |
| Approach Delay, s/veh | 75.5 | | 14.2 | | 10.6 | |
| Approach LOS | E | B | B | | B | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 22.9 | 91.3 | | | 114.2 | 14.7 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 42.0 | 84.0 | | | 131.0 | 38.0 |
| Max Q Clear Time (g _c +t1), s | 16.5 | 39.2 | | | 33.8 | 10.0 |
| Green Ext Time (g _e +c), s | 1.3 | 29.2 | | | 74.4 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 12.9 | | | |
| HCM 6th LOS | | | B | | | |
| Notes | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | |

HCM 6th Signalized Intersection Summary
 2. Mokulele Hwy/Maui Veterans Hwy & Mēhameha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|--|-------|------|------|------|-------|-------|------|------|------|------|------|
| Lane Configurations | 30 | 5 | 5 | 5 | 5 | 5 | 110 | 5 | 2095 | 195 | 390 | 2425 |
| Traffic Volume (veh/h) | 30 | 5 | 5 | 5 | 5 | 5 | 110 | 5 | 2095 | 195 | 390 | 2425 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Obs), veh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1752 | 1870 | 1870 | 1559 | 1870 | 1470 | 1870 | 1870 | 1604 | 1544 | 1870 | 1856 |
| Adj Flow Rate, veh/h | 33 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2277 | 142 | 424 | 2636 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 10 | 2 | 2 | 23 | 2 | 29 | 2 | 2 | 20 | 24 | 2 | 3 |
| Cap, veh/h | 42 | 46 | 39 | 82 | 63 | 11 | 3357 | 894 | 469 | 4165 | 1283 | |
| Arrive On Green | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.00 | 0.01 | 0.66 | 0.16 | 0.82 | 0.82 | |
| Sat Flow, veh/h | 1668 | 1870 | 1585 | 2881 | 1870 | 1246 | 1781 | 5106 | 1359 | 2853 | 5106 | 1572 |
| Grp Volume(v), veh/h | 33 | 5 | 5 | 5 | 5 | 5 | 5 | 2277 | 142 | 424 | 2636 | 78 |
| Grp Sat Flow(s), veh/h/m/618 | 1870 | 1585 | 1440 | 1870 | 1246 | 1781 | 1702 | 1359 | 1427 | 1702 | 1572 | |
| Q Serve(g.s), s | 3.5 | 0.5 | 0.1 | 3.3 | 0.5 | 0.0 | 0.5 | 49.6 | 7.2 | 26.3 | 35.4 | 1.7 |
| Cycle O Clear(g.c), s | 3.5 | 0.5 | 0.1 | 3.3 | 0.5 | 0.0 | 0.5 | 49.6 | 7.2 | 26.3 | 35.4 | 1.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 42 | 46 | 39 | 82 | 63 | 11 | 3357 | 894 | 469 | 4165 | 1283 | |
| VC Ratio(x) | 0.79 | 0.11 | 0.03 | 0.66 | 0.10 | 0.46 | 0.68 | 0.16 | 0.90 | 0.63 | 0.06 | |
| Avail Cap(c), veh/h | 190 | 156 | 132 | 616 | 343 | 49 | 3357 | 894 | 697 | 4165 | 1283 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 87.3 | 65.8 | 85.7 | 86.6 | 85.2 | 0.0 | 89.1 | 19.1 | 11.8 | 73.8 | 6.3 | 3.2 |
| Incr Delay (d2), s/veh | 21.2 | 0.0 | 0.0 | 0.3 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%), veh/m/2 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 18.6 | 2.3 | 10.2 | 10.2 | 0.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 114.5 | 86.9 | 85.9 | 95.2 | 86.0 | 0.0 | 116.1 | 20.2 | 12.2 | 84.9 | 7.1 | 3.3 |
| LnGrp LOS | F | F | F | F | F | F | F | C | B | F | A | A |
| Approach Vol, veh/h | 39 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 3138 |
| Approach Delay, s/veh | 110.2 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 94.4 | 17.5 |
| Approach LOS | F | F | F | F | F | F | F | B | B | B | B | B |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 35.6 | 124.3 | 9.6 | 10.4 | 7.1 | 152.8 | 9.0 | 11.1 | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 60.0 | 38.5 | 15.0 | 5.0 | 99.0 | 20.5 | 33.0 | | | | | |
| Max Q Clear Time (g_c+llg), s | 51.6 | 5.3 | 2.5 | 2.5 | 37.4 | 5.5 | 2.5 | | | | | |
| Green Ext Time (p_c), s | 1.3 | 7.3 | 0.2 | 0.0 | 0.0 | 41.5 | 0.0 | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 200 | | | | | | | | | | | |
| HCM 6th LOS | B | | | | | | | | | | | |
| Notes | User approved pedestrian interval to be less than phase max green. | | | | | | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3. Maui Veterans Hwy & DHHL Access/DLNR Access

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------------|--|------|------|------|-------|------|------|------|------|------|------|------|
| Lane Configurations | 45 | 5 | 35 | 85 | 10 | 85 | 90 | 2155 | 250 | 2120 | 110 | |
| Traffic Volume (veh/h) | 45 | 5 | 35 | 85 | 10 | 85 | 90 | 2155 | 250 | 2120 | 110 | |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Obs), veh | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1752 | 1870 | 1767 | 1781 | 1870 | 1781 | 1841 | 1870 | 1856 | 1856 | 1870 | 1856 |
| Adj Flow Rate, veh/h | 49 | 5 | 1 | 92 | 11 | 0 | 98 | 2342 | 208 | 272 | 2304 | 96 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 10 | 2 | 9 | 8 | 2 | 8 | 4 | 2 | 3 | 3 | 2 | 3 |
| Cap, veh/h | 90 | 50 | 99 | 131 | 73 | 135 | 3786 | 1229 | 315 | 4053 | 1292 | |
| Arrive On Green | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.00 | 0.08 | 1.00 | 1.00 | 0.09 | 0.79 | 0.79 |
| Sat Flow, veh/h | 3237 | 1870 | 1497 | 3291 | 1870 | 1510 | 3401 | 5106 | 1572 | 3428 | 5106 | 1572 |
| Grp Volume(v), veh/h | 49 | 5 | 1 | 92 | 11 | 0 | 98 | 2342 | 208 | 272 | 2304 | 96 |
| Grp Sat Flow(s), veh/h/m/618 | 1870 | 1497 | 1646 | 1870 | 1510 | 1700 | 1702 | 1572 | 1714 | 1702 | 1572 | |
| Q Serve(g.s), s | 2.7 | 0.5 | 0.1 | 5.0 | 1.0 | 0.0 | 5.1 | 0.0 | 0.0 | 14.1 | 30.5 | 2.1 |
| Cycle O Clear(g.c), s | 2.7 | 0.5 | 0.1 | 5.0 | 1.0 | 0.0 | 5.1 | 0.0 | 0.0 | 14.1 | 30.5 | 2.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 90 | 50 | 99 | 131 | 73 | 135 | 3786 | 1229 | 315 | 4053 | 1292 | |
| VC Ratio(x) | 0.55 | 0.10 | 0.01 | 0.70 | 0.15 | 0.73 | 0.62 | 0.17 | 0.86 | 0.57 | 0.07 | |
| Avail Cap(c), veh/h | 638 | 275 | 280 | 613 | 255 | 274 | 3786 | 1229 | 429 | 4053 | 1292 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.69 | 0.69 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 86.4 | 65.5 | 78.5 | 85.4 | 83.6 | 0.0 | 81.9 | 0.0 | 0.0 | 80.6 | 7.0 | 3.1 |
| Incr Delay (d2), s/veh | 5.1 | 0.9 | 0.0 | 6.7 | 1.0 | 0.0 | 5.1 | 0.5 | 0.2 | 12.7 | 0.6 | 0.1 |
| Initial Q Delay(d3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackQ(50%), veh/m/2 | 0.2 | 0.0 | 0.0 | 2.3 | 0.5 | 0.0 | 2.2 | 0.2 | 0.1 | 6.7 | 9.7 | 0.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 91.4 | 86.3 | 78.5 | 92.0 | 84.6 | 0.0 | 87.0 | 0.5 | 0.2 | 93.3 | 7.6 | 3.2 |
| LnGrp LOS | F | F | F | F | F | F | F | A | A | F | A | A |
| Approach Vol, veh/h | 55 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 2672 |
| Approach Delay, s/veh | 90.7 | 91.2 | 91.2 | 91.2 | 91.2 | 91.2 | 91.2 | 91.2 | 91.2 | 91.2 | 91.2 | 16.1 |
| Approach LOS | F | F | F | F | F | F | F | A | A | A | A | B |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 138.0 | 11.7 | 9.3 | 11.6 | 147.4 | 9.5 | 11.5 | | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | |
| Max Green Setting (Gmax), s | 79.5 | 33.5 | 26.5 | 14.5 | 87.5 | 35.5 | 24.5 | | | | | |
| Max Q Clear Time (g_c+llg), s | 2.0 | 7.0 | 2.5 | 7.1 | 32.5 | 4.7 | 3.0 | | | | | |
| Green Ext Time (p_c), s | 0.5 | 41.3 | 0.3 | 0.0 | 0.1 | 32.4 | 0.1 | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 123 | | | | | | | | | | | |
| HCM 6th LOS | B | | | | | | | | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|-------|------|------|------|-------|------|------|------|-------|------|------|
| Lane Configurations | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 10 | 5 | 45 | 65 | 5 | 40 | 140 | 2445 | 155 | 70 | 2125 | 45 |
| Future Volume (veh/h) | 10 | 5 | 45 | 65 | 5 | 40 | 140 | 2445 | 155 | 70 | 2125 | 45 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1559 | 1870 | 1707 | 1826 | 1870 | 1856 | 1841 | 1870 | 1856 | 1885 | 1870 | 1826 |
| Adj Flow Rate, veh/h | 11 | 5 | 0 | 71 | 5 | 2 | 152 | 2658 | 126 | 76 | 2310 | 34 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 23 | 2 | 13 | 5 | 2 | 3 | 4 | 2 | 3 | 1 | 2 | 5 |
| Cap, veh/h | 80 | 36 | 149 | 106 | 170 | 173 | 3982 | 1226 | 93 | 3743 | 1134 | |
| Arrive On Green | 0.01 | 0.02 | 0.00 | 0.05 | 0.06 | 0.06 | 0.10 | 0.78 | 0.10 | 0.10 | 1.00 | 1.00 |
| Sat Flow, veh/h | 1485 | 1870 | 1447 | 1739 | 1870 | 1572 | 1753 | 5106 | 1572 | 1795 | 5106 | 1547 |
| Grp Volume(v), veh/h | 11 | 5 | 0 | 71 | 5 | 2 | 152 | 2658 | 126 | 76 | 2310 | 34 |
| Grp Sat Flow(s),veh/hln/1870 | 1870 | 1447 | 1739 | 1870 | 1572 | 1753 | 1702 | 1572 | 1795 | 1702 | 1547 | |
| Q Serve(g.s), s | 1.3 | 0.5 | 0.0 | 7.1 | 0.5 | 0.2 | 15.4 | 43.0 | 3.5 | 7.5 | 0.0 | 0.0 |
| Cycle Q Clear(g.c), s | 1.3 | 0.5 | 0.0 | 7.1 | 0.5 | 0.2 | 15.4 | 43.0 | 3.5 | 7.5 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 80 | 36 | 149 | 106 | 170 | 173 | 3982 | 1226 | 93 | 3743 | 1134 | |
| VC Ratio(x) | 0.14 | 0.14 | 0.48 | 0.05 | 0.01 | 0.88 | 0.67 | 0.10 | 0.82 | 0.62 | 0.03 | |
| Avail Cap(c), veh/h | 322 | 140 | 348 | 119 | 182 | 326 | 3982 | 1226 | 115 | 3743 | 1134 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.80 | 0.80 | 0.80 |
| Uniform Delay (d), s/veh | 85.2 | 68.8 | 0.0 | 79.5 | 80.3 | 71.6 | 80.1 | 9.1 | 4.7 | 79.9 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.8 | 1.8 | 0.0 | 2.4 | 0.2 | 0.0 | 13.3 | 0.9 | 0.2 | 25.6 | 0.6 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%)veh/10.5 | 0.2 | 0.0 | 3.3 | 0.2 | 0.1 | 7.5 | 14.1 | 1.2 | 3.9 | 0.2 | 0.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 86.0 | 88.6 | 0.0 | 81.9 | 80.5 | 71.7 | 93.4 | 10.0 | 4.9 | 105.5 | 0.6 | 0.0 |
| LnGrp LOS | F | F | F | F | F | F | F | A | A | F | A | A |
| Approach Vol, veh/h | 16 | A | 78 | | | | 2936 | | | 2420 | | |
| Approach Delay, s/veh | 86.8 | | 81.5 | | | | 14.1 | | | 3.9 | | |
| Approach LOS | F | F | F | B | B | B | A | | | A | | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 13.4 | 144.9 | 13.4 | 7.9 | 22.2 | 136.4 | 6.6 | 14.7 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 107.5 | 29.5 | 13.5 | 33.5 | 85.5 | 31.5 | 11.5 | | | | | |
| Max Q Clear Time (g_c+1/9), s | 45.0 | 9.1 | 2.5 | 17.4 | 2.0 | 3.3 | 2.5 | | | | | |
| Green Ext Time (p_c), s | 0.0 | 44.1 | 0.1 | 0.0 | 0.3 | 39.0 | 0.0 | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 10.7 | | | | | | | | | | | |
| HCM 6th LOS | B | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 5: Piliiani Hwy/Maui Veterans Hwy & N Kihei Rd/Monsanto Drwy

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|------|-------|-------|------|------|------|------|------|-------|------|------|
| Lane Configurations | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 570 | 5 | 450 | 10 | 0 | 5 | 550 | 2330 | 10 | 5 | 1770 | 140 |
| Future Volume (veh/h) | 570 | 5 | 450 | 10 | 0 | 5 | 550 | 2330 | 10 | 5 | 1770 | 140 |
| Initial Q (Ob), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 624 | 0 | 367 | 11 | 0 | 1 | 598 | 2533 | 7 | 5 | 1924 | 59 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 704 | 0 | 1240 | 18 | 0 | 16 | 668 | 3301 | 1025 | 9 | 2948 | 726 |
| Arrive On Green | 0.20 | 0.00 | 0.20 | 0.01 | 0.00 | 0.01 | 0.19 | 0.65 | 0.65 | 0.00 | 0.46 | 0.46 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 624 | 0 | 367 | 11 | 0 | 1 | 598 | 2533 | 7 | 5 | 1924 | 59 |
| Grp Sat Flow(s),veh/hln/1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Q Serve(g.s), s | 26.7 | 0.0 | 12.5 | 1.0 | 0.0 | 0.1 | 26.5 | 54.5 | 0.2 | 0.4 | 36.2 | 3.3 |
| Cycle Q Clear(g.c), s | 26.7 | 0.0 | 12.5 | 1.0 | 0.0 | 0.1 | 26.5 | 54.5 | 0.2 | 0.4 | 36.2 | 3.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 704 | 0 | 1240 | 18 | 0 | 16 | 668 | 3301 | 1025 | 9 | 2948 | 726 |
| VC Ratio(x) | 0.89 | 0.00 | 0.30 | 0.59 | 0.00 | 0.06 | 0.89 | 0.77 | 0.01 | 0.56 | 0.65 | 0.08 |
| Avail Cap(c), veh/h | 796 | 0 | 1321 | 159 | 0 | 142 | 926 | 4333 | 1345 | 68 | 3982 | 981 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 61.1 | 0.0 | 32.9 | 77.2 | 0.0 | 76.8 | 61.7 | 19.4 | 9.8 | 77.8 | 32.8 | 23.9 |
| Incr Delay (d2), s/veh | 10.8 | 0.0 | 0.1 | 26.9 | 0.0 | 1.5 | 8.6 | 0.6 | 0.0 | 45.6 | 0.2 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%)veh/18.2 | 0.0 | 4.9 | 0.6 | 0.0 | 0.0 | 12.2 | 20.0 | 0.1 | 0.3 | 13.8 | 1.2 | |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 72.0 | 0.0 | 33.0 | 104.1 | 0.0 | 78.3 | 70.3 | 20.1 | 9.8 | 123.4 | 33.1 | 23.9 |
| LnGrp LOS | E | A | C | F | A | E | E | C | A | F | C | C |
| Approach Vol, veh/h | 991 | | | 12 | | | 3138 | | | 1988 | | |
| Approach Delay, s/veh | 57.5 | | | 101.9 | | | 29.6 | | | 33.0 | | |
| Approach LOS | E | E | F | C | F | C | C | | | C | | |
| Timer - Assigned Phs | 1 | 2 | 2 | 4 | 5 | 6 | 8 | | | | | |
| Phs Duration (G+Y+R), s | 6.6 | 36.3 | 107.3 | 6.6 | 36.3 | 77.8 | 36.0 | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | | |
| Max Green Setting (Gmax), s | 133.0 | 14.0 | 42.0 | 97.0 | 14.0 | 42.0 | 35.0 | | | | | |
| Max Q Clear Time (g_c+1/9), s | 56.5 | 3.0 | 28.5 | 38.2 | 3.0 | 28.5 | 28.7 | | | | | |
| Green Ext Time (p_c), s | 0.0 | 44.8 | 0.0 | 1.8 | 24.0 | 2.3 | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | 35.4 | | | | | | | | | | | |
| HCM 6th LOS | D | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

HCM 6th TWSC
9: Maui Veterans Hwy & DHHL South Dwy 1

DHHL Pulehunui TIAR
02/05/2019

| Intersection | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|--------|--------|--------|--------|------|------|
| Initial Delay, s/veh | | | | | | |
| 1.3 | | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | | | | | |
| Traffic Vol. veh/h | 0 | 65 | 2670 | 25 | 0 | 2235 |
| Future Vol. veh/h | 0 | 65 | 2670 | 25 | 0 | 2235 |
| Conflicting Peds. #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 500 | - | - |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 |
| Grade, % | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 5 | 2 | 5 | 0 | 2 |
| Mgmt Flow | 0 | 71 | 2902 | 27 | 0 | 2429 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | - | 1451 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hwy | - | 7.2 | - | - | - | - |
| Critical Hwy Stg 1 | - | - | - | - | - | - |
| Critical Hwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hwy | - | 3.95 | - | - | - | - |
| Pl Cap-1 Maneuver | 0 | 100 | - | 0 | - | - |
| Stage 1 | 0 | - | - | 0 | - | - |
| Stage 2 | 0 | - | - | 0 | - | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 100 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | SB | | |
| HCM Control Delay, s | 100.7 | 0 | 0 | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mgmt | NBT | NBR | WBL | WBL | SBT | SBT |
| Capacity (veh/h) | - | - | 100 | - | - | - |
| HCM Lane V/C Ratio | - | - | 0.707 | - | - | - |
| HCM Control Delay (s) | - | - | 100.7 | - | - | - |
| HCM Lane LOS | - | - | F | - | - | - |
| HCM 95th %ile Q(veh) | - | - | 3.6 | - | - | - |

HCM 6th Signalized Intersection Summary
10: Maui Veterans Hwy & DHHL South Dwy 2

DHHL Pulehunui TIAR
02/05/2019



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--|-------|-------|------|------|-------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 175 | 95 | 2600 | 240 | 340 | 1895 |
| Future Volume (veh/h) | 175 | 95 | 2600 | 240 | 340 | 1895 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1826 | 1826 | 1870 | 1752 | 1678 | 1870 |
| Adj Flow Rate, veh/h | 190 | 4 | 2826 | 147 | 370 | 2060 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 5 | 5 | 2 | 10 | 15 | 2 |
| Cap. veh/h | 205 | 182 | 2881 | 838 | 386 | 4245 |
| Arrive On Green | 0.12 | 0.12 | 0.56 | 0.56 | 0.24 | 0.83 |
| Sat Flow, veh/h | 1739 | 1547 | 5274 | 1485 | 1598 | 5274 |
| Grp Volume(v), veh/h | 190 | 4 | 2826 | 147 | 370 | 2060 |
| Grp Sat Flow(s), veh/h | 1739 | 1547 | 1702 | 1485 | 1598 | 1702 |
| Q Serve(g.s), s | 19.2 | 0.4 | 95.8 | 8.5 | 40.5 | 20.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 205 | 182 | 2881 | 838 | 386 | 4245 |
| V/C Ratio(X) | 0.93 | 0.02 | 0.98 | 0.18 | 0.96 | 0.49 |
| Avail Cap(c_a), veh/h | 205 | 182 | 2882 | 838 | 410 | 4322 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 77.5 | 69.2 | 37.7 | 18.7 | 66.3 | 4.2 |
| Incr Delay (d2), s/veh | 42.9 | 0.0 | 12.6 | 0.1 | 32.8 | 0.1 |
| %ile BackOfQ(50%), s/veh | 11.1 | 0.2 | 41.1 | 2.9 | 19.8 | 5.5 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 120.3 | 69.2 | 50.3 | 18.8 | 99.1 | 4.3 |
| LnGrp LOS | F | E | D | B | F | A |
| Approach Vol. veh/h | 194 | | 2973 | | 2430 | |
| Approach Delay, s/veh | 119.3 | | 48.8 | | 18.7 | |
| Approach LOS | F | | D | | B | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 47.4 | 104.5 | | | 151.9 | 25.4 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | 45.5 | 100.1 | | | 150.1 | 20.9 |
| Max Q Clear Time (g_c+I1), s | 42.5 | 97.8 | | | 22.2 | 21.2 |
| Green Ext Time (g_e), s | 0.4 | 2.3 | | | 32.1 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 38.2 | | | |
| HCM 6th LOS | | | D | | | |
| Notes | | | | | | |
| User approved pedestrian interval to be less than phase max green. | | | | | | |

| Intersection | Init Delay, s/veh | | | | | |
|--------------------------|-------------------|--------|--------|--------|------|------|
| | WBL | WBR | NBT | NBR | SBL | SBT |
| Init Delay, s/veh | 0.2 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 20 | 2820 | 80 | 0 | 2070 |
| Future Vol, veh/h | 0 | 20 | 2820 | 80 | 0 | 2070 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 500 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 0 | 2 | 5 | 0 | 2 |
| Mvmt Flow | 0 | 22 | 3065 | 87 | 0 | 2250 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | - | 1533 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.1 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.9 | - | - | - | - |
| Pot Cap-1 Maneuver | 0 | 92 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 92 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | SB | | |
| HCM Control Delay, s | 55.8 | 0 | 0 | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR | WBL | N1 | SBT | |
| Capacity (veh/h) | - | - | 92 | - | - | |
| HCM Lane V/C Ratio | - | - | 0.236 | - | - | |
| HCM Control Delay (s) | - | - | 55.8 | - | - | |
| HCM Lane LOS | - | - | F | - | - | |
| HCM 95th %ile Q(veh) | - | - | 0.8 | - | - | |

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2038 PM Peak With Mitigation

HCM 6th Signalized Intersection Summary
 1. Maui Veterans Hwy & Nakii Rd

DHHL Pulehunui TIAR
 02/05/2019

| Movement | WBL | WBR | NBT | NBR | SBL | SBR |
|--|-------|-------|-------|------|-------|------|
| Lane Configurations | 5 | 5 | 4 | 4 | 4 | 4 |
| Traffic Volume (veh/h) | 75 | 385 | 3500 | 70 | 180 | 3030 |
| Future Volume (veh/h) | 75 | 385 | 3500 | 70 | 180 | 3030 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1841 | 1856 | 1870 | 1648 | 1752 | 1870 |
| Adj Flow Rate, veh/h | 82 | 0 | 3804 | 59 | 196 | 3293 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 4 | 3 | 2 | 17 | 10 | 2 |
| Cap, veh/h | 99 | 4051 | 1108 | 233 | 4543 | |
| Arrive On Green | 0.06 | 0.00 | 0.79 | 0.79 | 0.07 | 0.89 |
| Sat Flow, veh/h | 1753 | 1572 | 5274 | 1397 | 3237 | 5274 |
| Grp Volume(v), veh/h | 82 | 0 | 3804 | 59 | 196 | 3293 |
| Grp Sat Flow(s), veh/h | 1753 | 1572 | 1702 | 1397 | 1618 | 1702 |
| Q Serve(g_s), s | 9.5 | 0.0 | 123.5 | 1.9 | 12.2 | 41.0 |
| Cycle O Clear(g_c), s | 9.5 | 0.0 | 123.5 | 1.9 | 12.2 | 41.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 99 | 4051 | 1108 | 233 | 4543 | |
| V/C Ratio(x) | 0.83 | 0.04 | 0.05 | 0.05 | 0.84 | 0.72 |
| Avail Cap(c_a), veh/h | 403 | 4051 | 1108 | 411 | 4543 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 95.5 | 0.0 | 17.1 | 4.6 | 93.8 | 3.5 |
| Incr Delay (d2), s/veh | 15.6 | 0.0 | 5.7 | 0.1 | 8.1 | 1.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m | 4.8 | 0.0 | 42.8 | 0.5 | 5.4 | 8.8 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d)s/veh | 111.1 | 0.0 | 22.8 | 4.7 | 101.9 | 4.5 |
| LnGrp LOS | F | C | A | A | F | A |
| Approach Vol, veh/h | 82 | A | 3843 | | | 3489 |
| Approach Delay, s/veh | 111.1 | | 22.5 | | | 10.0 |
| Approach LOS | F | C | C | | | B |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 19.7 | 168.3 | | | 188.0 | 16.6 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Sailing (Gmax), s | 26.0 | 151.0 | | | 182.0 | 47.0 |
| Max Q Clear Time (g_c+I1), s | 14.2 | 125.5 | | | 43.0 | 11.5 |
| Green Ext Time (p_c), s | 0.5 | 25.1 | | | 108.0 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 17.6 | | | |
| HCM 6th LOS | | | B | | | |
| Notes | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | |

HCM 6th Signalized Intersection Summary
 2. Mokulele Hwy/Maui Veterans Hwy & Mehamaha Lp North/Kamaaina Rd

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|-------|------|------|-------|-------|-------|-------|------|-------|------|------|
| Lane Configurations | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Traffic Volume (veh/h) | 125 | 5 | 15 | 220 | 15 | 480 | 15 | 2940 | 100 | 235 | 2650 | 80 |
| Future Volume (veh/h) | 125 | 5 | 15 | 220 | 15 | 480 | 15 | 2940 | 100 | 235 | 2650 | 80 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1648 | 1870 | 1693 | 1900 | 1870 | 1693 | 1737 | 1870 | 1885 |
| Adj Flow Rate, veh/h | 136 | 5 | 1 | 239 | 16 | 0 | 16 | 3196 | 64 | 295 | 2880 | 59 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 17 | 2 | 14 | 0 | 2 | 14 | 11 | 2 | 1 |
| Cap, veh/h | 165 | 52 | 44 | 283 | 63 | 28 | 3392 | 953 | 289 | 3774 | 1181 | |
| Arrive On Green | 0.09 | 0.03 | 0.03 | 0.09 | 0.03 | 0.00 | 0.02 | 0.66 | 0.66 | 0.09 | 0.74 | 0.74 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 3045 | 1870 | 1434 | 1810 | 5106 | 1434 | 3209 | 5106 | 1598 |
| Grp Volume(v), veh/h | 136 | 5 | 1 | 239 | 16 | 0 | 16 | 3196 | 64 | 255 | 2880 | 59 |
| Grp Sat Flow(s), veh/h | 1870 | 1585 | 1522 | 1870 | 1434 | 1810 | 1702 | 1434 | 1605 | 1702 | 1598 | |
| Q Serve(g_s), s | 13.6 | 0.5 | 0.1 | 13.9 | 1.5 | 0.0 | 1.6 | 101.1 | 2.8 | 14.1 | 60.8 | 1.8 |
| Cycle O Clear(g_c), s | 13.6 | 0.5 | 0.1 | 13.9 | 1.5 | 0.0 | 1.6 | 101.1 | 2.8 | 14.1 | 60.8 | 1.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 155 | 52 | 44 | 283 | 63 | 28 | 3392 | 953 | 289 | 3774 | 1181 | |
| V/C Ratio(x) | 0.88 | 0.10 | 0.02 | 0.85 | 0.26 | 0.58 | 0.94 | 0.07 | 0.88 | 0.76 | 0.05 | |
| Avail Cap(c_a), veh/h | 193 | 156 | 132 | 634 | 343 | 50 | 3392 | 953 | 303 | 3774 | 1181 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 81.2 | 65.3 | 85.1 | 80.4 | 84.8 | 0.0 | 88.0 | 27.1 | 10.6 | 80.9 | 14.1 | 6.4 |
| Incr Delay (d2), s/veh | 29.1 | 0.8 | 0.2 | 6.9 | 2.1 | 0.0 | 17.6 | 6.8 | 0.1 | 24.1 | 1.5 | 0.1 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m | 6.2 | 0.0 | 0.0 | 5.8 | 0.8 | 0.0 | 0.9 | 39.2 | 1.0 | 6.7 | 21.0 | 0.6 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 110.3 | 86.1 | 85.3 | 87.2 | 86.9 | 0.0 | 105.7 | 34.0 | 10.8 | 105.0 | 15.6 | 6.4 |
| LnGrp LOS | F | F | F | F | F | F | F | C | B | F | B | A |
| Approach Vol, veh/h | 142 | | | 255 | | A | | 3276 | | | | 3194 |
| Approach Delay, s/veh | 109.3 | | | 87.2 | | | 33.9 | | | | | 22.5 |
| Approach LOS | F | | | F | | | C | | | | | C |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 22.2 | 125.6 | 21.2 | 11.0 | 8.8 | 139.0 | 20.2 | 12.0 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | |
| Max Green Sailing (Gmax), s | 88.0 | 37.5 | 15.0 | 5.0 | 100.0 | 19.5 | 33.0 | | | | | |
| Max Q Clear Time (g_c+I1), s | 103.1 | 15.9 | 2.5 | 3.6 | 62.8 | 15.6 | 3.5 | | | | | |
| Green Ext Time (p_c), s | 0.1 | 0.0 | 0.8 | 0.0 | 0.0 | 31.3 | 0.1 | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | 32.1 | | | | | |
| HCM 6th LOS | | | | | | | C | | | | | |
| Notes | | | | | | | | | | | | |
| User approved pedestrian interval to be less than phase max green. | | | | | | | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3. Maui Veterans Hwy & DHHL Access/DLNR Access

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|-------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 195 | 20 | 150 | 445 | 45 | 450 | 110 | 2390 | 320 | 320 | 2440 | 145 |
| Future Volume (veh/h) | 195 | 20 | 150 | 445 | 45 | 450 | 110 | 2390 | 320 | 320 | 2440 | 145 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 212 | 22 | 100 | 484 | 49 | 0 | 120 | 2598 | 250 | 348 | 2652 | 113 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 261 | 135 | 187 | 535 | 283 | 158 | 2863 | 1134 | 388 | 3203 | 1114 | 114 |
| Arrive On Green | 0.08 | 0.07 | 0.07 | 0.15 | 0.15 | 0.00 | 0.09 | 1.00 | 1.00 | 0.11 | 0.63 | 0.63 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 3456 | 1870 | 1585 | 3456 | 5106 | 1585 | 3456 | 5106 | 1585 |
| Grp Volume(V), veh/h | 212 | 22 | 100 | 484 | 49 | 0 | 120 | 2598 | 250 | 348 | 2652 | 113 |
| Grp Sat Flow(s), veh/h/m/1767 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Q Serve(g.s), s | 10.9 | 2.0 | 10.7 | 24.8 | 4.1 | 0.0 | 6.1 | 0.0 | 0.0 | 17.9 | 72.5 | 4.1 |
| Cycle O Clear(g.c), s | 10.9 | 2.0 | 10.7 | 24.8 | 4.1 | 0.0 | 6.1 | 0.0 | 0.0 | 17.9 | 72.5 | 4.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 261 | 135 | 187 | 535 | 283 | 158 | 2863 | 1134 | 388 | 3203 | 1114 | 114 |
| VC Ratio(X) | 0.81 | 0.16 | 0.53 | 0.91 | 0.17 | 0.76 | 0.91 | 0.22 | 0.90 | 0.83 | 0.10 | 0.10 |
| Avail Cap(c), veh/h | 682 | 275 | 306 | 643 | 283 | 278 | 2863 | 1134 | 432 | 3203 | 1114 | 114 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.52 | 0.52 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 82.0 | 78.4 | 74.7 | 74.8 | 66.5 | 0.0 | 80.8 | 0.0 | 0.0 | 78.9 | 26.0 | 8.6 |
| Incr Delay (d2), s/veh | 6.1 | 0.6 | 2.4 | 14.7 | 0.3 | 0.0 | 3.9 | 0.0 | 0.0 | 19.6 | 2.6 | 0.2 |
| Initial O Delay(g3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/mi | 1.0 | 4.5 | 12.2 | 2.0 | 0.0 | 2.7 | 0.8 | 0.1 | 9.0 | 28.5 | 1.5 | 1.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 88.0 | 79.0 | 77.1 | 89.4 | 66.8 | 0.0 | 84.7 | 3.0 | 0.2 | 98.5 | 28.6 | 8.7 |
| LnGrp LOS | F | E | E | F | E | F | E | F | A | A | F | C |
| Approach Vol, veh/h | 334 | | | 533 | A | | 2968 | | | | 3113 | |
| Approach Delay, s/veh | 84.2 | | | 87.4 | | | 6.1 | | | | 35.7 | |
| Approach LOS | F | | | F | | | A | | | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 24.7 | 105.4 | 32.3 | 17.5 | 12.7 | 117.4 | 18.1 | 31.8 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 79.5 | 33.5 | 26.5 | 14.5 | 87.5 | 35.5 | 24.5 | | | | | |
| Max Q Clear Time (g.c+1/9), s | 2.0 | 26.8 | 12.7 | 8.1 | 74.5 | 12.9 | 6.1 | | | | | |
| Green Ext Time (p.c), s | 0.3 | 50.5 | 1.1 | 0.3 | 0.2 | 11.8 | 0.7 | 0.1 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 4. Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|-------|------|-------|------|-------|------|------|------|------|------|------|
| Lane Configurations | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |
| Traffic Volume (veh/h) | 50 | 15 | 195 | 245 | 15 | 100 | 125 | 2650 | 170 | 60 | 2935 | 20 |
| Future Volume (veh/h) | 50 | 15 | 195 | 245 | 15 | 100 | 125 | 2650 | 170 | 60 | 2935 | 20 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1856 | 1870 | 1870 | 1885 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1841 |
| Adj Flow Rate, veh/h | 54 | 16 | 0 | 266 | 16 | 9 | 136 | 2880 | 125 | 65 | 3190 | 13 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 145 | 52 | 291 | 214 | 253 | 156 | 3585 | 1113 | 81 | 3369 | 1029 | 49 |
| Arrive On Green | 0.04 | 0.03 | 0.00 | 0.13 | 0.11 | 0.11 | 0.09 | 0.70 | 0.70 | 0.06 | 0.88 | 0.88 |
| Sat Flow, veh/h | 1767 | 1870 | 1585 | 1795 | 1870 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1560 |
| Grp Volume(V), veh/h | 54 | 16 | 0 | 266 | 16 | 9 | 136 | 2880 | 125 | 65 | 3190 | 13 |
| Grp Sat Flow(s), veh/h/m/1767 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Q Serve(g.s), s | 5.3 | 1.5 | 0.0 | 22.5 | 1.4 | 0.9 | 13.6 | 69.4 | 4.6 | 6.5 | 81.5 | 0.2 |
| Cycle O Clear(g.c), s | 5.3 | 1.5 | 0.0 | 22.5 | 1.4 | 0.9 | 13.6 | 69.4 | 4.6 | 6.5 | 81.5 | 0.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 145 | 52 | 291 | 214 | 253 | 156 | 3585 | 1113 | 81 | 3369 | 1029 | 49 |
| VC Ratio(X) | 0.37 | 0.31 | 0.91 | 0.07 | 0.04 | 0.87 | 0.80 | 0.11 | 0.80 | 0.95 | 0.01 | 0.01 |
| Avail Cap(c), veh/h | 318 | 140 | 291 | 214 | 253 | 272 | 3585 | 1113 | 114 | 3369 | 1029 | 49 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 81.0 | 65.8 | 0.0 | 74.5 | 71.2 | 63.9 | 81.1 | 18.3 | 8.7 | 83.8 | 8.7 | 3.8 |
| Incr Delay (d2), s/veh | 1.6 | 3.4 | 0.0 | 31.1 | 0.1 | 0.1 | 13.5 | 2.0 | 0.0 | 12.5 | 3.9 | 0.0 |
| Initial O Delay(g3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/mi | 5.0 | 0.8 | 0.0 | 3.8 | 0.7 | 0.4 | 6.8 | 25.7 | 1.7 | 3.2 | 10.0 | 0.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 82.6 | 89.2 | 0.0 | 105.6 | 71.4 | 64.0 | 94.6 | 20.3 | 8.9 | 96.2 | 12.7 | 3.8 |
| LnGrp LOS | F | F | F | F | E | F | E | F | C | A | F | B |
| Approach Vol, veh/h | 70 | A | | 291 | | | 3141 | | | | 3268 | |
| Approach Delay, s/veh | 84.1 | | | 102.4 | | | 23.1 | | | | 14.3 | |
| Approach LOS | F | | | F | | | C | | | | B | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 27.0 | 130.9 | 27.0 | 9.5 | 20.3 | 123.3 | 11.4 | 25.1 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 114.5 | 22.5 | 13.5 | 27.5 | 98.5 | 24.5 | 11.5 | | | | | |
| Max Q Clear Time (g.c+1/9), s | 71.4 | 24.5 | 3.5 | 15.6 | 83.5 | 7.3 | 3.4 | | | | | |
| Green Ext Time (p.c), s | 0.0 | 36.2 | 0.0 | 0.0 | 0.2 | 14.4 | 0.1 | 0.0 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 5: Piliian Hwy/Maui Veterans Hwy & N Kihel Rd/Monsanto Drwy

DHHL Pulehunui TIAR
 02/05/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------------|-------|-------|------|-------|-------|-------|-------|------|------|-------|------|------|
| Lane Configurations | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 460 | 0 | 530 | 15 | 5 | 15 | 625 | 2380 | 15 | 5 | 2915 | 610 |
| Future Volume (veh/h) | 460 | 0 | 530 | 15 | 5 | 15 | 625 | 2380 | 15 | 5 | 2915 | 610 |
| Initial Q (Q _{bb}) veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 500 | 0 | 549 | 16 | 5 | 1 | 619 | 2587 | 11 | 5 | 3168 | 372 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 564 | 0 | 1150 | 25 | 21 | 4 | 706 | 3667 | 1138 | 9 | 3336 | 822 |
| Arrive On Green | 0.16 | 0.00 | 0.16 | 0.01 | 0.01 | 0.01 | 0.20 | 0.72 | 0.72 | 0.00 | 0.52 | 0.52 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 1513 | 303 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Sat Flow(s), veh/hln | 500 | 0 | 549 | 16 | 0 | 6 | 679 | 2587 | 11 | 5 | 3168 | 372 |
| Q Serve(g_s), s | 28.8 | 0.0 | 28.0 | 1.9 | 0.0 | 0.7 | 40.8 | 60.7 | 0.4 | 0.6 | 98.0 | 31.0 |
| Cycle O Clear(g_c), s | 28.8 | 0.0 | 28.0 | 1.9 | 0.0 | 0.7 | 40.8 | 60.7 | 0.4 | 0.6 | 98.0 | 31.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 564 | 0 | 1150 | 25 | 0 | 25 | 706 | 3667 | 1138 | 9 | 3336 | 822 |
| V/C Ratio(X) | 0.89 | 0.00 | 0.48 | 0.65 | 0.00 | 0.24 | 0.96 | 0.71 | 0.01 | 0.58 | 0.95 | 0.45 |
| Avail Cap(c), veh/h | 628 | 0 | 1207 | 34 | 0 | 35 | 708 | 3667 | 1138 | 34 | 3343 | 823 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 86.4 | 0.0 | 51.5 | 103.0 | 0.0 | 102.4 | 82.6 | 16.9 | 8.4 | 104.2 | 47.9 | 31.8 |
| Incr Delay (d2), s/veh | 13.4 | 0.0 | 0.3 | 25.5 | 0.0 | 4.8 | 24.6 | 0.6 | 0.0 | 49.9 | 7.1 | 0.4 |
| Initial Q Delay(Q), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%), veh/mi | 5.0 | 0.0 | 11.4 | 1.1 | 0.0 | 0.4 | 20.5 | 22.7 | 0.1 | 0.4 | 39.9 | 12.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 99.8 | 0.0 | 51.8 | 128.5 | 0.0 | 107.2 | 107.2 | 17.5 | 8.4 | 154.1 | 55.0 | 32.2 |
| LnGrp LOS | F | A | D | F | A | F | F | B | A | F | D | C |
| Approach Vol, veh/h | 1049 | | | 22 | | | 3277 | | | 3545 | | |
| Approach Delay, s/veh | 74.7 | | | 122.7 | | | 36.1 | | | 52.7 | | |
| Approach LOS | E | | | F | | | D | | | D | | |
| Timer - Assigned PHS | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+Rc), s | 7.0 | 156.7 | 7.9 | 48.9 | 114.8 | 38.2 | | | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 | 5.0 | | | | | | |
| Max Green Setting (Gmax), s | 148.0 | 4.0 | 43.0 | 109.0 | 37.0 | | | | | | | |
| Max Q Clear Time (g_c+1/2g), s | 62.7 | 3.9 | 42.8 | 100.0 | 30.8 | | | | | | | |
| Green Ext Time (p_c), s | 0.0 | 49.6 | 0.0 | 0.1 | 8.8 | 2.4 | | | | | | |

Intersection Summary
 HCM 6th Ctrl Delay 48.9
 HCM 6th LOS D

Notes
 User approved pedestrian interval to be less than phase max green.
 User approved volume balancing among the lanes for turning movement.

HCM 6th TWSC
 9: Maui Veterans Hwy & DHHL South Dwy 1

DHHL Pulehunui TIAR
 02/05/2019

| Intersection | 2.1 | | | | | | | | | | | |
|--------------------------|--------|-----------|--------|--------|------|------|--|--|--|--|--|--|
| Ini Delay, s/veh | WBL | WBR | NBL | NBR | SBL | SBT | | | | | | |
| Movement | WBL | WBR | NBL | NBR | SBL | SBT | | | | | | |
| Lane Configurations | 4 | 4 | 4 | 4 | 4 | 4 | | | | | | |
| Traffic Vol, veh/h | 0 | 75 | 2860 | 5 | 0 | 3370 | | | | | | |
| Future Vol, veh/h | 0 | 75 | 2860 | 5 | 0 | 3370 | | | | | | |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Sign Control | Stop | Stop | Free | Free | Free | Free | | | | | | |
| RT Channelized | - | None | - | None | - | None | | | | | | |
| Storage Length | - | 0 | - | 500 | - | - | | | | | | |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Grade, % | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | | | | | | |
| Heavy Vehicles, % | 0 | 5 | 2 | 0 | 0 | 2 | | | | | | |
| Mvmt Flow | 0 | 82 | 3109 | 5 | 0 | 3663 | | | | | | |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | | | | | | | |
| Conflicting Flow All | - | 1555 | 0 | 0 | - | - | | | | | | |
| Stage 1 | - | - | - | - | - | - | | | | | | |
| Stage 2 | - | - | - | - | - | - | | | | | | |
| Critical Hdwy | - | 7.2 | - | - | - | - | | | | | | |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | | | | | | |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | | | | | | |
| Follow-up Hdwy | - | 3.95 | - | - | - | - | | | | | | |
| Pd Cap-1 Maneuver | 0 | 85 | - | - | - | 0 | | | | | | |
| Stage 1 | 0 | - | - | - | - | 0 | | | | | | |
| Stage 2 | 0 | - | - | - | - | 0 | | | | | | |
| Platoon blocked, % | - | - | - | - | - | - | | | | | | |
| Mov Cap-1 Maneuver | - | 85 | - | - | - | - | | | | | | |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | | | | | | |
| Stage 1 | - | - | - | - | - | - | | | | | | |
| Stage 2 | - | - | - | - | - | - | | | | | | |
| Approach | WB | NB | SB | | | | | | | | | |
| HCM Control Delay, s | 173.7 | 0 | 0 | | | | | | | | | |
| HCM LOS | F | | | | | | | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR/WBLnt | SBT | | | | | | | | | |
| Capacity (veh/h) | - | - | 85 | | | | | | | | | |
| HCM Lane V/C Ratio | - | - | 0.959 | | | | | | | | | |
| HCM Control Delay (s) | - | - | 173.7 | | | | | | | | | |
| HCM Lane LOS | - | - | F | | | | | | | | | |
| HCM 95th %ile Q(veh) | - | - | 5.3 | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 10: Maui Veterans Hwy & DHHL South Dwy 2

HCM 6th TWSC
 11: Maui Veterans Hwy & DHHL South Dwy 3

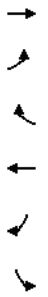
DHHL Pulehunui TIAR
 02/05/2019

DHHL Pulehunui TIAR
 02/05/2019

| | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|------|------|------|------|-------|------|
| Movement | | | | | | |
| Lane Configurations | ↔ | ↔ | ↔↔↔ | ↔ | ↔ | ↔↔↔ |
| Traffic Volume (veh/h) | 250 | 150 | 2725 | 95 | 120 | 3250 |
| Future Volume (veh/h) | 250 | 150 | 2725 | 95 | 120 | 3250 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1678 | 1752 | 1870 | 1826 | 1826 | 1870 |
| Adj Flow Rate, veh/h | 272 | 41 | 2962 | 61 | 130 | 3533 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 15 | 10 | 2 | 5 | 5 | 2 |
| Cap, veh/h | 294 | 273 | 3180 | 964 | 154 | 3810 |
| Arrive On Green | 0.18 | 0.18 | 0.62 | 0.62 | 0.09 | 0.75 |
| Sat Flow, veh/h | 1598 | 1485 | 5274 | 1547 | 1739 | 5274 |
| Grp Volume(v), veh/h | 272 | 41 | 2962 | 61 | 130 | 3533 |
| Grp Sat Flow(s),veh/h | 1598 | 1485 | 1702 | 1547 | 1739 | 1702 |
| Q Serve(g_s), s | 21.5 | 3.0 | 67.0 | 2.0 | 9.5 | 73.3 |
| Cycle Q Clear(g_c), s | 21.5 | 3.0 | 67.0 | 2.0 | 9.5 | 73.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 294 | 273 | 3180 | 964 | 154 | 3810 |
| V/C Ratio(X) | 0.93 | 0.15 | 0.93 | 0.06 | 0.85 | 0.93 |
| Avail Cap(c_a), veh/h | 304 | 283 | 3196 | 969 | 156 | 3832 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.6 | 44.0 | 21.8 | 9.5 | 57.8 | 13.4 |
| Incr Delay (d2), s/veh | 32.4 | 0.3 | 5.7 | 0.0 | 32.5 | 4.6 |
| Initial Q Delay(Q3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%),veh/h | 11.3 | 1.1 | 25.1 | 0.6 | 5.5 | 22.7 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d),s/veh | 84.0 | 44.3 | 27.5 | 9.6 | 90.3 | 18.1 |
| LnGrp LOS | F | D | C | A | F | B |
| Approach Vol, veh/h | 313 | 3023 | | | 3663 | |
| Approach Delay, s/veh | 78.8 | 27.2 | | | 20.6 | |
| Approach LOS | E | C | | | C | |
| Timer - Assigned PHS | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+R), s | 15.9 | 84.6 | | | 100.5 | 28.1 |
| Change Period (Y+R), s | 4.5 | 4.5 | | | 4.5 | 4.5 |
| Max Green Sailing (Gmax), s | 11.5 | 80.5 | | | 96.5 | 24.5 |
| Max Q Clear Time (g_c+I1), s | 11.5 | 69.0 | | | 75.3 | 23.5 |
| Green Ext Time (p_c), s | 0.0 | 10.9 | | | 20.6 | 0.1 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 26.1 | | | |
| HCM 6th LOS | | | C | | | |

| Intersection | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|--------|-----------|--------|--------|------|------|
| In Delay, s/veh | | | | | | 0.2 |
| Movement | | | | | | |
| Lane Configurations | ↔ | ↔ | ↔↔↔ | ↔ | ↔ | ↔↔↔ |
| Traffic Vol, veh/h | 0 | 25 | 2795 | 25 | 0 | 3500 |
| Future Vol, veh/h | 0 | 25 | 2795 | 25 | 0 | 3500 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 500 | - | - |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 5 | 2 | 5 | 0 | 2 |
| Mvmt Flow | 0 | 27 | 3038 | 27 | 0 | 3804 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | - | 1519 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.2 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.95 | - | - | - | - |
| Pl Cap-1 Maneuver | 0 | 90 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 90 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | SB | | |
| HCM Control Delay, s | 61.4 | 0 | 0 | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR/WBLnt | SBT | | | |
| Capacity (veh/h) | - | - | 90 | - | | |
| HCM Lane V/C Ratio | - | - | 0.302 | - | | |
| HCM Control Delay (s) | - | - | 61.4 | - | | |
| HCM Lane LOS | - | - | F | - | | |
| HCM 95th %ile Q(veh) | - | - | 1.1 | - | | |

APPENDIX C
LEVEL OF SERVICE CALCULATIONS
• Future Year 2038 WE Peak With Mitigation



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|--|------|-------|------|------|-------|------|
| Lane Configurations | ↔ | ↔ | ↔↔↔ | ↔ | ↔↔ | ↔↔ |
| Traffic Volume (veh/h) | 25 | 140 | 3110 | 45 | 105 | 2855 |
| Future Volume (veh/h) | 25 | 140 | 3110 | 45 | 105 | 2855 |
| Initial Q (Q _{sb}), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1707 | 1841 | 1870 | 1693 | 1767 | 1870 |
| Adj Flow Rate, veh/h | 27 | 0 | 3380 | 37 | 114 | 3103 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 13 | 4 | 2 | 14 | 9 | 2 |
| Cap, veh/h | 37 | 4176 | 1173 | 156 | 4598 | |
| Arrive On Green | 0.02 | 0.00 | 0.82 | 0.82 | 0.05 | 0.90 |
| Sat Flow, veh/h | 1626 | 1560 | 5274 | 1434 | 3264 | 5274 |
| Grp Volume(v), veh/h | 27 | 0 | 3380 | 37 | 114 | 3103 |
| Grp Sat Flow(s), veh/h | 1626 | 1560 | 1702 | 1434 | 1632 | 1702 |
| Q Serve(g_s), s | 2.4 | 0.0 | 51.3 | 0.7 | 5.0 | 22.1 |
| Cycle Q Clear(g_c), s | 2.4 | 0.0 | 51.3 | 0.7 | 5.0 | 22.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 37 | 4176 | 1173 | 156 | 4598 | |
| VC Ratio(X) | 0.72 | 0.81 | 0.03 | 0.73 | 0.67 | |
| Avail Cap(c_a), veh/h | 136 | 4442 | 1248 | 159 | 4868 | |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 69.7 | 0.0 | 7.1 | 2.4 | 67.5 | 1.8 |
| Incr Delay (d2), s/veh | 23.0 | 0.0 | 1.1 | 0.0 | 15.3 | 0.3 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back(Q50%), veh/h | 1.2 | 0.0 | 12.8 | 0.1 | 2.4 | 1.2 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 92.8 | 0.0 | 8.2 | 2.5 | 82.8 | 2.2 |
| LnGrp LOS | F | A | A | A | F | A |
| Approach Vol, veh/h | 27 | A | 3417 | | 3217 | |
| Approach Delay, s/veh | 92.8 | 8.1 | | | 5.0 | |
| Approach LOS | F | A | | | A | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 11.9 | 123.5 | | | 135.4 | 8.3 |
| Change Period (Y+Rc), s | 5.0 | 6.0 | | | 6.0 | 5.0 |
| Max Green Setting (Gmax), s | 7.0 | 125.0 | | | 137.0 | 12.0 |
| Max Q Clear Time (g_c+I1), s | 7.0 | 53.3 | | | 24.1 | 4.4 |
| Green Ext Time (g_e), s | 0.0 | 64.3 | | | 83.5 | 0.0 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 7.0 | | | |
| HCM 6th LOS | | | A | | | |
| Notes | | | | | | |
| Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | |

HCM 6th Signalized Intersection Summary
 2. Mokulele Hwy/Maui Veterans Hwy & Mēhameha Lp North/Kamaaina Rd

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--|-------|------|------|-------|-------|-------|------|------|------|------|------|
| Lane Configurations | 140 | 0 | 20 | 175 | 20 | 410 | 15 | 2630 | 125 | 315 | 2435 | 120 |
| Traffic Volume (veh/h) | 140 | 0 | 20 | 175 | 20 | 410 | 15 | 2630 | 125 | 315 | 2435 | 120 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1796 | 1870 | 1767 | 1870 | 1870 | 1767 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 152 | 11 | 1 | 190 | 22 | 0 | 16 | 2859 | 75 | 342 | 2647 | 89 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 7 | 2 | 9 | 2 | 9 | 6 | 2 | 2 | 2 |
| Cap, veh/h | 171 | 98 | 83 | 236 | 52 | 27 | 3245 | 952 | 387 | 3758 | 1167 | 66 |
| Arrive On Green | 0.10 | 0.05 | 0.07 | 0.03 | 0.00 | 0.02 | 0.64 | 0.64 | 0.12 | 0.74 | 0.74 | 0.74 |
| Sat Flow, veh/h | 1781 | 1870 | 1585 | 3319 | 1870 | 1497 | 1781 | 1506 | 1497 | 3346 | 5106 | 1585 |
| Grp Volume(V), veh/h | 152 | 11 | 1 | 190 | 22 | 0 | 16 | 2859 | 75 | 342 | 2647 | 89 |
| Grp Sat Flow(s), veh/h | 1870 | 1870 | 1585 | 3319 | 1870 | 1497 | 1781 | 1702 | 1497 | 1673 | 1702 | 1585 |
| Q Serve(g.s), s | 15.2 | 10 | 0.1 | 10.2 | 2.1 | 0.0 | 1.6 | 83.5 | 3.5 | 18.1 | 51.1 | 2.8 |
| Cycle O Clear(g.c), s | 15.2 | 10 | 0.1 | 10.2 | 2.1 | 0.0 | 1.6 | 83.5 | 3.5 | 18.1 | 51.1 | 2.8 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 171 | 98 | 83 | 236 | 52 | 27 | 3245 | 952 | 387 | 3758 | 1167 | 66 |
| VC Ratio(X) | 0.89 | 0.11 | 0.01 | 0.81 | 0.42 | 0.59 | 0.88 | 0.08 | 0.88 | 0.70 | 0.08 | 0.88 |
| Avail Cap(c), veh/h | 193 | 156 | 132 | 691 | 343 | 49 | 3245 | 952 | 521 | 3758 | 1167 | 66 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 80.4 | 81.3 | 80.8 | 82.4 | 86.1 | 0.0 | 88.1 | 27.2 | 12.6 | 78.4 | 13.0 | 6.6 |
| Incr Delay (d2), s/veh | 33.8 | 0.5 | 0.1 | 6.4 | 5.4 | 0.0 | 18.5 | 3.8 | 0.2 | 13.0 | 1.1 | 0.1 |
| Initial O Delay(g3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m/6 | 0.5 | 0.0 | 4.6 | 1.1 | 0.0 | 0.9 | 32.4 | 1.3 | 8.4 | 17.7 | 1.0 | 0.0 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 114.3 | 81.7 | 80.9 | 88.8 | 91.5 | 0.0 | 106.5 | 31.0 | 12.7 | 91.3 | 14.1 | 6.8 |
| LnGrp LOS | F | F | F | F | F | F | F | C | B | F | B | A |
| Approach Vol, veh/h | 164 | | | 212 | | | A | 2950 | | | 3078 | |
| Approach Delay, s/veh | 111.9 | | | 89.1 | | | | 30.9 | | | 22.5 | |
| Approach LOS | F | | | F | | | | C | | | C | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 34.8 | 120.4 | 17.3 | 15.5 | 8.8 | 138.5 | 21.8 | 11.0 | | | | |
| Change Period (Y+R), s | 6.0 | 4.5 | 6.0 | 6.0 | 6.0 | 6.0 | 4.5 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 77.0 | 37.5 | 15.0 | 5.0 | 100.0 | 19.5 | 33.0 | | | | | |
| Max Q Clear Time (g.c+pb), s | 85.5 | 12.2 | 3.0 | 3.6 | 53.1 | 17.2 | 4.1 | | | | | |
| Green Ext Time (p.c), s | 0.7 | 0.0 | 0.6 | 0.0 | 0.0 | 34.6 | 0.1 | 0.1 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | 30.9 | | | | |
| HCM 6th LOS | | | | | | | | C | | | | |
| Notes | User approved pedestrian interval to be less than phase max green. | | | | | | | | | | | |
| | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 3. Maui Veterans Hwy & DHHL Access/DLNR Access

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|--|------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | 225 | 20 | 175 | 530 | 55 | 530 | 170 | 2020 | 495 | 495 | 1935 | 225 |
| Traffic Volume (veh/h) | 225 | 20 | 175 | 530 | 55 | 530 | 170 | 2020 | 495 | 495 | 1935 | 225 |
| Future Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Q (Q _{bb}), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A _{pb}) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 245 | 22 | 128 | 576 | 60 | 0 | 185 | 2196 | 392 | 538 | 2103 | 166 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 295 | 164 | 241 | 616 | 337 | 222 | 2377 | 1020 | 583 | 2910 | 1039 | 166 |
| Arrive On Green | 0.09 | 0.09 | 0.09 | 0.18 | 0.18 | 0.00 | 0.13 | 0.93 | 0.93 | 0.17 | 0.57 | 0.57 |
| Sat Flow, veh/h | 3456 | 1870 | 1585 | 3456 | 1870 | 1585 | 3456 | 5106 | 1585 | 3456 | 5106 | 1585 |
| Grp Volume(V), veh/h | 245 | 22 | 128 | 576 | 60 | 0 | 185 | 2196 | 392 | 538 | 2103 | 166 |
| Grp Sat Flow(s), veh/h | 1728 | 1870 | 1585 | 3456 | 1870 | 1585 | 1728 | 1702 | 1585 | 1728 | 1702 | 1585 |
| Q Serve(g.s), s | 12.6 | 2.0 | 13.4 | 29.6 | 4.9 | 0.0 | 9.4 | 38.2 | 4.1 | 27.6 | 54.2 | 7.3 |
| Cycle O Clear(g.c), s | 12.6 | 2.0 | 13.4 | 29.6 | 4.9 | 0.0 | 9.4 | 38.2 | 4.1 | 27.6 | 54.2 | 7.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 295 | 164 | 241 | 616 | 337 | 222 | 2377 | 1020 | 583 | 2910 | 1039 | 166 |
| VC Ratio(X) | 0.83 | 0.13 | 0.53 | 0.94 | 0.18 | 0.83 | 0.92 | 0.38 | 0.92 | 0.72 | 0.16 | 0.16 |
| Avail Cap(c), veh/h | 682 | 275 | 335 | 643 | 337 | 278 | 2377 | 1020 | 643 | 2910 | 1039 | 166 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 81.0 | 75.8 | 70.4 | 72.9 | 62.5 | 0.0 | 77.5 | 4.6 | 1.6 | 73.7 | 28.3 | 11.9 |
| Incr Delay (d2), s/veh | 6.0 | 0.4 | 1.8 | 20.7 | 0.2 | 0.0 | 8.6 | 4.1 | 0.5 | 18.0 | 1.6 | 0.3 |
| Initial O Delay(g3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOf(50%), veh/m/6 | 1.0 | 5.6 | 15.0 | 2.4 | 0.0 | 4.2 | 3.2 | 0.9 | 13.6 | 21.8 | 2.8 | 2.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)s/veh | 87.0 | 76.2 | 72.3 | 93.6 | 62.7 | 0.0 | 86.1 | 8.8 | 2.1 | 91.7 | 29.9 | 12.3 |
| LnGrp LOS | F | F | F | F | F | F | F | A | A | F | C | B |
| Approach Vol, veh/h | 395 | | | 636 | | | A | 2773 | | | 2807 | |
| Approach Delay, s/veh | 81.6 | | | 90.7 | | | | 13.0 | | | 40.7 | |
| Approach LOS | F | | | F | | | | B | | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 34.9 | 88.3 | 36.6 | 20.3 | 16.1 | 107.1 | 19.9 | 37.0 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 68.5 | 33.5 | 26.5 | 14.5 | 87.5 | 35.5 | 24.5 | | | | | |
| Max Q Clear Time (g.c+pb), s | 40.2 | 31.6 | 15.4 | 11.4 | 56.2 | 14.6 | 6.9 | | | | | |
| Green Ext Time (p.c), s | 0.8 | 21.1 | 0.5 | 0.3 | 0.2 | 20.6 | 0.8 | 0.2 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | 36.3 | | | | |
| HCM 6th LOS | | | | | | | | D | | | | |
| Notes | Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 4: Maui Veterans Hwy & Mehamaha Loop South

DHHL Pulehunui TIAR
 01/31/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-------|-------|------|------|------|-------|-------|------|------|-------|------|------|
| Lane Configurations | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 50 | 15 | 215 | 290 | 20 | 115 | 190 | 2485 | 250 | 95 | 2505 | 35 |
| Future Volume (veh/h) | 50 | 15 | 215 | 290 | 20 | 115 | 190 | 2485 | 250 | 95 | 2505 | 35 |
| Initial Q (Obs), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1856 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1826 |
| Adj Flow Rate, veh/h | 54 | 16 | 0 | 315 | 22 | 16 | 207 | 2701 | 171 | 103 | 2723 | 21 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 145 | 52 | 351 | 276 | 335 | 226 | 3320 | 1030 | 114 | 2997 | 908 | 82 |
| Arrive On Green | 0.04 | 0.03 | 0.00 | 0.16 | 0.15 | 0.15 | 0.13 | 0.65 | 0.65 | 0.08 | 0.78 | 0.78 |
| Sat Flow, veh/h | 1767 | 1870 | 1585 | 1795 | 1870 | 1585 | 1781 | 5106 | 1585 | 1781 | 5106 | 1547 |
| Grp Volume(v), veh/h | 54 | 16 | 0 | 315 | 22 | 16 | 207 | 2701 | 171 | 103 | 2723 | 21 |
| Grp Sat Flow(s),veh/hln/1781 | 1870 | 1585 | 1795 | 1870 | 1585 | 1781 | 1702 | 1585 | 1781 | 1702 | 1547 | 1547 |
| Q Serve(g.s), s | 5.3 | 1.5 | 0.0 | 28.5 | 1.8 | 1.4 | 20.7 | 70.7 | 7.6 | 10.3 | 72.5 | 0.5 |
| Cycle Q Clear(g.c), s | 5.3 | 1.5 | 0.0 | 28.5 | 1.8 | 1.4 | 20.7 | 70.7 | 7.6 | 10.3 | 72.5 | 0.5 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 145 | 52 | 351 | 276 | 335 | 226 | 3320 | 1030 | 114 | 2997 | 908 | 82 |
| VC Ratio(x) | 0.37 | 0.31 | 0.90 | 0.08 | 0.05 | 0.91 | 0.81 | 0.17 | 0.91 | 0.91 | 0.91 | 0.02 |
| Avail Cap(c), veh/h | 377 | 140 | 351 | 276 | 335 | 272 | 3320 | 1030 | 114 | 2997 | 908 | 82 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 81.0 | 65.8 | 0.0 | 70.7 | 66.2 | 56.5 | 77.6 | 23.4 | 12.3 | 81.8 | 16.1 | 8.2 |
| Incr Delay (d2), s/veh | 1.6 | 3.3 | 0.0 | 24.4 | 0.1 | 0.1 | 29.8 | 2.3 | 0.3 | 40.3 | 3.4 | 0.0 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 0.0 | 17.0 | 0.9 | 0.6 | 11.3 | 27.3 | 2.9 | 5.9 | 20.4 | 0.2 | 0.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 82.6 | 69.2 | 0.0 | 95.1 | 66.3 | 56.6 | 107.4 | 25.7 | 12.7 | 122.1 | 19.5 | 8.2 |
| LnGrp LOS | F | F | F | F | F | F | F | C | B | F | B | A |
| Approach Vol, veh/h | 70 | A | 353 | | | | 3079 | | | 2847 | | |
| Approach Delay, s/veh | 84.1 | | 91.5 | | | | 30.5 | | | 23.1 | | |
| Approach LOS | F | F | F | F | F | F | C | C | C | C | C | C |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+R), s | 36.0 | 121.5 | 33.0 | 9.5 | 27.4 | 110.1 | 11.4 | 31.1 | | | | |
| Change Period (Y+R), s | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 108.5 | 28.5 | 13.5 | 27.5 | 92.5 | 30.5 | 11.5 | | | | | |
| Max Q Clear Time (g_c+llg), s | 72.7 | 30.5 | 3.5 | 22.7 | 74.5 | 7.3 | 3.8 | | | | | |
| Green Ext Time (p_c), s | 0.0 | 29.5 | 0.0 | 0.0 | 0.2 | 16.1 | 0.1 | 0.0 | | | | |
| Intersection Summary | | | 31.2 | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay. | | | | | | | | | | | | |

HCM 6th Signalized Intersection Summary
 5: Piliiani Hwy/Maui Veterans Hwy & N Kihei Rd/Monsanto Drwy

DHHL Pulehunui TIAR
 01/31/2019

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|------|------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 470 | 0 | 385 | 5 | 0 | 5 | 410 | 2370 | 5 | 5 | 2520 | 525 |
| Future Volume (veh/h) | 470 | 0 | 385 | 5 | 0 | 5 | 410 | 2370 | 5 | 5 | 2520 | 525 |
| Initial Q (Obs), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pb1) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No | No | No | No | No | No | No |
| Adj Sat Flow, veh/hln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 511 | 0 | 358 | 5 | 0 | 1 | 446 | 2576 | 3 | 5 | 2739 | 251 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 636 | 0 | 1041 | 11 | 0 | 10 | 518 | 3248 | 1008 | 9 | 3161 | 779 |
| Arrive On Green | 0.18 | 0.00 | 0.18 | 0.01 | 0.00 | 0.01 | 0.15 | 0.64 | 0.64 | 0.01 | 0.49 | 0.49 |
| Sat Flow, veh/h | 3563 | 0 | 3170 | 1781 | 0 | 1585 | 3456 | 5106 | 1585 | 1781 | 6434 | 1585 |
| Grp Volume(v), veh/h | 511 | 0 | 358 | 5 | 0 | 1 | 446 | 2576 | 3 | 5 | 2739 | 251 |
| Grp Sat Flow(s),veh/hln/1781 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1609 | 1585 |
| Q Serve(g.s), s | 17.4 | 0.0 | 10.8 | 0.4 | 0.0 | 0.1 | 15.9 | 46.8 | 0.1 | 0.4 | 47.6 | 12.1 |
| Cycle Q Clear(g.c), s | 17.4 | 0.0 | 10.8 | 0.4 | 0.0 | 0.1 | 15.9 | 46.8 | 0.1 | 0.4 | 47.6 | 12.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 636 | 0 | 1041 | 11 | 0 | 10 | 518 | 3248 | 1008 | 9 | 3161 | 779 |
| VC Ratio(x) | 0.80 | 0.00 | 0.34 | 0.47 | 0.00 | 0.10 | 0.86 | 0.79 | 0.00 | 0.55 | 0.87 | 0.32 |
| Avail Cap(c), veh/h | 988 | 0 | 1354 | 56 | 0 | 50 | 712 | 3438 | 1067 | 56 | 3211 | 791 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 49.7 | 0.0 | 32.1 | 62.5 | 0.0 | 62.4 | 52.4 | 16.9 | 8.4 | 62.6 | 28.4 | 19.4 |
| Incr Delay (d2), s/veh | 2.7 | 0.0 | 0.2 | 28.4 | 0.0 | 0.0 | 4.7 | 7.9 | 1.3 | 43.3 | 2.7 | 0.2 |
| Initial Q Delay(Q3), s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 4.2 | 0.2 | 0.0 | 0.0 | 0.0 | 7.3 | 16.3 | 0.0 | 0.3 | 17.6 | 4.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d)/s/veh | 52.5 | 0.0 | 32.3 | 91.0 | 0.0 | 67.1 | 60.3 | 18.1 | 8.4 | 105.9 | 31.2 | 19.6 |
| LnGrp LOS | D | A | C | F | A | E | E | B | A | F | C | B |
| Approach Vol, veh/h | 869 | | 6 | | | | 3025 | | | 2995 | | |
| Approach Delay, s/veh | 44.2 | | 87.0 | | | | 24.3 | | | 30.3 | | |
| Approach LOS | D | D | F | F | F | C | C | C | C | C | C | C |
| Timer - Assigned Phs | 1 | 2 | 4 | 5 | 6 | 8 | | | | | | |
| Phs Duration (G+Y+R), s | 66.3 | 5.8 | 24.9 | 68.0 | 27.5 | | | | | | | |
| Change Period (Y+R), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | | | | |
| Max Green Setting (Gmax), s | 65.0 | 4.0 | 26.0 | 63.0 | 35.0 | | | | | | | |
| Max Q Clear Time (g_c+llg), s | 48.8 | 2.4 | 17.9 | 49.6 | 19.4 | | | | | | | |
| Green Ext Time (p_c), s | 0.0 | 27.8 | 0.0 | 1.0 | 12.4 | 3.2 | | | | | | |
| Intersection Summary | | | 29.5 | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | | | | | | | | | |
| HCM 6th LOS | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | |
| User approved volume balancing among the lanes for turning movement. | | | | | | | | | | | | |

HCM 6th TWSC
9: Maui Veterans Hwy & DHHH South Dwy 1

DHHL Pulehunui TIAR
01/31/2019

| Intersection | WBL | WBR | NBT | NBR | SBL | SBT |
|--------------------------|--------|--------|--------|--------|------|------|
| Ini Delay, s/veh | 1.8 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | 0 | 70 | 2855 | 10 | 0 | 3005 |
| Traffic Vol, veh/h | 0 | 70 | 2855 | 10 | 0 | 3005 |
| Future Volume (veh/h) | 0 | 70 | 2855 | 10 | 0 | 3005 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 500 | - | - |
| Veh in Median Storage, # | 0 | 0 | 0 | 0 | 0 | 0 |
| Grade, % | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 5 | 2 | 5 | 0 | 2 |
| Mvmt Flow | 0 | 76 | 3103 | 11 | 0 | 3266 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | - | 1552 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.2 | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.95 | - | - | - | - |
| Pl Cap-1 Maneuver | 0 | 85 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 85 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | SB | | |
| HCM Control Delay, s | 156.5 | 0 | 0 | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR | WBL | WBL | SBT | SBT |
| Capacity (veh/h) | - | - | 85 | - | - | - |
| HCM Lane V/C Ratio | - | - | 0.895 | - | - | - |
| HCM Control Delay (s) | - | - | 156.5 | - | - | - |
| HCM Lane LOS | - | - | F | - | - | - |
| HCM 95th %ile Q(veh) | - | - | 4.8 | - | - | - |

HCM 6th Signalized Intersection Summary
10: Maui Veterans Hwy & DHHH South Dwy 2

DHHL Pulehunui TIAR
01/31/2019



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|------------------------------|------|------|------|------|-------|------|
| Lane Configurations | 1 | 1 | 1 | 1 | 1 | 1 |
| Traffic Volume (veh/h) | 215 | 125 | 2740 | 90 | 125 | 2880 |
| Future Volume (veh/h) | 215 | 125 | 2740 | 90 | 125 | 2880 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | No | No | No | No | No | No |
| Adj Sat Flow, veh/h | 1752 | 1752 | 1870 | 1826 | 1752 | 1870 |
| Adj Flow Rate, veh/h | 234 | 12 | 2978 | 60 | 136 | 3130 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 10 | 10 | 2 | 5 | 10 | 2 |
| Cap, veh/h | 268 | 229 | 3317 | 1005 | 159 | 3974 |
| Arrive On Green | 0.15 | 0.15 | 0.65 | 0.65 | 0.10 | 0.78 |
| Sat Flow, veh/h | 1668 | 1485 | 5274 | 1547 | 1668 | 5274 |
| Grp Volume(v), veh/h | 234 | 12 | 2978 | 60 | 136 | 3130 |
| Grp Sat Flow(s), veh/h | 1668 | 1485 | 1702 | 1547 | 1668 | 1702 |
| Q Serve(g.s), s | 18.5 | 0.9 | 65.6 | 1.9 | 10.7 | 47.0 |
| Cycle Q Clear(Q_c), s | 18.5 | 0.9 | 65.6 | 1.9 | 10.7 | 47.0 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h | 268 | 229 | 3317 | 1005 | 159 | 3974 |
| V/C Ratio(X) | 0.91 | 0.05 | 0.90 | 0.06 | 0.86 | 0.79 |
| Avail Cap(c_a), veh/h | 293 | 261 | 3378 | 1024 | 181 | 4704 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 55.6 | 48.2 | 19.7 | 8.5 | 59.6 | 8.5 |
| Incr Delay (d2), s/veh | 28.1 | 0.1 | 3.6 | 0.0 | 28.8 | 1.0 |
| %ile BackOfQ(50%), s/veh | 9.8 | 0.4 | 23.6 | 0.6 | 5.7 | 13.0 |
| Unsig. Movement Delay, s/veh | | | | | | |
| LnGrp Delay(d) s/veh | 83.7 | 48.3 | 23.3 | 8.6 | 88.5 | 9.5 |
| LnGrp LOS | F | D | C | A | F | A |
| Approach Vol, veh/h | 246 | 3038 | | | 3266 | |
| Approach Delay, s/veh | 81.9 | 23.0 | | | 12.8 | |
| Approach LOS | F | C | | | B | |
| Timer - Assigned Phs | 1 | 2 | | | 6 | 8 |
| Phs Duration (G+Y+Rc), s | 17.2 | 91.4 | | | 108.6 | 25.2 |
| Change Period (Y+Rc), s | 4.5 | 4.5 | | | 4.5 | 4.5 |
| Max Green Setting (Gmax), s | 14.5 | 88.5 | | | 107.5 | 23.5 |
| Max Q Clear Time (g_c+I1), s | 12.7 | 67.6 | | | 49.0 | 20.5 |
| Green Ext Time (g_e), s | 0.1 | 19.3 | | | 50.1 | 0.2 |
| Intersection Summary | | | | | | |
| HCM 6th Ctrl Delay | | | 20.2 | | | |
| HCM 6th LOS | | | C | | | |

| Intersection | Init Delay, s/veh | | | | | |
|--------------------------|-------------------|------------|--------|--------|------|---------|
| | WBL | WBR | NBT | NBR | SBL | SBT |
| Init Delay, s/veh | 0.3 | | | | | |
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | | ↑ ↑ ↑ ↑ | | ↑ | | ↑ ↑ ↑ ↑ |
| Traffic Vol, veh/h | 0 | 25 | 2805 | 30 | 0 | 3090 |
| Future Vol, veh/h | 0 | 25 | 2805 | 30 | 0 | 3090 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | 500 | - | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 5 | 2 | 5 | 0 | 2 |
| Mvmt Flow | 0 | 27 | 3049 | 33 | 0 | 3359 |
| Major/Minor | Minor1 | Major1 | Major1 | Major2 | | |
| Conflicting Flow All | - | 1525 | 0 | 0 | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | 7.2 | - | - | - | - |
| Critical Hdwy Slg 1 | - | - | - | - | - | - |
| Critical Hdwy Slg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | 3.95 | - | - | - | - |
| Pl Cap-1 Maneuver | 0 | 89 | - | - | 0 | - |
| Stage 1 | 0 | - | - | - | 0 | - |
| Stage 2 | 0 | - | - | - | 0 | - |
| Platoon blocked, % | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | 89 | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Approach | WB | NB | SB | SB | | |
| HCM Control Delay, s | 62.3 | 0 | 0 | 0 | | |
| HCM LOS | F | | | | | |
| Minor Lane/Major Mvmt | NBT | NBR/WBL/rt | SBT | | | |
| Capacity (veh/h) | - | - | 89 | - | | |
| HCM Lane V/C Ratio | - | - | 0.305 | - | | |
| HCM Control Delay (s) | - | - | 62.3 | - | | |
| HCM Lane LOS | - | - | F | - | | |
| HCM 95th %ile Q(veh) | - | - | 1.1 | - | | |

APPENDIX D
RECOMMENDED ROADWAY IMPROVEMENTS

Table D1 - Roadway Improvements Plan

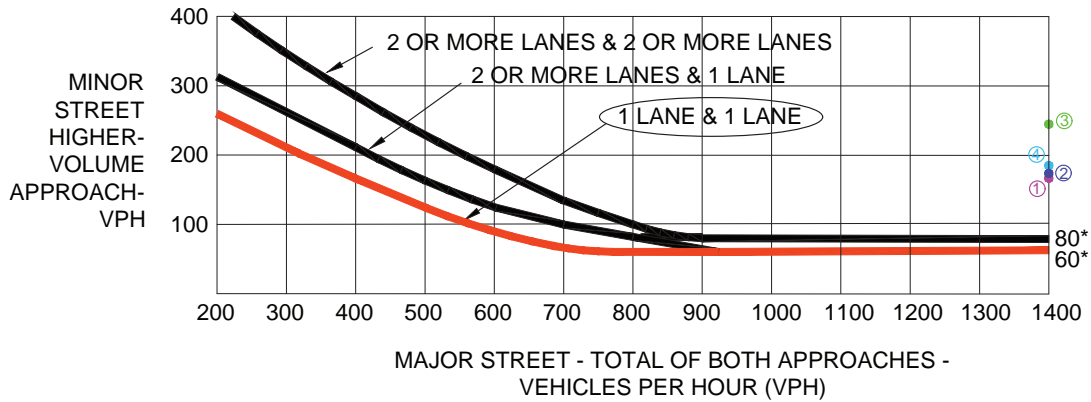
| ID | Intersection | Existing (2017) | Base Year 2038 (Without Project) With Mitigation ² | Future Year 2038 (With Project & Full Build-out of Pulehunu Master Plan) With Mitigation |
|--------------------------------|----------------------------------|---|---|--|
| Maui Veterans Highway @ | | | | |
| 1 | Nakii Road | #1 Maui Veterans Highway Nakii Rd | #1 Maui Veterans Highway Nakii Rd | #1 Maui Veterans Highway Nakii Rd |
| 2 | Kamaaina Road ¹ | #2 Maui Veterans Highway Kamaaina Road | #2 Maui Veterans Highway Kamaaina Road | #2 Maui Veterans Highway Kamaaina Road |
| 3 | Proposed NEW Middle Access | #3 Maui Veterans Highway DHHLDLNR Access | #3 Maui Veterans Highway DHHLDLNR Access | #3 Maui Veterans Highway DHHLDLNR Access |
| 4 | Mehameha Loop (South) | #4 Maui Veterans Highway Mehameha LP | #4 Maui Veterans Highway Mehameha LP | #4 Maui Veterans Highway Mehameha LP |
| 9 | DHHL South Driveway ¹ | #9 Maui Veterans Highway DHHL South Dwy 1 | #9 Maui Veterans Highway DHHL South Dwy 1 | #9 Maui Veterans Highway DHHL South Dwy 1 |
| 10 | DHHL South Driveway ² | #10 Maui Veterans Highway DHHL South Dwy 2 | #10 Maui Veterans Highway DHHL South Dwy 2 | #10 Maui Veterans Highway DHHL South Dwy 2 |
| 11 | DHHL South Driveway ³ | #11 Maui Veterans Highway DHHL South Dwy 3 | #11 Maui Veterans Highway DHHL South Dwy 3 | #11 Maui Veterans Highway DHHL South Dwy 3 |
| 5 | North Kihel Road | #5 Maui Veterans Highway N Kihel Rd / Monsario DW | #5 Maui Veterans Highway N Kihel Rd / Monsario DW | #5 Maui Veterans Highway N Kihel Rd / Monsario DW |

Notes:

- Green highlighted shows proposed improvement.
- 1. As part of Puunene Heavy Industrial Subdivision, the southbound left-turn lane is recommended to be lengthened and a new exclusive westbound right-turn lane and acceleration lane from Kamaaina Road onto Maui Veterans Highway is recommended.
- 2. It's assumed that by Year 2038, Maui Veterans Highway may be widened to three (3) lanes in each direction based on HDOT's Federal Aid Highways 2035 Transportation Plan for the District of Maui (Plan). HDOT's Maui Veterans Highway widening improvement is currently not identified on the latest Statewide Transportation Improvement Program (STIP). Due to the uncertainty of HDOT's Maui Veterans Highway widening improvement, DHHL will

APPENDIX E
TRAFFIC SIGNAL WARRANTS

Warrant 2, Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

- ① (11:30 AM to 12:30 PM), (4754, 167)
- ② (12:30 PM to 1:30 PM), (4522, 174)
- ③ (3:30 PM to 4:30 PM), (5095, 245)
- ④ (4:30 PM to 5:30 PM), (4922, 185)

DHHL PULEHUNUI
NORTH AND SOUTH
PARCEL TIAR

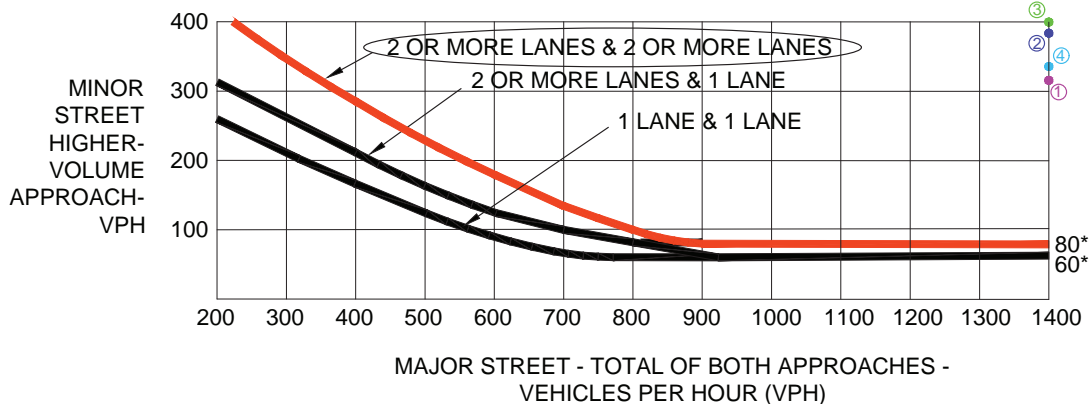
ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

BASE YEAR 2038 WITHOUT PROJECT FOUR HOUR TRAFFIC SIGNAL WARRANT FOR
MAUI VETERANS HIGHWAY/MEHAMEHA LOOP SOUTH INTERSECTION

FIGURE

E2

Warrant 2, Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

- ① (12:30 PM to 1:30 PM), (4099, 316)
- ② (1:30 PM to 2:30 AM), (4092, 384)
- ③ (3:30 PM to 4:30 PM), (4620, 445)
- ④ (4:30 PM to 5:30 PM), (4396, 336)

DHHL PULEHUNUI
NORTH AND SOUTH
PARCEL TIAR

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

BASE YEAR 2038 WITHOUT PROJECT FOUR HOUR TRAFFIC SIGNAL WARRANT FOR
MAUI VETERANS HIGHWAY/DLNR ACCESS INTERSECTION

FIGURE

E1

APPENDIX F

BASE YEAR 2038 SUPPLEMENTARY ANALYSIS

Appendix F: Alternative Base Year 2038 Scenario Without DHHL North & South Parcels, DLNR Industrial & Business Park & MRPSC

Based on discussions with HDOT, it was requested that an iterative Base Year 2038 scenario be analyzed that excludes the three (3) Pulehuni Master Planned Subdivision developments; DHHL North and South Project, DLNR Industrial and Business Park, and Maui Regional Public Safety Complex (MRPSC). This scenario is described in Appendix F.

As described in Section 4.1-4.2, an annual defacto growth rate of 2.1 percent per year was applied along Maui Veterans Highway. In addition, numerous developments are forecast to be completed within the vicinity of the Project and generate additional traffic along Maui Veterans Highway. Table F.1 shows the total peak hour traffic volumes forecast to be generated by other known developments for this scenario. Note this table excludes the DHHL North and South Project, DLNR Industrial and Business Park and MRPSC.

F.1 Base Year 2038 Without Mitigation Conditions (No DHHL-DLNR-MRPSC)

[1] Maui Veterans Highway & Nakii Road

It is anticipated that during the AM peak hour, the southbound left turn will operate at LOS F and overcapacity conditions, though the intersection will continue to operate at LOS D overall. During the PM peak hour, the westbound right turn and southbound left turn will operate at LOS F and overcapacity conditions and LOS E overall. During the WE peak, the southbound is anticipated to operate at LOS F.

[2] Maui Veterans Highway & Mehamaha Loop/Kamaaina Road

It is anticipated that during the AM peak hour, the southbound left turn will operate at LOS F and overcapacity conditions. During the PM peak hour, the northbound through movement, movements on the westbound approach and southbound left turn movement will operate at LOS F and overcapacity conditions, and the northbound left turn approach will operate at LOS F. Overall, the intersection is anticipated to operate at LOS E. During the WE peak, all movements are anticipated to operate at LOS D or higher with the exception of the northbound left turn movement and the southbound left turn movement, which will operate at LOS E.

[4] Maui Veterans Highway & Mehamaha Loop South

All movements are anticipated to operate at LOS C with the exception of the westbound shared LT/TH lane, which will operate at LOS F for AM and WE peaks, and overcapacity for the PM peak, though volumes are minimal, with only 5 vehicles anticipated to arrive throughout the entire hour for all peaks.

[5] Maui Veterans Highway/Piihahi Highway & North Kihei Road

During the AM peak hour, the westbound left turn and southbound left turn is anticipated to operate at LOS F. The northbound left turn, eastbound left turn and westbound shared TH/RT is anticipated to operate at LOS E, and the intersection is as anticipated to operate at LOS C overall. During the PM peak hour, various movements will operate at LOS F, with the

southbound left turn operating with overcapacity conditions. Overall, the intersection will operate at LOS F for the PM peak hour. During the WE peak, the westbound left turn movement and southbound left turn movements are anticipated to operate at LOS F and the westbound shared TH/RT movement is anticipated to operate at LOS E. Overall, the intersection is anticipated to operate at LOS C. Volumes on the westbound approach are anticipated to be minimal, with 10-30 vehicles arriving per hour throughout all peak hours. Similarly, only approximately 5 vehicles are anticipated to arrive during the hour at the southbound left turn approach for all peak hours.

F.2 Base Year 2038 With Mitigation Conditions (No DHHL-DLNR-MRPSC)

The following improvements are recommended. With the listed mitigation implemented, all mainline northbound and southbound through movements along Maui Veterans Highway and overall LOS are anticipated to operate at LOS D or better for all peak hours at intersections. Some movements on the minor street approaches and the mainline left-turn movements may operate at LOS E/F due to low volume movements or long cycle lengths that prioritize the mainline Maui Veterans Highway traffic. However, all movements are anticipated to operate under capacity, with the exception of the westbound shared LT/TH movement at Maui Veterans Highway and Mehamaha Loop South, which is only anticipated to serve 5 vehicles across the entire hour for all peak hours.

[1] Maui Veterans Highway & Nakii Road

- Widen Maui Veterans Highway to provide an additional southbound left-turn lane, resulting in two southbound left turn lanes on Maui Veterans Highway. Also, widen Nakii Road to provide an exclusive left turn lane and a channelized right turn lane.
 - Northbound: Two (2) through lanes and one (1) right-turn lane
 - Southbound: Two (2) left-turn lanes and two (2) through lanes
 - Westbound: One (1) left-turn lane and one (1) right-turn lane

[2] Maui Veterans Highway & Mehamaha Loop/Kamaaina Road

- Implement planned roadway improvements listed in Section 4.3
- Widen Maui Veterans Highway to provide an additional southbound left-turn lane, resulting in two southbound left turn lanes on Maui Veterans Highway.
 - Northbound: One (1) left-turn, two (2) through lanes and one (1) right-turn lane
 - Southbound: Two (2) left-turn lanes, two (2) through lanes and one right-turn lane
 - Eastbound: Shared left-turn/through/right-turn lane
 - Westbound: One (1) shared left-turn/through lane and one (1) right turn lane

[5] Maui Veterans Highway/Piilani Highway & North Kihei Road

- Widen Maui Veterans Highway to provide an additional southbound through lane, resulting in three (3) southbound through lanes on Maui Veterans Highway
 - Northbound: Two (2) left-turn lanes, two (2) through lanes and one (1) right-turn lane
 - Southbound: One (1) left-turn lane, three (3) through lanes and one right-turn lane
 - Eastbound: One (1) exclusive left-turn lane, one (1) shared left-turn/through lane, and two (2) right-turn lanes
 - Westbound: One (1) left-turn lane, and one (1) shared through/right-turn lane

Figure F1 and F2 illustrate the lane configuration, forecast traffic volumes and movement LOS for Base Year 2038 WITHOUT and WITH the recommended mitigation, respectively. Table F2 summarizes the Base Year 2038 LOS at the study intersections compared to existing conditions. Table F3 summarizes roadway improvements at the study intersections for Base Year 2038.

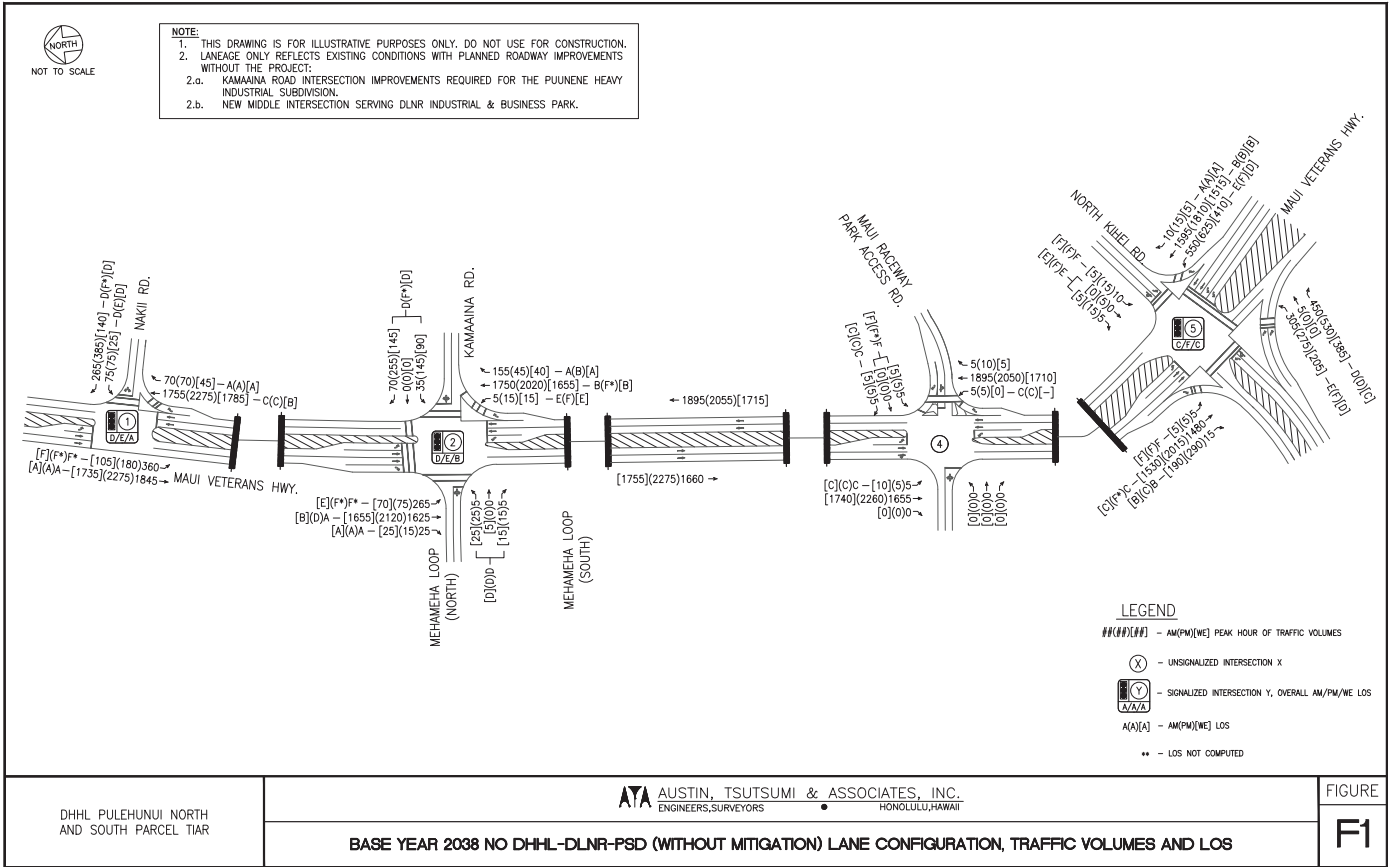


Table F.1 Background Developments Trip Generation (Without DHHL-DLNR-PSD)

| Land Use | Independent Variable (ITE Code) | Size | AM Peak Hour | | | PM Peak Hour | | | WE Peak Hour | | |
|---|---------------------------------|---------------------|--------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | | Enter (vph) | Exit (vph) | Total (vph) | Enter (vph) | Exit (vph) | Total (vph) | Enter (vph) | Exit (vph) | Total (vph) |
| Puunene Heavy Industrial Subdivision ¹ | Industrial Park (130) | 65.92 acres | 392 | 80 | 472 | 99 | 372 | 471 | 100 | 211 | 311 |
| Central Maui Baseyard Expansion | Industrial Park (130) | 100 acres | 506 | 104 | 610 | 123 | 465 | 588 | 151 | 320 | 471 |
| Piilani Promenade 2 | Retail/Commercial (820) | 530,000 SF | 268 | 164 | 432 | 703 | 777 | 1,480 | 1,096 | 993 | 2,089 |
| | Industrial Park (130) | 58,000 SF (5 Acres) | | | | | | | | | |
| Maui Bay Villas ^{1,2} | Timeshare (265) | 388 Dwelling Units | 210 | 110 | 60 | 319 | 136 | 183 | 319 | 136 | 183 |
| | Beach Park (415) | 12 Stalls | | | | | | | | | |
| Kihei High School ^{1,2} | High School (530) | 946 students | 270 | 127 | 397 | 58 | 65 | 123 | 116 | 66 | 182 |
| Total NEW External Trips | | | 1,646 | 585 | 1,971 | 1,302 | 1,815 | 2,845 | 1,782 | 1,726 | 3,236 |

Notes:
 - kSF = 1,000 Square Feet of Gross Leasable Area
 1. Trip generation taken from TIAR's prepared for each respective development.
 2. Table 4.2 shows total new external trips generated by each development. However, due to its location further south in Kihei, only a portion of these trips traverse the study intersections along Maui Veterans Highway.

TABLE F1: LOS SUMMARY TABLE
EXISTING, BASE YEAR 2038 AND BASE YEAR 2038 WITH MITIGATION CONDITIONS
(NO DHHL-DLNR-PSD)

| Intersection | Existing Conditions | | | | | | Base Year 2038 Conditions (No DLNR - DHHL - PSD) | | | | | | Base Year 2038 with Mitigation Conditions (No DLNR - DHHL - PSD) | | | | | |
|---|---------------------|-----------|-----|-----------|-----------|-----|---|-----------|-----|-----------|-----------|-----|---|-----------|-----|-----------|-----------|-----|
| | AM | | PM | | WE | | AM | | PM | | WE | | AM | | PM | | WE | |
| | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS |
| 1. Maui Veterans Hwy & Nakihi Rd | | | | | | | | | | | | | | | | | | |
| NB TH | 9.3 | 0.74 | A | 8.5 | 0.74 | A | 6.9 | 0.64 | A | 22.5 | 0.91 | C | 30.9 | 0.98 | C | 11.1 | 0.82 | B |
| NB RT | 5.3 | 0.01 | A | 4.5 | 0.02 | A | 4.5 | 0.01 | A | 8.0 | 0.04 | A | 5.3 | 0.05 | A | 4.4 | 0.03 | A |
| WB LT | 36.4 | 0.63 | D | 27.8 | 0.47 | C | 30.8 | 0.42 | C | 50.1 | 0.73 | D | 57.6 | 0.56 | E | 38.2 | 0.33 | D |
| WB RT | 21.6 | 0.02 | C | 21.7 | 0.02 | C | 18.9 | 0.05 | B | 48.2 | 0.63 | D | 87.8 | 2.33 | F* | 42.7 | 0.57 | D |
| SB LT | 28.0 | 0.76 | C | 27.5 | 0.64 | C | 22.8 | 0.52 | C | 284.9 | 1.50 | F* | 344.6 | 1.56 | F* | 82.0 | 0.85 | F |
| SB TH | 2.8 | 0.50 | A | 3.4 | 0.64 | A | 2.8 | 0.48 | A | 5.3 | 0.71 | A | 8.5 | 0.84 | A | 3.4 | 0.68 | A |
| OVERALL | 7.5 | - | A | 6.5 | - | A | 5.2 | - | A | 38.4 | - | D | 67.8 | - | E | 10.0 | - | A |
| 2. Maui Veterans Hwy & Mehamaha Ln North/Kamaaina Rd | | | | | | | | | | | | | | | | | | |
| NB LT | 69.3 | 0.40 | E | 30.7 | 0.43 | D | 30.0 | 0.43 | C | 75.4 | 0.43 | E | 93.0 | 0.56 | F | 64.6 | 0.50 | E |
| NB TH | 6.9 | 0.65 | A | 6.7 | 0.63 | A | 7.2 | 0.60 | A | 15.2 | 0.82 | B | 68.0 | 1.05 | F* | 17.8 | 0.83 | B |
| NB RT | 4.1 | 0.00 | A | 3.9 | 0.01 | A | 4.7 | 0.00 | A | 7.0 | 0.12 | A | 14.3 | 0.07 | B | 8.3 | 0.02 | A |
| EB LT/TH/RT | 23.7 | 0.03 | C | 26.1 | 0.15 | C | 20.2 | 0.13 | C | 48.5 | 0.04 | D | 51.8 | 0.13 | D | 40.2 | 0.15 | D |
| WB LT/TH | 23.7 | 0.03 | C | 25.3 | 0.01 | C | 19.7 | 0.03 | B | 52.2 | 0.42 | D | 122.9 | 1.04 | F* | 47.6 | 0.70 | D |
| WB RT | 23.7 | 0.03 | C | 25.3 | 0.01 | C | 19.7 | 0.03 | B | 52.2 | 0.42 | D | 122.9 | 1.04 | F* | 47.6 | 0.70 | D |
| SB LT | 42.2 | 0.64 | D | 135.8 | 0.95 | F | 54.4 | 0.56 | D | 382.9 | 1.70 | F* | 222.4 | 1.14 | F* | 68.1 | 0.84 | E |
| SB TH | 5.9 | 0.56 | A | 7.1 | 0.68 | A | 7.5 | 0.62 | A | 5.6 | 0.64 | A | 41.3 | 0.98 | D | 13.4 | 0.76 | B |
| SB RT | 3.7 | 0.02 | A | 3.9 | 0.01 | A | 4.9 | 0.02 | A | 2.7 | 0.02 | A | 9.4 | 0.01 | A | 8.2 | 0.02 | A |
| OVERALL | 6.6 | - | A | 7.7 | - | A | 7.8 | - | A | 37.0 | - | D | 62.1 | - | E | 18.6 | - | B |
| 4. Maui Veterans Hwy & Mehamaha Loop South | | | | | | | | | | | | | | | | | | |
| NB LT | 11.5 | 0.00 | B | 12.9 | 0.01 | B | - | - | - | 15.5 | 0.02 | C | 24.2 | 0.03 | C | - | - | - |
| WB LT/TH | 111.3 | 0.06 | F | 144.1 | 0.08 | F | 71.9 | 0.04 | F | 1078.5 | 0.91 | F | 2303.4 | 1.81 | F* | 760.7 | 0.68 | F |
| WB RT | 14.1 | 0.01 | B | 14.3 | 0.01 | B | 12.7 | 0.01 | B | 20.9 | 0.02 | C | 22.9 | 0.03 | C | 18.5 | 0.02 | C |
| SB LT | 12.1 | 0.01 | B | 12.2 | 0.01 | B | 10.9 | 0.01 | B | 18.4 | 0.02 | C | 20.3 | 0.02 | C | 10.3 | 0.03 | C |
| OVERALL | 0.1 | - | - | 0.1 | - | - | 0.1 | - | - | 1.6 | - | - | 2.8 | - | - | 1.2 | - | - |
| 5. Pitani Hwy/Maui Veterans Hwy & N Kihai Rd/Moanaloa Driv | | | | | | | | | | | | | | | | | | |
| NB LT | 29.3 | 0.76 | C | 33.4 | 0.79 | C | 24.9 | 0.86 | C | 63.8 | 0.89 | E | 101.1 | 0.95 | F | 51.8 | 0.84 | D |
| NB TH | 10.5 | 0.56 | B | 11.0 | 0.58 | B | 9.5 | 0.53 | A | 12.3 | 0.69 | B | 19.5 | 0.77 | B | 12.3 | 0.69 | B |
| NB RT | 7.1 | 0.01 | A | 7.2 | 0.01 | A | 8.6 | 0.00 | A | 8.1 | 0.01 | A | 8.2 | 0.00 | A | 8.9 | 0.01 | A |
| EB LT | 30.6 | 0.59 | C | 33.4 | 0.51 | C | 25.6 | 0.50 | C | 64.7 | 0.77 | E | 81.5 | 0.54 | F | 47.0 | 0.50 | D |
| EB RT | 16.2 | 0.23 | B | 21.2 | 0.32 | C | 17.3 | 0.14 | B | 36.2 | 0.34 | D | 51.2 | 0.46 | D | 33.3 | 0.38 | C |
| WB LT | 67.2 | 0.46 | E | 49.2 | 0.46 | D | 60.0 | 0.26 | E | 97.3 | 0.58 | F | 128.2 | 0.68 | F | 83.8 | 0.48 | F |
| WB TH/RT | 37.4 | 0.08 | D | 41.2 | 0.18 | D | 68.9 | 0.29 | E | 72.8 | 0.06 | E | 104.4 | 0.20 | F | 80.8 | 0.10 | E |
| SB LT | 113.7 | 0.52 | F | 141.4 | 0.45 | F | 79.4 | 0.32 | E | 117.0 | 0.56 | F | 152.2 | 0.58 | F | 96.5 | 0.55 | F |
| SB TH | 22.9 | 0.81 | C | 35.1 | 0.94 | D | 16.2 | 0.73 | B | 33.7 | 0.87 | C | 140.6 | 1.19 | F* | 30.3 | 0.90 | C |
| SB RT | 14.1 | 0.01 | B | 15.5 | 0.12 | B | 11.7 | 0.10 | B | 18.6 | 0.01 | B | 27.6 | 0.24 | C | 14.0 | 0.12 | B |
| OVERALL | 18.9 | - | B | 25.4 | - | C | 15.4 | - | B | 32.4 | - | C | 80.4 | - | F | 28.6 | - | C |

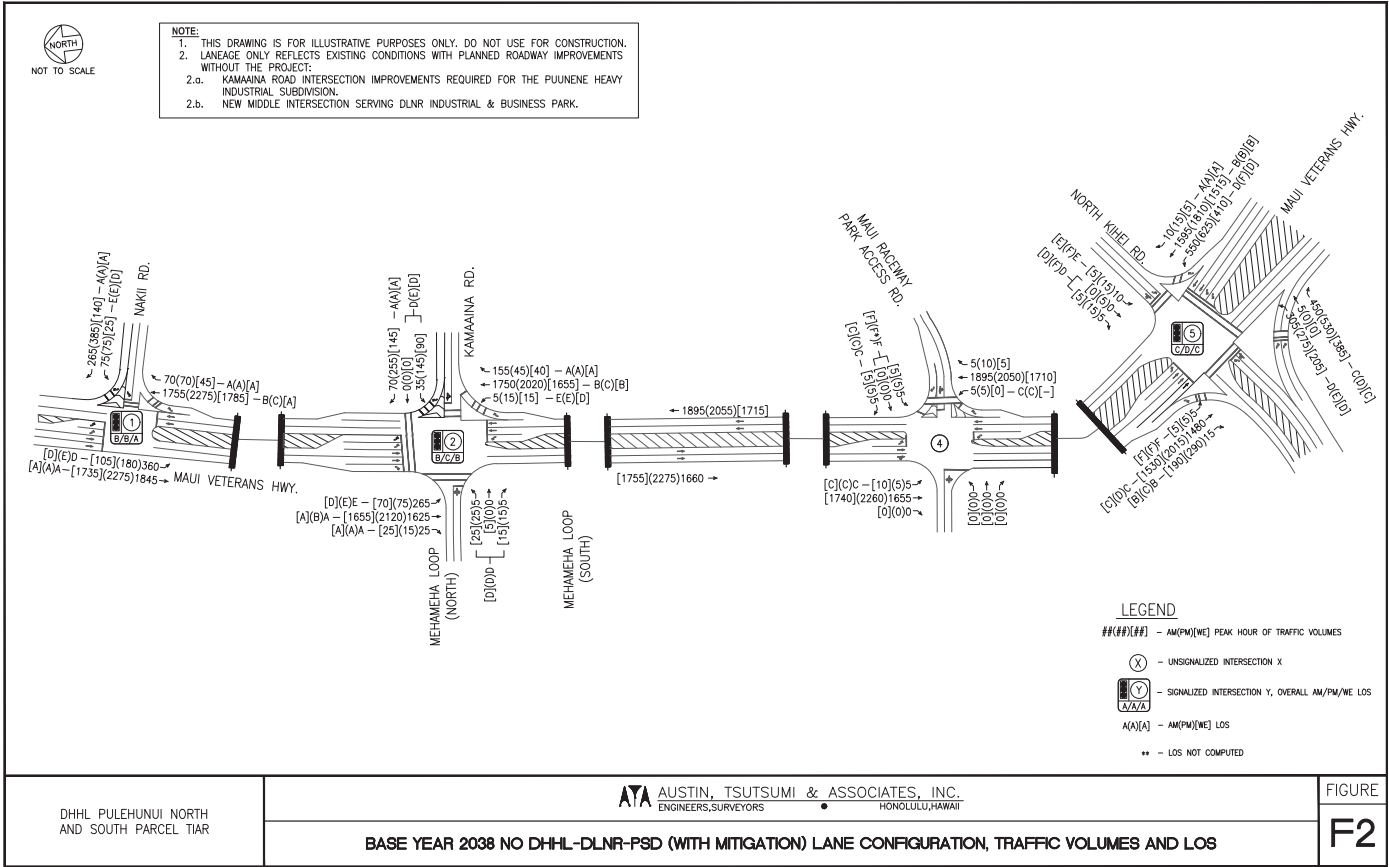


Table F3 - Roadway Improvements Plan

| ID | Intersection | Existing (2017) | Base Year 2038 (Without DHHL-DLNR-MRPSC) With Mitigation ² |
|--------------------------------|----------------------------|---|---|
| Maui Veterans Highway @ | | | |
| 1 | Nakii Road | #1 Maui Veterans Highway Nakii Rd | #1 Maui Veterans Highway Nakii Rd |
| 2 | Kamaaina Road ¹ | #2 Maui Veterans Highway Kamaaina Road | #2 Maui Veterans Highway Kamaaina Road |
| 4 | Mehameha Loop (South) | #4 Maui Veterans Highway Mehameha Lp | #4 Maui Veterans Highway Mehameha Lp |
| 5 | North Kihei Road | #5 Maui Veterans Highway N Kihei Rd/ Monsanto DW | #5 Maui Veterans Highway N Kihei Rd/ Monsanto DW |

Notes:

- Green highlighted shows proposed improvement.
- 1. As part of Puuene Heavy Industrial Subdivision, the southbound left-turn lane is recommended to be lengthened and a new exclusive westbound right-turn lane and acceleration lane from Kamaaina Road onto Maui Veterans Highway is recommended.

APPENDIX G
ALTERNATIVE FUTURE YEAR 2038 SCENARIO WITH PROJECT
WITHOUT MAUI VETERANS HIGHWAY CORRIDOR WIDENING

Appendix G: Alternative Future Year 2038 Scenario With Project Without Maui Veterans Highway Corridor Widening (Maintain 4-lanes throughout)

Based on the HDOT comment letter dated December 20, 2018 (STP 8.2568), HDOT Highways Division comment number 1.1 requested that an iterative Future Year 2038 with Project scenario be analyzed to depict future lane configurations to remain as current four-lanes. This scenario assumes that no new through lanes are implemented along Maui Veterans Highway to maintain four lanes throughout the study area. However, left-turn lane and right-turn lane widening improvements will be implemented, consistent with this TIAR's original recommendations in Section 7.3 and Table D1 in Appendix D.

As described in Section 4.1-4.2, an annual defacto growth rate of 2.1 percent per year was applied along Maui Veterans Highway. In addition, traffic generated by the DHHL North and South Project and all nearby developments shown in Table 4.2 is included in this scenario.

G.1 Future Year 2038 Scenario With Project Without Maui Veterans Highway Corridor Widening Analysis

The configurations for each of the study intersections for this scenario are listed below, with deviations from Future Year 2038 (With Mitigation) Conditions in **bold**:

[1] Maui Veterans Highway/Nakii Road

- Northbound: **Two (2) through lanes** and one (1) right-turn lane.
- Southbound: **Two (2) left-turn lanes and two (2) through lanes.**
- Westbound: One (1) left-turn lane and one (1) right-turn lane.

[2] Maui Veterans Highway/Mehameha Loop (North)/Kamaaina Road

- Northbound: One (1) left-turn lane, **two (2) through** and one (1) right-turn lane.
- Southbound: **Two (2) left-turn lanes, two (2) through** and one (1) right-turn lane.
- Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.
- Westbound: **Two (2) left-turn lanes, one (1) through** and one (1) right-turn lane with acceleration lane.

[3] Maui Veterans Highway/DHHL North Access/DLNR Access

- Northbound: **Two (2) left-turn lanes, two (2) through** and one (1) right-turn lane.
- Southbound: **Two (2) left-turn lanes, two (2) through** and one (1) right-turn lane.
- Eastbound: **Two (2) left-turn lanes, one (1) through** and one (1) right-turn lane.
- Westbound: **Two (2) left-turn lanes, one (1) through** and one (1) right-turn lane with an acceleration lane.

[4] Maui Veterans Highway/Mehameha Loop (South)/Maui Raceway Park Access Road

- Northbound: One (1) left-turn lane, **two (2) through** and one (1) right-turn lane.
- Southbound: One (1) left-turn lane, **two (2) through** and one (1) right-turn lane.
- Eastbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane with an acceleration lane.
- Westbound: One (1) left-turn lane, one (1) through and one (1) right-turn lane.

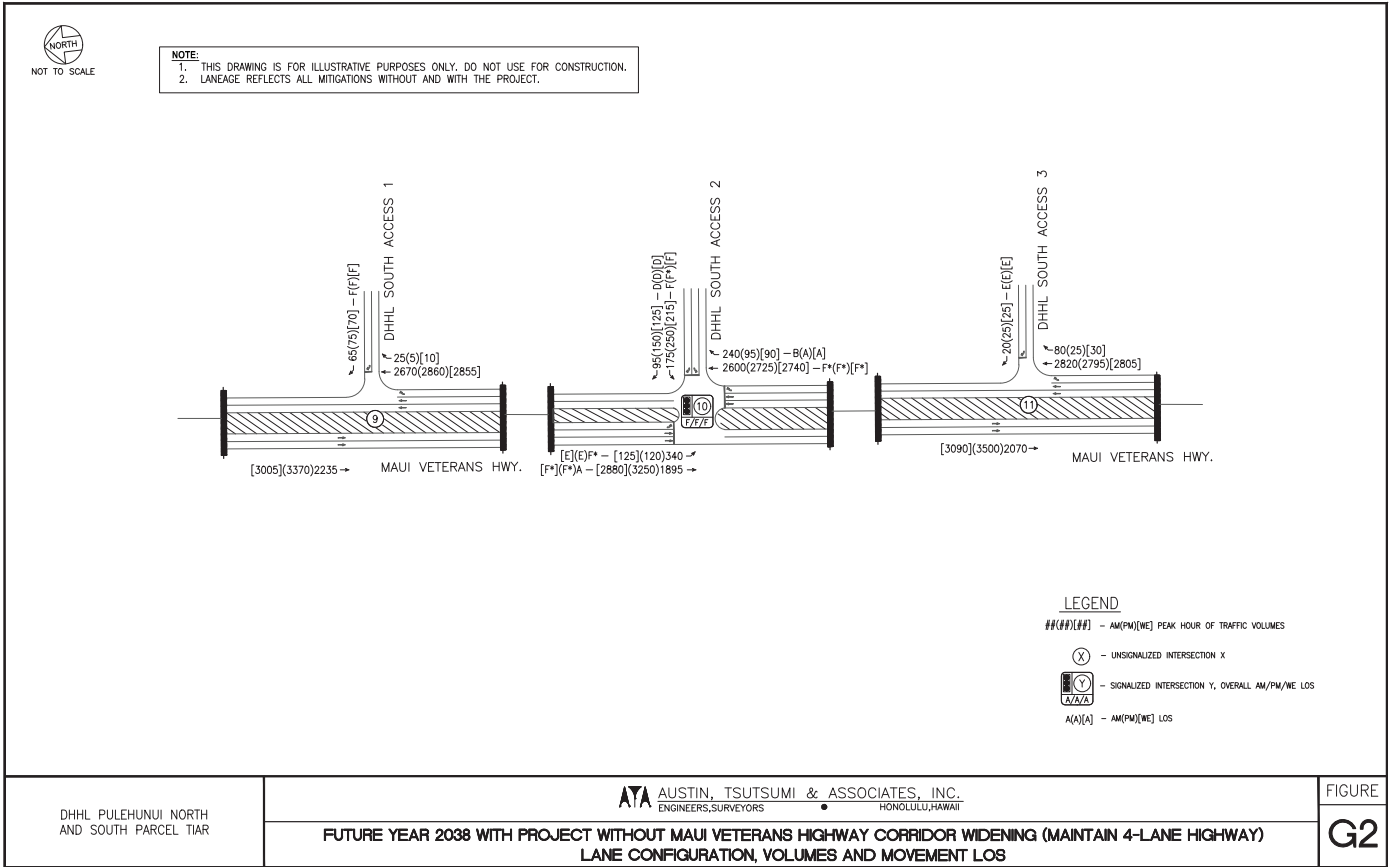
[5] Maui Veterans Highway/Piilani Highway/North Kihei Road/Monsanto Driveway

- Northbound: **Two (2) left-turn lanes, two (2) through** and one (1) right-turn lane.
- Southbound: One (1) left-turn lane, **two (2) through** and one (1) right-turn lane.
- Eastbound: One (1) left-turn lane, one (1) shared left-turn/through lane and two (2) right-turn lanes.
- Westbound: One (1) left-turn lane and one (1) shared through/right-turn lane.

1.1.1 Future Year 2038 Supplementary Scenario Intersection Analysis

As anticipated, operations are significantly worse in this scenario with Maui Veterans Highway maintained as a four-lane highway. The signalized intersections operate unacceptably with through movements and overall intersections operating at LOS F and overcapacity conditions for various peak hours of traffic.

Figure G1 and G2 illustrate the lane configuration, forecast traffic volumes and movement LOS for Future Year 2038 condition, maintaining a four-lane Maui Veterans Highway. Table G1 summarizes the results of this analysis in comparison to the Future Year 2038 without mitigation and with mitigation scenarios described in Section 5 of this TIAR. LOS worksheets are provided in Appendix C.

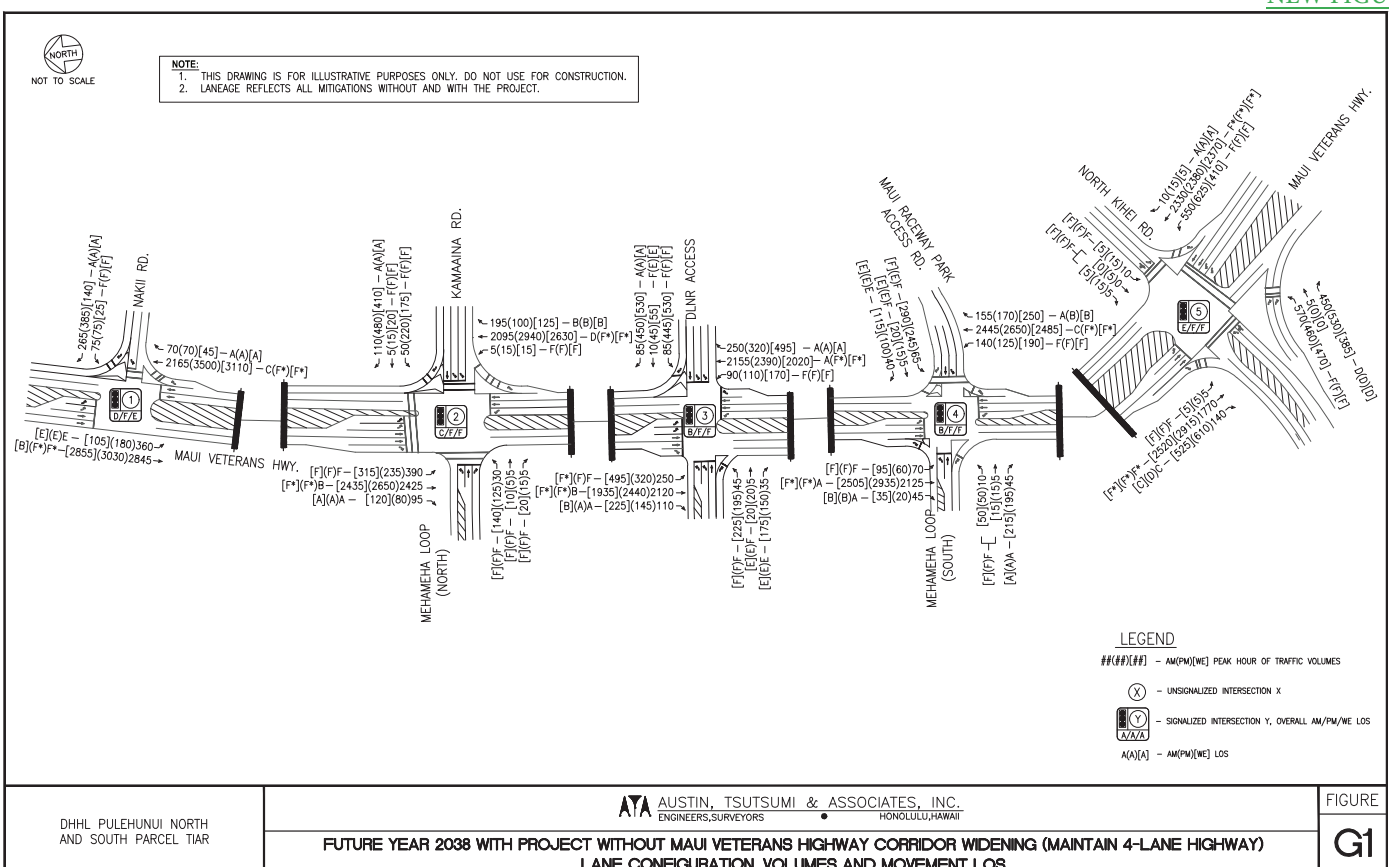


DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
 ENGINEERS, SURVEYORS HONOLULU, HAWAII

FUTURE YEAR 2038 WITH PROJECT WITHOUT MAUI VETERANS HIGHWAY CORRIDOR WIDENING (MAINTAIN 4-LANE HIGHWAY)
 LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE
G2



DHHL PULEHUNUI NORTH AND SOUTH PARCEL TIAR

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
 ENGINEERS, SURVEYORS HONOLULU, HAWAII

FUTURE YEAR 2038 WITH PROJECT WITHOUT MAUI VETERANS HIGHWAY CORRIDOR WIDENING (MAINTAIN 4-LANE HIGHWAY)
 LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE
G1

APPENDIX H
ROUNDBOUT ANALYSIS

Appendix H: Roundabout Analysis

Based on the Maui County Department of Planning comment letter dated December 18, 2018, comment #9 requested that the feasibility of roundabouts be considered at the following three study intersections:

- Maui Veterans Highway/DHHL Access/DLNR Access
- Maui Veterans Highway/Mehameha Loop North/Kamaaina Road
- Maui Veterans Highway/Mehameha Loop South

Section 4.4.1 of this TIAR describes the following limitations of implementing a single-lane or double-lane roundabout based on average daily traffic thresholds:

"Based on national guidance, the vehicular capacity for a single-lane roundabout is constrained by the circulating flow within the roundabout and geometric elements of the roundabout, and is generally up to 25,000 vehicles per day. For a single-lane roundabout, Maui Veterans Highway would need to be reduced from its existing four-lane roadway to a two-lane roadway, and the existing demand of 30,000-35,000 vehicles per day would result in overcapacity conditions with lengthy delays and congestion negatively impacting traffic conditions.

Based on national guidance, the vehicular capacity for a double-lane roundabout is generally up to 45,000 vehicles per day, while forecasted traffic for Year 2038 predicts between 60,000-75,000 vehicles per day. As a result, double-lane roundabouts at Project intersections are likely infeasible as the roundabout cannot provide enough capacity to serve the demand. Also, there are currently no double-lane roundabouts operational in the state of Hawaii, resulting in a potentially steep learning curve for drivers in a relatively high-volume area upon implementation.

There are few triple-lane roundabouts operational throughout the United States due to notable challenges documented by the FHWA including an increased risk of sideswipe crashes due to drivers crossing lanes within the roundabout, and driver confusion in interpreting signage and lane arrows. As previously noted, as double-lane roundabouts are already likely to have a steep learning curve for Hawaii drivers, it follows that triple-lane roundabouts may be infeasible due to the lack of experience that drivers in the state of Hawaii have in navigating challenges associated with multilane roundabouts."

Analysis shows that Base Year 2038 Without Project conditions with double-lane roundabouts at each of the three (3) main Project intersections shown above will result in overcapacity conditions at all intersections along the critical mainline Maui Veterans Highway. Additionally, there are currently no double-lane roundabouts operational in the State of Hawaii, so there will be a steep learning curve for these drivers in a relatively high-volume area upon implementation. Therefore, double-lane roundabouts are considered to be infeasible at the three (3) main Project intersections

Table H.1 summarizes the delay and levels of service anticipated for Base Year 2038 conditions.

NEW TABLE

Table H.1: Base Year 2038 With Roundabout Conditions

| Intersection | Base Year 2038 With Roundabout Conditions | | | | | | | | | | | |
|---|---|-----------|----------|--------------|-----------|----------|--------------|-----------|----------|--------------|-----------|----------|
| | AM | | | | PM | | | | WE | | | |
| | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS | HCM Delay | v/c Ratio | LOS |
| 2. Maul Veterans Highway & Mehamaha Lo North/Kamaaina Rd | | | | | | | | | | | | |
| EB Left Lane | 37.3 | 0.46 | E | 83.3 | 0.39 | F | 54.4 | 0.29 | F | 54.4 | 0.29 | F |
| EB Right Lane | 25.7 | 0.04 | D | 48.3 | 0.18 | E | 36.7 | 0.17 | E | 36.7 | 0.17 | E |
| WB Left Lane | 34.5 | 0.33 | D | 80.3 | 2.72 | F* | 306.1 | 1.46 | F* | 306.1 | 1.46 | F* |
| WB Right Lane | 51.7 | 0.64 | F | 165.7 | 4.52 | F* | 869.8 | 2.80 | F* | 869.8 | 2.80 | F* |
| NB Left Lane | 172.1 | 1.33 | F* | 175.2 | 1.34 | F* | 158.2 | 1.30 | F* | 158.2 | 1.30 | F* |
| NB Right Lane | 188.4 | 1.37 | F* | 202.1 | 1.41 | F* | 180.6 | 1.35 | F* | 180.6 | 1.35 | F* |
| SB Left Lane | 46.1 | 1.01 | F* | 180.2 | 1.35 | F* | 98.8 | 1.16 | F* | 98.8 | 1.16 | F* |
| SB Right Lane | 64.4 | 1.07 | F* | 208.5 | 1.42 | F* | 123.5 | 1.22 | F* | 123.5 | 1.22 | F* |
| Overall | 111.7 | - | F | 334.5 | - | F | 200.4 | - | F | 200.4 | - | F |
| 3. Maul Veterans Highway & DLNR Access | | | | | | | | | | | | |
| WB Left Lane | 47.3 | 0.55 | E | 1050.6 | 3.20 | F* | 814.7 | 2.70 | F* | 814.7 | 2.70 | F* |
| WB Right Lane | 33.6 | 0.45 | D | 775.8 | 2.60 | F* | 599.6 | 2.24 | F | 599.6 | 2.24 | F |
| NB Left Lane | 81.1 | 1.11 | F* | 162.0 | 1.31 | F* | 229.9 | 1.46 | F* | 229.9 | 1.46 | F* |
| NB Right Lane | 101.8 | 1.17 | F* | 186.4 | 1.37 | F* | 248.9 | 1.51 | F* | 248.9 | 1.51 | F* |
| SB Left Lane | 20.6 | 0.84 | C | 285.4 | 1.61 | F* | 259.1 | 1.53 | F* | 259.1 | 1.53 | F* |
| SB Right Lane | 25.0 | 0.90 | D | 319.8 | 1.67 | F* | 277.7 | 1.57 | F* | 277.7 | 1.57 | F* |
| Overall | 58.9 | - | F | 344.1 | - | F | 339.1 | - | F | 339.1 | - | F |
| 4. Maul Veterans Highway & Mehamaha Loop South | | | | | | | | | | | | |
| WB Left Lane | 50.4 | 0.50 | F | 537.3 | 2.01 | F* | 585.3 | 2.14 | F* | 585.3 | 2.14 | F* |
| WB Right Lane | 28.1 | 0.24 | D | 99.9 | 0.83 | F | 58.0 | 0.69 | F | 58.0 | 0.69 | F |
| NB Left Lane | 37.8 | 0.97 | E | 434.5 | 1.94 | F* | 50.5 | 1.02 | F* | 50.5 | 1.02 | F* |
| NB Right Lane | 52.7 | 1.04 | F* | 3.9 | 0.14 | A | 69.7 | 1.09 | F* | 69.7 | 1.09 | F* |
| SB Left Lane | 15.1 | 0.76 | C | 810.0 | 2.77 | F* | 123.4 | 1.22 | F* | 123.4 | 1.22 | F* |
| SB Right Lane | 17.1 | 0.81 | C | 3.3 | 0.00 | A | 146.2 | 1.28 | F* | 146.2 | 1.28 | F* |
| Overall | 33.0 | - | D | 604.7 | - | F | 124.2 | - | F | 124.2 | - | F |

* Denotes overcapacity condition, v/c ≥ 1.0

APPENDIX I-1

**PHASE I ENVIRONMENTAL SITE ASSESSMENT,
2017**

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Phase I Environmental Site Assessment
 TMK (2) 3-8-8; Parcels 8, 34, 35, and 36 (portion) January 2017
 ETC Project No. 16-1017

**PHASE I
 ENVIRONMENTAL SITE ASSESSMENT**

DHHL Leased Lands
 Portions of HC&S Fields 821, 912, 916, and 917
 Puunene, Maui, Hawaii
 TMK (2) 3-8-8; Parcels 8, 34, 35, 36 (portion)

Prepared For:
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 Through its division
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ETC Project No. 16-1017
 January 2017

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1.0 EXECUTIVE SUMMARY

This report presents the results of a Phase I Environmental Site Assessment (ESA) performed by EnviroServices & Training Center, LLC (ETC) in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E1527-13. This Phase I ESA was completed for Alexander & Baldwin, LLC through its division Hawaiian Commercial & Sugar Company (Client) for the State of Hawaii, Department of Hawaiian Home Lands (DHHL) Lease Lands, identified as Tax Map Key (TMK) identification numbers (2) 3-8-8: Parcels 8, 34, 35, and 36 (portion). The property corresponds to portions of HC&S Field Nos. 821, 912, 916, and 917, located in Puunene, Maui, Hawaii, herein referred to as the Subject Property. Review of tax records indicated that the Subject Property parcels are currently owned by DHHL.

The Subject Property consists of two non-contiguous land areas. The east area consists of 6.9-acre land parcel 8, 97.4-acre land parcel 35, and a portion (40 acres) of 80-acre land parcel 36 located within HC&S Field 912. The west area consists of a 646-acre land parcel 34 located within HC&S Fields 821, 916, and 917. Parcels 8, 35 and 36 currently consist of former sugarcane fields and two concrete bunker structures. Parcel 34 consists of sugarcane fields and eighteen (18) concrete bunker structures. All subject parcels are currently occupied by HC&S under Right-of-Entry Permits (i.e. leases) for sugarcane cultivation.

Visual observation for the use and/or storage of hazardous materials and hazardous waste was performed on September 19, 2016. Stockpiles of concrete, rock, asphalt, and scrap metal were observed on the Subject Property. While no petroleum products or hazardous substances were observed from the visible surface areas of these piles; the interior areas of the piles were not visible. The quantity and size of these piles made it infeasible to adequately and fully characterize their potential environmental impact. As such, the unknown contents of these piles are considered a data gap. Based on interview findings the piles may have been created prior to 1969 and are suspected to contain demolition materials from various structures at the former NAS Puunene. While the contents of these piles are unknown; site reconnaissance findings and information provided by HC&S do not indicate the presence of significant quantities of hazardous substances or petroleum projects. Based on these findings, this data gap is not considered significant.

The Subject Property was identified as a LUST, UST, and FUDS site by the contracted database. Review indicated that the Subject Property is located on a portion of the *Former Puunene Navy Airport*, which is identified as a LUST/UST facility. ETC requested and reviewed the *Former Puunene Navy Airport (Facility ID 9-503623)* LUST facility file at the DOH SHWB. File review indicated that a total of nine (9) USTs were closed in 2000. All nine (9) USTs were situated east and north of the Subject Property across Mokuale Highway. Site 1 consisted of three (3) 50,000-gallon aviation fuel USTs, Site 2 consisted of four (4) 25,000-gallon aviation fuel USTs, and Site 3 consisted of two (2) 50,000-gallon aviation fuel USTs. A release was found during closure activities and subsequent release response activities were completed including the over excavation and approximately 15-cubic yards of petroleum contaminated soils. Following aeration and confirmation sampling, the soils were utilized as an excavation backfill at the facility. As a

result, the DOH issued the facility a letter dated May 1, 2001 indicating that 'no further action' was required in response to the release. Based on these findings, the UST release associated with the *Former Puunene Navy Airprt* LUST facility is not considered a REC for the Subject Property.

In addition to the LUST findings, document review and interview findings indicate that four (4) additional aviation fuel USTs/ASTs may have been located on the southwest portion of the Parcel 35. Specifically, in a 1955 map of the NAS Puunene, four (4) circular structures labeled as 'Gasoline Storage - Aviation' was observed. The capacity and status of the suspect USTs are unknown; and no evidence of the suspect USTs were noted during ETC's site reconnaissance activities. In addition, the suspect location of these tanks has been used for sugarcane cultivation for over 30 years. ETC could not confirm or disconfirm the presence of these suspect USTs. Based on these findings, ETC cannot dismiss the possibility that residual contamination associated with the suspect USTs may be present on the Subject Property. As such, the four (4) suspect USTs identified on the southwest portion of Parcel 35 are considered RECs for the Subject Property.

The Subject Property was identified to have been part of the former *Maui Airport Military Reservation* FUDS site, also known as Naval Air Station (NAS) Puunene. File review indicated that a transformer release site and a former landfill were located on the NAS Puunene. Review indicated that both the transformer release site and former landfill are located north of Parcel 34. The transformer release site was cleaned up including the removal and disposal of approximately 633-cubic yards of PCB-contaminated soil and concrete debris. The release site was subsequently backfilled and restored. As a result, the DOH HER Office issued the facility a letter indicating that no further action (i.e. No Department of Defense Action Indicated) was required for the site. File review indicated that the *Maui Airport Landfill* reportedly consisted of a 20-acre dump site that was believed to contain the remains of aircraft and other equipment that were deemed surplus for military purposes. Environmental investigations were conducted on the former *Maui Airport Landfill* site which included both environmental investigations (i.e. soil and groundwater sampling and analyses) and non-environmental investigations (i.e. exploratory trenching). Significant investigative findings indicated the presence of landfill debris; and elevated concentrations of arsenic, cadmium, lead, and PCBs in the soil. A feasibility study determined that surface capping with institutional controls and natural attenuation with institutional controls were determined to be two highest ranking remedial alternatives. Permanent closure of the landfill appears to be ongoing; however, based on the analytical findings for the former *Maui Airport Landfill*, ETC believes this facility does not pose a reasonable risk of impacting the Subject Property.

In addition to the Subject Property findings, the contracted database search identified one (1) UST site and one (1) Orphan site within the specified radii. Based on these findings, ETC requested and reviewed select facility files from the Hawaii Department of Health. Database and file review findings indicated that none of these facilities were considered a REC for the Subject Property.

Interview findings indicate that pre-harvest burning of sugarcane has been conducted on the Subject Property as part of the sugarcane cultivation operations. Note that the primary concern regarding sugarcane burning is the airborne particulate matter. As such, the former sugarcane burning is not considered to be a REC for the Subject Property.

The Subject Property has been used for commercial sugarcane cultivation since at least 1910. Activities commonly associated with commercial sugar cultivation include the use and application of pesticides. As described in Section 9 of the DOH HEER Office's November 2009 *Interim Final Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan* (HEER TGM), with the exception of arsenic, residual pesticides in former sugarcane fields are rarely detected above levels of potential concern. In addition, data gathered by the DOH over the past ten years indicate that dioxins in former sugarcane fields do not pose a significant health risk (DOH, 2009). Review of the DOH HEER Office's *Summary of Pesticide and Dioxin Contamination Associated with Former Sugarcane Operations* indicated that elevated concentrations were not reported in the surface soils of sugarcane field(s) associated with the nearby Puunene Sugar Mill (DOH, 2011). No pesticide mixing sites are known to have been operated on the Subject Property. Although other contaminants associated with commercial sugarcane cultivation were not evaluated, based on these findings, the former agricultural usage of the Subject Property is considered a *de minimis* condition.

In summary, ETC performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-13 on the Subject Property. This assessment has revealed no evidence of RECs in connection with the Subject Property except for the following:

- The potential presence of residual contamination associated with the four (4) suspect aviation fuel USTs is considered a REC for the Subject Property.

2.0 INTRODUCTION

EnviroServices & Training Center, LLC (ETC) was contracted by Alexander & Baldwin, Inc. through its division Hawaiian Commercial & Sugar Company (Client) to complete a Phase I Environmental Site Assessment (ESA) for the DHHH Lease Lands, identified as Tax Map Key (TMK) identification numbers (2) 3-8-8: Parcels 8, 34, 35, and 36 (portion). The property corresponds to portions of HC&S Field Nos. 821, 912, 916, and 917 located in Puunene, Maui, Hawaii, herein referred to as the Subject Property.

This Phase I ESA was performed in accordance with the ASTM International Standard E1527-13 entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (referred to herein as the ASTM Practice). The ASTM Practice is intended for use by parties who wish to assess the environmental condition of commercial real estate with respect to contaminants within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and petroleum products. As such, the ASTM Practice was designed to satisfy "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" as defined in 42 United States Code (U.S.C.) §9601(35)(B).

2.1 Background

Under CERCLA, persons may be held liable for cleaning up hazardous substances at properties that they either currently own or operate, or owned or operated at the time of disposal. Strict liability in the context of CERCLA means that a potentially responsible party may be liable for environmental contamination based solely on property ownership and without regard to fault or negligence.

In 1986, the Superfund Amendments and Reauthorization Act (SARA) amended CERCLA by creating an "innocent landowner" defense to CERCLA liability for those persons who could successfully demonstrate, among other requirements, that they "did not know and had no reason to know" prior to purchasing the property that any hazardous substance that is the subject of a release or threatened release was disposed of on, in, or at the property. Such persons, to demonstrate that they had "no reason to know" must have undertaken, prior to, or on the date of acquisition of the property, "all appropriate inquiries" into the previous ownership and uses of the property consistent with good commercial or customary standards and practices.

The Small Business Liability Relief and Brownfields Revitalization Act (referred to as "the Brownfields Amendments") was enacted in January 2002 to amend CERCLA. These amendments included providing funds to assess and clean up brownfields sites, clarifying CERCLA liability provisions for certain landowners, and providing funding to enhance state and tribal cleanup programs.

Subtitle B of Title II of the Brownfields Amendments revised CERCLA, clarifying the requirements necessary to establish the innocent landowner defense. The Brownfields Amendments also added protections from CERCLA liability for “bona fide prospective purchasers” and “contiguous property owners” who meet certain statutory requirements. Each of the CERCLA liability provisions for innocent landowners, bona fide prospective purchasers, and contiguous property owners (referred to collectively as “landowner liability protections,” or LLPs) requires that, among other requirements, persons claiming the liability protections conduct all appropriate inquiries into prior ownership and use of a property prior to or on the date a person acquires a property.

A key provision of the Brownfields Amendments was to finalize regulations setting federal standards for the conduct of all appropriate inquiries. Such federal standards were promulgated in the *Standards and Practices for All Appropriate Inquiries, Final Rule, 40 CFR Part 312*, referred to as the AAI Final Rule.

Section 312.11 of the AAI Final Rule indicates that the ASTM International Standard E1527-05/13, entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, may be used to comply with the requirements set forth in Sections 312.23 through 312.31 of the AAI Final Rule. Therefore, this Phase I ESA was performed in conformance with the ASTM International Standard E1527-13.

2.2 Purpose

This Phase I ESA was conducted to meet requirement of the Right-of-Entry Permits to “conduct a Level One (1) Hazardous Waste Evaluation” prior to termination of the permits.

The purpose and goal of this Phase I ESA is to conduct an inquiry designed to identify recognized environmental conditions in connection with the Subject Property, to the extent feasible pursuant to the process described in the ASTM Practice. The term recognized environmental condition (REC) is defined as:

“the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative or a release to the environment; (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not recognized environmental conditions.”

As defined in the ASTM Practice, for the purposes of this Phase I ESA, the term “migrate” or “migration” refers to the movement of hazardous substances or petroleum products in any form, including, for example, solid and liquid at the surface or subsurface, and vapor in the subsurface (ASTM, 2013).

2.3 Scope of Services

The scope of work included the following:

- Development of a site description for the Subject Property including site background, physical characteristics and historical site conditions;
- Evaluation of user provided information including but not limited to environmental liens, activity and use limitations, specialized knowledge, valuation reduction of environmental issues, and other information pertaining to the property;
- Evaluation of information in programs such as NPL, CERCLIS, FINDS, ERNS, RCRA notifiers, and other governmental information systems within specific radii of the property to identify sites that would have the potential to impact the property;
- Conduct a visual site reconnaissance from publicly accessible areas detailing the current property and adjacent property conditions;
- Visual evaluation of the adjacent properties to identify high-risk neighbors and the potential for a chemical to migrate onto the property; and
- Conduct interviews with owner(s), site manager(s), occupant(s), local government official(s), and/or other individuals with past and prior use history of the property, if available;
- Complete a written report detailing the Phase I ESA findings, conclusions; and
- Documentation of supportive information including maps, site photographs, regulatory records, and interview(s).

2.4 Significant Assumptions

This Phase I ESA is limited by the availability of information at the time of the assessment. Interviews were conducted and interviewee’s responses were assumed to be answered in good faith, to the extent of his/her actual knowledge. In addition, since no hydrogeological data was available for the Subject Property, the groundwater was assumed to flow in the direction of the surface topography of the Subject Property and surrounding areas.

2.5 Conditions and Limitations

ETC has completed this Phase I ESA for the Subject Property in accordance with the scope and limitations of ASTM Practice E1527-13. ETC’s findings and conclusions contained herein are professional opinions based solely upon visual observations, interviews, and interpretation of the historical information and documents available to ETC at the time this Phase I ESA was conducted. Opinions stated in this report do not apply to changes that may have occurred after the services were performed.

ETC has performed specified services for this project with the degree of care, skill and diligence ordinarily exercised by professional consultants performing the same or similar services. No other warranty, guarantee, or representation, expressed or implied, is included or intended; unless otherwise specifically agreed to in writing by both ETC and ETC's Client.

2.6 User Reliance

This report is intended for the sole use of ETC's Client, exclusively for the project site indicated. ETC's Client may use and release this report, including making and retaining copies, provided such use is limited to the particular site and project for which this report is provided. However, the services performed may not be appropriate for satisfying the needs of other users. Release of this report to third-parties will be at the sole risk of Client and/or said user, and ETC shall not be liable for any claims or damages resulting from or connected with such release or any third party's use or reuse of this report.

3.0 SITE DESCRIPTION

3.1 Location and Description

The Subject Property consists of 6.9-acre land parcel 8, 97.4-acre land parcel 35, and a portion (40 acres) of 80-acre land parcel 36 located within Hawaiian Commercial and Sugar (HC&S) Field 912; and a 646-acre land parcel 34 located within HC&S Fields 821, 916, and 917 in Puunene, Maui, Hawaii on the island of Maui. Parcels 8, 35, and 36 are located along and west of Mokulele Highway, and Parcel 34 is located along and east of Mokulele Highway. A map of the Subject Property is included as Appendix I. No potable water sources or sewer system infrastructures were observed on the Subject Property.

3.2 Physical Setting

Groundcover at the Subject Property generally consists of bare soil (i.e. previously sugar cane fields) with a limited asphalt paved area located on the south portion of Parcel 8. Parcel 35 included two concrete structures (i.e. bunkers); and Parcel 34 included nineteen concrete structures (i.e. bunkers). Except for the gulch/ditch which traverses Parcel 34 between HC&S Fields 916 and 917, the Subject Property and Surrounding areas exhibited no discernible gradient. A site plan is included as Appendix I, Figure 2. Photographic documentation of ETC's site reconnaissance is included in Appendix II.

3.2.1 Site Topography

Topographic map coverage of the Subject Property and surrounding areas is provided by the United States Geological Survey Island of Maui, Hawaii 7.5-minute Series, Maalaea and Puu O Kali Quadrangles, 2013. The elevation of the Subject Property is approximately 390- to 120-feet above mean sea level (msl).

3.2.2 Regional Geology

The island of Maui is the second largest of the Hawaiian Islands. Maui consists of two shield volcanoes with a connecting isthmus. The volcanic rocks of the West Maui Mountains (West Maui Volcano) are divided into three series. The oldest is the Wailuku Volcanic Series, followed by the Honolua and Lahaina Volcanic Series. The Wailuku Series built the major shield volcano comprised of basaltic lava flows and associated pyroclastic deposits. The Lahaina Series then covered the western slopes of the West Maui Volcano.

The Haleakala Volcano last erupted around 1790 and is presently dormant. The shield of the volcano is composed of a and pahoehoe lava flows of theolite, theoleitic olivine basalt, and oceanite known as the Honomanu Volcano Series. The Kula Volcanic Series overlies the Honomanu Series and is comprised of hawaiite, alkalic olivine basalt, and ankaramite. Lava flows from the Haleakala volcano formed the Maui Isthmus and are made up of permeable basalt and erosional deposits (Macdonald, et al., 1983).

3.2.3 Site Geology

The soil on the Subject Property is mapped as a variety of soil types: Parcel 008, 035, and 036 (Field 912) of the Subject Property is mapped as Pulehu silt loam, 0 to 3 percent slopes (PpA), Pulehu cobbly silt loam, 0 to 3 percent slopes (PrA), and Ewa silty clay loam, 0 to 3 percent slopes (EaA). Parcel 034 (Fields 916, 917, and 821) of the Subject Property are mapped as Pulehu silt loam, 0 to 3 percent slopes (PpA), Pulehu cobbly silt loam, 0 to 3 percent slopes (PrA), Pulehu clay loam, 0 to 3 percent slopes (PsA), Alae sandy loam, 3 to 7 percent slopes (AaB), Alae cobbly sandy loam, 0 to 3 percent slopes (AcA), and 3 to 7 percent slopes (AcB), Waiakoa silty clay loam, 3 to 7 percent slopes (WeB), Waiakoa very stony silt clay loam, 3 to 7 percent slopes (WgB), Waiakoa extremely stony silty clay loam, 3 to 7 percent slopes (WhB), and 3 to 25 percent slopes, eroded (WID2), and Ewa silty clay loam, 0 to 3 percent slopes (EaA).

The Pulehu series consists of well-drained soils on alluvial fans and stream terraces and in basins on the islands of Lanai, Maui, Molokai, and Oahu. The annual rainfall for the Pulehu series amounts to 10- to 35- inches. The natural vegetation consists of bermudagrass, bristly foxtail, fingergrass, kiawe, klu, lantana, koa haole, and sandbur. These soils are generally used for sugarcane, truck crops, pasture, homesites, and wildlife habitat. Within the Pulehu series, the Subject Property is mapped as PsA, PpA, and PrA. In a representative profile, PsA surface layer is dark brown clay loam about 21 inches thick. The subsoil consists of dark brown, dark grayish-brown, and brown massive single grain, stratified loam. The soil is neutral in the surface layer and neutral to mildly alkaline below the surface layer. PsA, PpA is similar to PsA; however PpA is identified by its silt loam texture. PrA is also similar to PsA; however PrA is identified by its silt loam texture and cobblestone surface. In a few places, cobblestones are present throughout the profile (USDA 1972).

The Alae series consists of excessively drained soils on alluvial fans on the island of Maui. These soils developed in volcanic ash and recent alluvium derived from basic igneous rock. The annual rainfall for the Alae series amounts to 12- to 20- inches. The natural vegetation is feather fingergrass, kiawe, and uhaloa. These soils are generally used for sugarcane and pasture. Small areas are used for truck crops. Within the Alae series, the Subject Property is mapped as AcA, AcB, and AaB. In a representative profile, AcA surface layer is approximately 7 inches thick, very dark grayish-brown, comprised of cobbly sand loam that has angular structure. The substratum reaches a depth of 48 inches or more and is very dark grayish-brown, very dark gray, and consists of coarse to very coarse sand. The soil is neutral to mildly alkaline in the surface layer and mildly to moderately alkaline in the substratum. AcB is similar to AcA; however, AcB consist of steeper slopes. In these soils, the runoff is slow and the erosion hazard is slight AaB is also similar to AcA; however, AaB is identified by the absence of cobblestones on its surface. Within the surface layer, these soils contain many pebble-size rock fragments (USDA 1972).

The Waiakoa series consists of well-drained soils on uplands on the island of Maui. These soils developed in material weathered from basic igneous rock. The upper part of the profile is influenced by volcanic ash. The annual rainfall for the Waiakoa series amounts to 12- to 20- inches. The natural vegetation consists of buffgrass, feather fingergrass, ilima, kiawe, uhaloa, and zinna. These soils are used for sugarcane, pasture, homesites, and wildlife habitat. Within the Waiakoa series, the Subject Property is mapped as WgB, WeB, WhB, and WID2. In a representative profile, WgB surface layer is dark reddish-brown silty clay loam about 2 inches thick. The subsoil in about 23 inches thick and consists of dark reddish-brown and very dark grayish-brown silty clay loam that has prismatic structure or is massive. The substratum is very dark brown silty clay loam and hard, basic igneous rock. The soil is neutral in the surface layer and slightly acid to neutral in the subsoil. WeB is similar to WgB; however, WeB differs in that it is comprised of very stony silty clay loam texture. WhB is also similar to WgB; however, WhB is identified by containing stones that cover 3 to 15 percent of the surface. Additionally, WID2 is similar to WgB; however, WID2 soils are eroded and contain stones that cover 3 to 15 percent of the surface. In most areas, about 50 percent of the surface layer has been removed by erosion (USDA 1972).

The Ewa series consists of well-drained soils in basins on alluvial fans on the islands of Maui and Oahu. These soils developed in alluvium, derived from basic igneous rock. The annual rainfall for the Ewa series amounts to 10- to 30- inches. The natural vegetation consists of fingergrass, kiawe, koa haole, klu, and uhaloa. These soils are used for sugarcane and homesites. In a representative profile, EaA surface layer is dark reddish-brown silty clay loam about 18 inches thick. The subsoil, about 42 inches thick, is dark reddish-brown and dark-red silty clay loam that has subangular block structure. The substratum is coral limestone, sand, or gravelly alluvium. The soil is neutral in the surface layer and subsoil (USDA 1972).

3.2.4 Regional Hydrogeology

The primary drinking water in the Hawaiian Islands is drawn from basal groundwater. Basal groundwater is formed by rainwater percolating down through the residual soils and permeable volcanic rock. The portion of the island situated below sea level is saturated with ocean salt water, except within rift zones of the volcanoes where fresh water forms a basal lens called the "Chyben-Hertzberg" lens. A zone of transition between the fresh groundwater and the ocean salt water occurs due to the constant movement of the interface as a result of tidal fluctuations, seasonal fluctuations in recharge and discharge and aquifer development (Macdonald, et al., 1983).

Downward percolation of rainwater may be stopped by impermeable layers such as dense lava flows, alluvial clay layers and volcanic ash, which can cause the formation of a perched or high level aquifer that is not in contact with salt water. Recharge of the aquifer occurs in areas of high rainfall, which are the interior mountainous areas. The groundwater flows from the recharge areas to the areas of discharge along the shoreline. Frictional resistance to groundwater flow causes it to pile up within the island until it attains sufficient hydraulic head to overcome friction. Thus, basal groundwater tends to slope toward the shoreline.

3.2.5 Site Hydrogeology

The Subject Property is underlain by numerous aquifer systems. Parcels 008, 035, and 036 (Field 912) are underlain by two aquifer types within the Kahului Aquifer System, which are part of the Central Aquifer Sector on the island of Maui; and are classified by Mink and Lau, 1990, with the system identification number 60301116 (12211)/60301111 (12212). Parcel 034 (Field 916, 917, and 821) is underlain by four aquifer types within the Kahului Aquifer System and four aquifer types within the Paia Aquifer System. These aquifer types are classified with the system identification numbers 60301116 (12211)/60301111 (12212), 60301214 (33221)/60301111 (12212), 60302116 (33321)/60302111 (33321), and 60302214 (33221)/60302111 (11112) (Mink and Lau, 1990).

Parcels 008, 035, and 036; and the west portion of Parcel 34 are underlain by the Kahului Aquifer System, ID No. 60301116 (12211), which is described as an unconfined basal aquifer in sedimentary lithology. The groundwater within this aquifer is described as being a current used, ecologically important, low salinity (200 to 1000-mg/l Cl-) water source. The groundwater is also described as irreplaceable with a high vulnerability to contamination. The area is further underlain by a secondary aquifer of the same system (60301111 [12212]). This aquifer is an unconfined, basal aquifer in flank formation. The groundwater in this aquifer is described as a currently used, ecologically important water source, containing low salinity (200 to 1000-mg/l Cl-). The groundwater is described as irreplaceable with a moderate vulnerability to contamination (Mink and Lau, 1990).

The northwest portion of Parcel 034 is underlain by the Kahului Aquifer System, ID No. 60301214 (33221); and is described as an unconfined high level aquifer, perched on an impermeable layer. The groundwater in this aquifer is described as a low salinity (200 to 1000-mg/l Cl-), non-drinking water source. The groundwater is also described as irreplaceable with high vulnerability to contamination. This area is further underlain by a secondary aquifer of the same system, ID No.60301111 (12212). This aquifer is an unconfined basal aquifer in flank formations. The groundwater is described as a currently used, ecologically important water source, containing low salinity (200 to 1000-mg/l Cl-). The groundwater is also described as irreplaceable with a moderate vulnerability to contamination (Mink and Lau, 1990).

The southwest portion of Parcel 034 is underlain by the Paia Aquifer System, ID No. 60302116 (33321); and is described as an unconfined basal aquifer in sedimentary lithology. The groundwater in this aquifer is described as being a non-drinking water source, containing moderate salinity (1000 to 5000-mg/l Cl-). The groundwater is also described as replaceable with a high vulnerability to contamination. This area is further underlain by a secondary aquifer of the same system, ID No.60302111 (33321). This aquifer is an unconfined basal aquifer in flank formations. The groundwater is not considered to be a drinking water source or ecologically important. The groundwater is also described as having moderate salinity (1000 to 5000-mg/l Cl-) and no potential use. The groundwater is considered to be replaceable with a high vulnerability to contamination (Mink and Lau, 1990).

The northeast portion of Parcel 034 is underlain by a second set of aquifers within the Paia Aquifer System. The upper aquifer, ID Nos. 60302214 (33221) is described as an unconfined, basal aquifer situated on a perched impermeable layer. The aquifer is described as a low salinity (200 to 1000-mg/l Cl-), non-drinking water source. The groundwater is also described as replaceable with a high vulnerability to contamination. This area is further underlain by a secondary aquifer of the same system, ID No. 60302111 (11112). This aquifer is an unconfined basal aquifer in flank formations. The aquifer is described as a currently used drinking water source with fresh salinity (<250-mg/l Cl-). The groundwater is also described as irreplaceable with moderate vulnerability to contamination (Mink and Lau, 1990).

3.2.6 Nearest Surface Water Bodies

The nearest surface water body to Parcels 8, 35, and 36 (Field 912) is the Waikapu Stream located approximately 0.5-miles west of Field 912 and the HC&S Reservoir 92 located approximately 0.7-miles north Field 912. There is an apparent ditch/gulch which traverses east-west across Parcel 34. The nearest surface water body to Parcel 34 (Fields 821, 916, and 917) is the Kealia Pond located approximately 900-feet west of the Parcel 34, the Pacific Ocean located 0.42 miles southwest of Parcel 34, and the HC&S Reservoir 83 located approximately 0.64-miles southeast of Parcel 34.

3.3 Current Use of the Subject Property

The Subject Property is currently not actively used; and was most recently used for the commercial cultivation of sugar by HC&S. Parcel 8 consists of former sugarcane fields and a limited area of asphalt pavement. Parcel 34 consists of approximately nineteen (19) concrete structures, several concrete/rock piles, and former sugarcane fields. Parcel 35 consists of two concrete structures and former sugarcane fields. Parcel 36 consists of former sugarcane fields.

3.4 Current Use of the Adjoining Properties

ETC visually inspected the neighboring properties and their operations from the Subject Property and publicly accessible areas. The north portion of the Subject Property (Parcels 8, 35 and 36) is bordered by former sugar cane and other agricultural (seed corn) fields to the north, west and south; and Mokuale Highway to the east. The south portion of the Subject Property (Parcel 34) is bordered by the Maui Raceway Park and former sugarcane fields to the north, Mokuale Highway to west, and former sugar cane fields and other agricultural fields (seed corn) to the east and south.

4.0 USER PROVIDED INFORMATION

This section is intended to provide information obtained from the user of this Phase I ESA that will help identify RECs associated with the Subject Property. The information provided does not require the user to have the technical expertise of an environmental professional and are generally not provided by the environmental professional performing the Phase I ESA.

4.1 Required Information

In order to qualify for one of the LLPs offered by the Brownfields Amendments, the user must provide the following information (if available) to the environmental professional. Failure to provide this information could result in a determination that “all appropriate inquiry” is not complete. Mr. Sean O’Keefe, Director, Environmental Affairs, Alexander & Baldwin, Inc. (A&B), provided ETC with the following information. Mr. O’Keefe manages environmental affair for A&B and its subsidiaries, including HC&S (User).

4.1.1 Environmental Liens

The User had no information pertaining to any environmental liens or governmental notifications relating to past or recurrent violations of environmental laws with respect to the Subject Property.

4.1.2 Activity and Use Limitations

The User had no information pertaining to activity and land use limitations filed or recorded in a registry under federal, tribal, state or local law.

4.1.3 Specialized Knowledge

The User acknowledged that they possess specialized knowledge or experience related to the Subject Property. This information is discussed further in Section 7.0.

4.1.4 Valuation Reduction for Environmental Issues

The User indicated that the purpose of the Phase I ESA is for termination of its Right-of-Entry permits (i.e. leases); therefore, valuation reduction for environmental issues pertaining to the Subject Property is not applicable.

4.1.5 Commonly Known or Reasonably Ascertainable Information

The User provided ETC with commonly known and reasonably ascertainable information about the Subject Property that would help the environmental professional to identify conditions indicative of releases or threatened releases. In addition known spills and/or chemical releases, if any, were noted. This information is discussed further in the Section 7.0.

4.1.6 Degree of Obviousness of Potential Contamination

Except for the information provided in Section 7.0, the User had no knowledge of any obvious indicators that point to the presence or likely presence of contamination at the property based on their knowledge and experience related to the Subject Property.

4.2 Other Information Pertaining to the Subject Property

4.2.1 Reason for Performing Phase I ESA

This Phase I ESA was conducted as part of the User’s termination of its Right-of-Entry permits.

4.2.2 Title Records

Title records/documents were not provided by the User. However, ETC conducted a limited land title search, which is documented in Section 5.3.3.

4.2.3 Owner, Property Manager, and Occupant Information

Subject Property Manager/Occupant: Mr. Sean O’Keefe, Director,
Environmental Affairs
Alexander & Baldwin, Inc.
Shelly Carreira
Land Agent, Land Management Division
Department of Hawaiian Home Lands
Ph: 808-620-9459

Subject Property Owner:

5.0 RECORDS REVIEW

5.1 Standard Environmental Record Sources

To obtain information concerning recognized environmental conditions at or near the Subject Property, ETC contracted Environmental Data Resources, Inc. (EDR) to conduct an environmental database search. EDR is a company that specializes in the review of public regulatory environmental databases. The regulatory agency report provided (Appendix IV) is based on an evaluation of the data collected and compiled by a contracted data research company. The report is a radius search report, which focuses on both the Subject Property and adjacent properties that may impact the Subject Property. Adjacent properties listed in governmental environmental records are identified within a specific search radius (Table 1). The search radius varies depending on the particular record being researched. The search is designed to meet the requirements of the current industry approach as described in ASTM Practice E1527-13. The information provided is assumed to be correct and complete, unless noted otherwise.

Table 1: ASTM Practice Environmental Record Sources and Recommended Search Distances

| Environmental Database Sources | ASTM Practice Search Distances (miles) |
|--|---|
| Federal NPL Site List | 1.0 |
| Federal Delisted NPL Sites | 0.5 |
| Federal CERCLIS List | 0.5 |
| Federal CERCLIS NFRAP Site List | 0.5 |
| Federal RCRA CORRACTS Facilities List | 1.0 |
| Federal RCRA non-CORRACTS TSD Facilities List | 0.5 |
| Federal RCRA Generators List | Subject Property and adjoining properties |
| Federal Institutional Control/Engineering Control Registries | Subject Property only |
| Federal ERNS List | Subject Property only |
| State-Equivalent NPL | 1.0 |
| State-Equivalent CERCLIS | 0.5 |
| State Landfill and/or Solid Waste Disposal Site Lists | 0.5 |
| State Leaking LUST List | 0.5 |
| State Registered LUST List | Subject Property and adjoining properties |
| State Institutional Control Registry | Subject Property only |
| State Voluntary Cleanup/Response (VCP/VRP) Sites | 0.5 |
| State Brownfield Sites | 0.5 |

5.1.1 Federal NPL and Delisted NPL

The National Priorities List (NPL) is the Environmental Protection Agency's (EPA) database of uncontrolled or abandoned hazardous waste properties, which are considered to pose an immediate threat to human health and the environment. These properties are identified for priority remedial response actions under the Superfund Program. The Subject Property was not identified as a NPL site or a delisted NPL site. The database did not identify any delisted NPL sites within a 0.5-mile radius of the Subject Property. In addition, the database did not identify any NPL sites within a 1-mile radius of the Subject Property.

5.1.2 Federal CERCLIS and CERCLIS NFRAP

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database contains information on various aspects of potentially uncontrolled or abandoned hazardous waste properties from initial screening and assessment phases to listing on the NPL. The Subject Property was not identified as an active CERCLIS site or a CERCLIS No Further Remedial Action Planned (NFRAP) site. The database did not identify any active CERCLIS facilities or CERCLIS NFRAP facilities within a 0.5-mile radius of the Subject Property.

5.1.3 Federal RCRA CORRACTS

The RCRA Corrective Action Sites (CORRACTS) database contains Resource Conservation Recovery Information System (RCRIS) sites with reported corrective action. The Subject Property was not identified as a CORRACTS facility. The database search did not identify any CORRACTS site within a 1-mile radius of the Subject Property.

5.1.4 Federal RCRA (non-CORRACTS) TSD Facilities

The EPA's RCRA program identifies and tracks hazardous waste from the point of generation to the point of final disposal. The RCRA Treatment, Storage or Disposal (TSD) facility database compiles those reporting facilities that treat, store, or dispose of hazardous waste. The Subject Property was not identified as a RCRA TSD facility. The database search did not identify any RCRA TSD facilities within a 0.5-mile radius of the Subject Property.

5.1.5 Federal RCRA Generator

The RCRA Generator database is a compilation by EPA's RCRIS of regulated facilities that generate hazardous waste. The Subject Property was not identified as a RCRA Generator. The database did not identify any RCRA generators located on potential adjoining properties with respect to the Subject Property.

5.1.6 Federal Institutional Control/Engineering Control Registries

Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health. Institutional Controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on a site. The EPA Institutional Control and Engineering Control registry maintains a listing of sites with Institutional or Engineering Controls in place. The Subject Property was not identified as having institutional or engineering controls in place.

5.1.7 Federal ERNS

The Emergency Response Notification System (ERNS) tracks the initial notification of reported oil and hazardous material spills. The database contains information regarding the discharger, release date, material, amount released, incident location and release action taken. The Subject Property was not identified as an ERNS facility.

5.1.8 State Equivalent NPL and CERCLIS

The CERCLIS List is a compilation of known or suspected uncontrolled or abandoned hazardous waste sites. These sites either have been investigated or are currently under investigation by the EPA for the release, or threatened release, of hazardous substances. Once a site is placed in CERCLIS, it may be subjected to several levels of review and evaluation and ultimately placed on the National Priorities List. The State of Hawaii does not have a formal "State Superfund" program; therefore, the State Hazardous Waste Sites (SHWS) are the State of Hawaii's equivalent to the federal EPA's CERCLIS database. Additionally, because this information is acquired from the Hawaii Department of Health (DOH) Hazard Evaluation and Emergency Response (HEER) Office, these sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup that use state funds (state equivalent superfund) are identified along with sites where cleanup is paid for by the potentially responsible parties. The Subject Property was not identified as a SHWS. The database search did not identify any SHWS facilities within a 1-mile radius of the Subject Property.

5.1.9 State Landfill and/or Solid Waste Disposal

The State of Hawaii has records of all facilities that have received a solid waste management permit, including solid waste landfills, transfer stations, and incinerators. The Subject Property was not identified as a Solid Waste Facility/Landfill (SWF/LF) facility. The database search did not identify any SWF/LF facilities within a 0.5-mile radius of the Subject Property.

5.1.10 State Leaking Underground Storage Tanks

The DOH Underground Storage Tank (UST) Program maintains a listing of all reported leaks and releases from USTs. The Subject Property was identified as a leaking underground storage tank (LUST) facility. The database search did not identify any LUST facilities within a 0.5-mile radius of the Subject Property.

5.1.11 State Registered Underground Storage Tanks

The DOH Underground Storage Tank (UST) Program registration system tracks known and registered UST systems. The Subject Property was identified as a UST facility. In addition, the database search identified one (1) UST facility located on potential adjoining properties with respect to the Subject Property.

5.1.12 State Institutional Control Registry

Institutional Controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on a site. The State Institutional Control listing includes Voluntary Response Program and Brownfields sites with institutional controls in place. The Subject Property was not identified as having institutional controls in place.

5.1.13 State Voluntary Cleanup/Response Sites

The Hawaii Voluntary Response Program (VRP) was created on July 7, 1997 by amendments made to Hawaii's Environmental Response Law (ERL). The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties. The VRP facilitates the cleanup process and, in certain situations, provides relief from the strict liability provisions of the Federal CERCLA and Hawaii's ERL. The Subject Property was not identified as a VRP site. The database search did not identify any VRP sites located within a 0.5-mile radius of the Subject Property.

5.1.14 State Brownfields

A Brownfields site is land which the expansion, redevelopment, or reuse of may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant. The Subject Property was not identified as a Brownfields site. The database search did not identify any Brownfields sites located within a 0.5-mile radius of the Subject Property.

5.1.15 Unmappable/Orphan Sites

One (1) unmappable site was identified in the Orphan Summary of the EDR Report. Unmappable sites are not plotted due to poor or inadequate address information. Due to the inaccurate or incomplete information provided by the respective agency, these sites cannot be plotted with confidence. Review of the addresses and site names indicated that the orphan site is not located on potential adjoining property.

5.2 Additional Environmental Record Sources

The EDR database also included a number of other regulatory databases that are not specified by the ASTM Practice. The Subject Property was identified to be a potential Formerly Used Defense Site (FUDS). The EDR database did not identify the Subject Property in the following databases:

- ODI – Open Dump Inventory
- DEBRIS REGION 9 – Torres Martinez Reservation Illegal Dump Site Locations
- US CDL – Clandestine Drug Labs
- US HIST CDL – National Clandestine Laboratory Register
- LIENS 2 – CERCLA Line Information
- LUCIS – Land Use Control Information System
- HMRIS – Hazardous Materials Information Reporting System
- DOT OPS – Incident and Accident Data
- CONSENT – Superfund (CERCLA) Consent Decrees
- ROD – Records of Decision
- UMTRA – Uranium Mill Tailings Sites
- TRIS – Toxic Chemical Release Inventory System
- TSCA – Toxic Substances Control Act
- FTTS – FIFRA/TSCA Tracking System
- HIST FTTS – FIFRA/TSCA Tracking System Administrative Cases
- SSTS – Section 7 Tracking Systems
- ICIS – Integrated Compliance Information System
- PADS – PCB Activity Database System
- MLTS – Material Licensing Tracking System
- RADINFO – Radiation Information Database
- RAATS – RCRA Administrative Action Tracking System
- UIC – Underground Injection Wells Listing
- DRYCLEANERS – Permitted Drycleaner Facility Listing
- SCRD DRYCLEANERS – State Coalition for Remediation of Drycleaners
- PCB TRANSFORMER – PCB Transformer Registration Database
- Manufactured Gas Plants – EDR Proprietary Manufactured Gas Plants
- RGH HWS – EDR Recovered Government Archive State Hazardous Waste Sites
- RGH LUST – EDR Recovered Government Archive LUST site

RGA LF – EDR Recovered Government Archive Solid Waste Facilities List

5.3 TIER 1 VAPOR ENCROACHMENT SCREEN

ETC also conducted a Tier 1 Vapor Encroachment Screen (VES) for the Subject Property. The Tier 1 VES was conducted in conformance with the scope and limitations of ASTM Practice E2600-10.

The purpose and goal of this Tier 1 VES is to conduct an inquiry designed to identify whether a vapor encroachment condition exists on the Subject Property. The term vapor encroachment condition (VEC) is defined as the “presence or likely presence of chemical(s) of concern (COC) vapors in the subsurface of the target property caused by the release of vapors from contaminated soil or groundwater or both, either on or near the target property as identified by a Tier 1 or Tier 2 screen.”

To obtain information concerning VECs at or near the Subject Property, ETC contracted EDR to conduct a Vapor Encroachment Screen. The report is a radius search report, which focuses on both the Subject Property and adjacent properties that may impact the Subject Property. The search radius varies depending on the particular record being researched. The search is designed to meet the recommended search radius described in ASTM Practice E2600-10.

Table 3: ASTM Practice E2600-10

| Environmental Database Sources | ASTM Practice Search Distances (miles) COC and Petroleum Hydrocarbon Chemicals of Concern |
|--|---|
| Federal NPL Site List | 1/3 |
| Federal CERCLIS List | 1/3 |
| Federal RCRA CORRACTS Facilities List | 1/3 |
| Federal RCRA non-CORRACTS TSD Facilities List | 1/3 |
| Federal RCRA Generators List | Subject Property only |
| Federal Institutional Control/Engineering Control Registries | Subject Property only |
| Federal ERNS List | Subject Property only |
| State-Equivalent NPL | 1/3 |
| State-Equivalent CERCLIS | 1/3 |
| State Landfill and/or Solid Waste Disposal Site Lists | 1/3 |
| State Leaking LUST List | 1/3 |
| State Registered LUST List | Subject Property only |
| State Institutional Control/Engineering Control Registries | Subject Property only |
| State Voluntary Cleanup/Response (VCP/VRP) Sites | 1/3 |
| State Brownfield Sites | 1/3 |

The Subject Property was not identified by the contracted database on any of environmental databases searched. In addition, the contracted database identified one (1) site within a 1/3-mile radius of the Subject Property. Results the VES are discussed in Section 8.3.3.

5.4 Historical Use Information on the Subject and Adjoining Properties

Historical uses of the Subject Property and adjoining properties were investigated through the review of documentation available from public land records and State of Hawaii archived information. In addition, available aerial photographs, plat maps, Sanborn maps, and building permits were reviewed.

5.4.1 Aerial Photograph Review

Aerial photographs from the EDR Aerial Photo Decade Package were reviewed. In addition, ETC reviewed available historic aerial photographs and maps at Hawaiian Commercial & Sugar Company's map office. A total of six (6) aerial photographs were found that included Parcels 8, 35, and 36; dated 1950, 1954, 1976, 1987, 1992, and 2000. A total of six (6) aerial photographs and maps were found that included Parcel 34; dated 1951, 1954, 1975, 1981, 1986/87, and 2000.

Parcel 8, 35, and 36 (Field No. 912)

In the 1950 aerial photograph, the Field No. 912 appears fully developed with numerous structures. Note that Field 912 appears to part of the former NAS Puunene which appears to extend beyond Field 912 to the north, south and east. The remaining surrounding areas west of Field 912 appear to be used for agricultural purposes.

Field 912 and the surrounding areas were not clearly visible in the 1954 aerial photograph due to poor photo resolution. Although not clearly visible, Field 912 and surrounding areas appear similar to the 1950 aerial photograph.

In the 1976 aerial photograph, except for two structures, all structures previously noted on Field 912 are no longer present; and Field 912 appears to be used for agricultural purposes. Note that a limited number of structures from the former NAS Puunene are depicted in the 1976 aerial photograph. No other significant changes from the 1950 aerial photograph were noted.

In the 1987 aerial photograph, two structures were noted in the south and east portion of Field 912. In addition, Parcel 8 (south portion of Field 912) appeared to be vacant with no visible structures and sparse vegetation. Except for the two observed structures, apparent stockpiles, and sparse vegetation on Parcel 8; Field 912 appeared to be used for agricultural purposes. The surrounding areas appear similar to the 1976 aerial photograph with no significant changes.

In the 1992 and 2000 aerial photographs, the Subject Property and surrounding areas appear similar to the 1987 aerial photograph with no significant changes. In addition, the 2000 aerial photograph appears similar to the current configuration of the Subject Property.

Parcel 34 (Field Nos. 821, 916, and 917)

In the 1951 aerial photograph, the Parcel 34 is only partially depicted. The visible areas of Parcel 34 appear to be partially developed with several structures situated in circular formation. The undeveloped areas appear to be covered with vegetation.

Parcel 34 and the surrounding areas were not clearly visible in the 1954 aerial photograph due to poor photo resolution. Although not clearly visible, Parcel 34 and surrounding areas appear similar to the 1951 aerial photograph.

In the 1975 aerial photograph, the Parcel 34 is only partially depicted. The visible areas of Parcel 34 appear similar to the 1951 aerial photograph with limited changes. Specifically, the undeveloped areas appear to be used for agricultural purposes.

In the 1981 aerial photograph, only Field 821 is depicted. Field 821 appears undeveloped with no visible structures and appears to be used for agricultural purposes. The surrounding areas east of Field 821 also appear undeveloped and used for agricultural purposes.

In the 1986 and 1987 photographs, Parcel 34 appears similar to the 1951 aerial photograph. Specifically, two distinct areas of several structures situated in a circular formation were observed within Fields 916 and 917. In addition, several apparent miscellaneous structures were noted throughout Parcel 34. The surrounding areas were limited to the immediate vicinity of Parcel 34; however, the surrounding areas appeared partially developed with a limited number of structures. In general, the surrounding areas appeared to be used for agricultural purposes. In addition, the apparent south end of the former runway (current Maui Raceway Park) associated with the NAS Puunene was noted along the north border of Parcel 34.

In the 2000 aerial photographs, the Subject Property and surrounding areas appear similar to the 1981 through 1987 aerial photographs with no significant changes. In addition, the 2000 aerial photograph appears similar to the current configuration of the Subject Property.

5.4.2 Fire Insurance Maps

ETC contracted EDR to conduct a search for Sanborn fire insurance maps of the Subject Property. The search indicated that the Subject Property is an Unmapped Property and therefore no Sanborn Map has been produced.

5.4.3 Historical Map Review

ETC reviewed available historic maps at Hawaiian Commercial & Sugar Company's map office. These included various field/plantation maps, contour maps, and facility site maps. Numerous maps (>50) were found that included the Subject Property. These maps were dated from 1910 to 2012.

Parcel 8, 35, and 36 (Field No. 912)

Parcels 8, 35, and 36 (Field 912) are noted to be agricultural fields (labeled as Field M) in the maps dated from 1910 to 1939. In the 1943 through 1963 maps; Field 912 is fully developed and labeled as part of the east adjacent NAS Puunene. Specifically, several structures including but not limited to a theatre, barracks, tennis court, hanger, offices, warehouse, inflammable storage, maintenance shops, etc. are depicted. In addition, four (4) suspect aviation fuel USTs are depicted on the southwest portion of Parcel 35. The surrounding areas west and south of Field 912 appear to be used for agricultural purposes. The north and east adjacent areas appear to part of the NAS

Puunene. Features of note on the east adjacent areas include an apparent aircraft runway, four 100,000-gallon aviation gasoline tanks, and two 100,000-gallon aviation gasoline tanks. In the 1968 map, all previously observed structures are no longer present; and except for two apparent bunker structures, Field 912 appears to be used for agricultural purposes. In addition, the east adjacent area appears to be labeled as the Puunene Airport. Field 912 remained unchanged in the 1969 through 2012 maps with no significant changes.

Parcel 34 (Field Nos. 821, 916, and 917)

Parcels 34 (Fields 821, 916, 917) are noted to be agricultural fields (labeled as Fields Q and R) in the maps dated from 1910 to 1939. In the 1943 through 1963 maps, Parcel 34 is fully developed and labeled as part of the north adjacent NAS Puunene. Specifically, the structures situated in a circular configuration are collectively labeled as Magazine Area C and Magazine Area E. The surrounding areas north of Parcel 34 appears to be fully developed with numerous structures which appear to be labeled collectively with Parcel 34 as NAS Puunene. The north and east adjacent areas appear to be part of the NAS Puunene. In the 1969 through 2012 maps, Parcel 34 appears to be no longer labeled as NAS Puunene or Puunene Airport; and appears to be used for agricultural purposes. Note that although no structures are depicted in the 1969 through 2012 maps, one or more of the field maps depict apparent non-field areas in the approximate locations of the previously noted structures (i.e. Magazine Area C and E).

5.4.4 Property Tax Files and Land Title Records

ETC conducted a limited chain of title search for the Subject Property at the Honolulu County Property Tax office. ETC is not a professional title search company and does not warrant the completeness or accuracy of the information provided, but considers the data useful in screening the Subject Property for environmentally suspect owners or lessees.

Review of the property records indicated that the Subject Property, identified as TMMs (2) 3-8-8: Parcels 8, 34, 35, and 36 (portion) are currently owned by the State of Hawaii - Department of Hawaiian Home Lands (DHHL). The State of Hawaii (formerly known as the Territory of Hawaii) has owned the Subject Property since 1948. Prior to 1956, the United States of America owned the Subject Property. Note that the United State of America appears to have 'taken' the Subject Property from HC&S in or around 1945 via an Order of Condemnation.

5.4.5 Building Permit Records

A review of available building permits issued by the County of Maui indicated that there are no permits pertaining to the Subject Property.

6.0 SITE RECONNAISSANCE

ETC performed a site reconnaissance on September 19, 2016 in order to complete a visual survey to identify the use and/or storage of hazardous materials.

6.1 Methodology and Limiting Conditions

ETC personnel performed the site reconnaissance by systematically inspecting all accessible areas within the Subject Property parcels. Due to safety concerns, the apparent ditch area which traverses east-west across Parcel 34 were inspected from the borders of the ditch. In addition, the second floor of the two-story concrete structure observed on Parcel 35 was not accessible at the time of ETC's site reconnaissance; however, HC&S indicated that the second floor was empty except for an apparent AST which reportedly formerly contained water. No other areas of the Subject Property were restricted from ETC's visual observation. A map of the Subject Property is included in Appendix I. Photographic documentation of ETC's site reconnaissance is included in Appendix II.

6.2 General Site Setting

The Subject Property consists of a 6.9-acre land Parcel 8 (Field 912), 646-acre land Parcel 34 (Fields 821, 916, 917), 97.4-acre land Parcel 35 (Field 912), and 40-acre portion of land Parcel 36 (Field 912). The Subject Property consists of former sugarcane land situated on a portion of the former NAS Puunene (later known as the Puunene Airport). As a result several out-of-use remnant concrete bunker structures were noted on the Subject Property.

6.3 Observations

Visual inspection of the Subject Property indicated that the groundcover generally consisted of vegetation and bare soil with an asphalt paved area located on the south portion of the Parcel 8. Nineteen single-story concrete structures (i.e. bunkers) were observed on Parcel 34 (Fields 821, 916, and 917). In addition, one single-story concrete structure and one two-story concrete structure was observed on Parcel 35 (Field 912). The accessible interior areas appeared to be vacant and unoccupied. Note that one or more of the bunkers contained empty storage shelves, cabinets, etc. Stockpiles of concrete rubble, asphalt, rocks/boulders, and miscellaneous metal were also observed on the Subject Property. No other evidence of the generation, storage or disposal of hazardous or regulated wastes was observed on the Subject Property. No active potable water and no sewer system infrastructure was observed on the Subject Property. In addition, no drains or sumps were noted on the Subject Property.

6.3.1 USTs / ASTs

A visual inspection for the presence of USTs or aboveground storage tanks (ASTs) was also conducted. No visual evidence (i.e. vent or fill pipes, dispensers, etc.) of the presence of USTs or ASTs was observed. Although not observed by ETC personnel, HC&S personnel indicated that there was an AST located on the second floor of the two-story structure located on Parcel 35. HC&S personnel indicated that the AST was believed to have been used to store water.

6.4 Hydraulic and Dielectric Fluid Containing Equipment

A visual inspection for hydraulic and electrical equipment or electrical components that use fluid that may contain PCBs was conducted. No suspect PCB-containing equipment was observed on the Subject Property.

7.0 INTERVIEWS

The objective of the interviews is to obtain information from past and present owners, operators, and occupants of the Subject Property to identify potential REC's in connection with the Subject Property.

Mr. Sean O'Keefe, Director Environmental Affairs, Alexander & Baldwin Inc., Hawaiian Commercial and Sugar Company, Subject Property Occupant

Mr. O'Keefe provided ETC with the following information regarding the Subject Property:

- Mr. O'Keefe's knowledge of the Subject Property dates back approximately 23 years.
- The Subject Property was under cultivation for sugarcane by HC&S from at least 1910. Note that some areas were in pasture for part of the time between 1910 and 1942. By 1939, portions of Field 912 were converted to use as the Puunene Airport (Maui Airport), and by about 1942, the airport had been converted to military use. By 1945, NAS Puunene had been expanded to include all or portions of Fields 821, 916, and 917 (i.e. Parcel 34). The Subject Property was restored to sugarcane cultivation by 1969 and has remained under cultivation through the final harvest in 2016.
- Various portions of the Subject Property were not suitable for sugarcane cultivation due to the presence of structures, pavement, debris piles, and other wastelands; therefore, these areas were not returned to cultivation after being vacated by the military.
- An approximate 40-acre portion of Field 912 not included as part of the Subject Property was followed in 2007. The followed area was reportedly used by a construction/trucking company for storage of fill material after the area was vacated by HC&S.
- The former usage of the Subject Property as part of the former NAS Puunene may have included industrial uses.
- According to historic maps of the NAS Puunene, various bunkers in Fields 916 and 917 were formerly used for the storage of munitions.
- There is no domestic water supply for the Subject Property; however, abandoned domestic water infrastructure associated with the NAS Puunene may still be present.
- The irrigation water source to the Subject Property is irrigation reservoirs 83, 90, and 91.
- There is no known active sewer system on the Subject Property; however, abandoned sewer infrastructure associated with the NAS Puunene may still be present.
- There are no known floor drains or sumps on the Subject Property.
- There are no known transformers on the Subject Property.

- There are no USTs (underground storage tanks) on the Subject Property. It is unknown whether the four (4) USTs in Field 912 and depicted in the NAS Puunene maps were removed. It is likely that there were also fuel pipelines associated with some or all of these tanks.
- There is an AST (aboveground storage tank) located in the two-story structure in Field 912, which is believed to have used to store water.
- Fertilizers and pesticides/herbicides commonly used on sugar plantation were used on the Subject Property. Arsenic may have been present in the older herbicides historically used on the Subject Property.
- A concrete storage bunker in Field 912 was once used to store old flow meters from the HC&S wells, which contained mercury, and other hazardous wastes; however, all mercury and other wastes were removed and properly disposed.
- Drums of asbestos containing asphaltic coating used by the HC&S construction shop were formerly stored in a concrete bunker on Field 912. These drums were removed and properly disposed. In addition, asbestos may be present in the remnant structures associated with the former NAS Puunene.
- A limited quantity of corrosive chemicals were formerly stored in one of the concrete storage bunkers on Field 912. These chemicals have since been removed.
- A variety of construction materials, supplies, equipment, and records were stored in the concrete bunkers on the Subject Property over the years. These materials have all been removed.
- No waste or rubbish is known to have been buried on the Subject Property; however, there are areas within or near the fields where concrete, asphalt, steel and similar materials, apparently generated by the demolitions of structures at the former NAS Puunene, have been disposed of in piles.
- No waste or rubbish is known to have been burned on the Subject Property; however, agricultural burning of the sugarcane fields (i.e. pre-harvest burning) has been conducted on the Subject Property for many years.
- No oils or lubricants were used on the Subject Property by HC&S except to the extent used in farm equipment which operated on the Subject Property.
- Paint and related materials were formerly stored for use by the HC&S Construction Shop in one or more of the concrete storage bunkers in Field 912. All these materials have since been removed.
- There are no known current or former gas stations on the Subject Property.
- There are no current or former maintenance shops on the Subject Property.
- There are no known chemical pipelines on the Subject Property.
- Runoff onto the Subject Property from the adjoining road and/or sugarcane fields is likely.

- There are no known current or former pits, ponds, or lagoons located on the Subject Property in connection with waste treatment or disposal.
- The Subject Property and adjoining properties are not used as a printing facility, gasoline station, motor repair facility, dry cleaner, photo developer, laboratory, junkyard, landfill, waste TSDF, or recycling facility. However, the Subject Property was formerly part of NAS Puunene, which may have included some of the above uses.
- There are known areas of past contamination and waste disposal on the adjoining portions of the former NAS Puunene. Specifically, a former landfill and a PCB transformer cleanup site area located on the state-owned land to the immediate north of HC&S Field 916. An unpermitted scrap metal recycling and solid waste management facility was formerly operated at a piggery located on private land to the immediate northeast of HC&S Field 916. The piggery and the transformer site were cleaned up to the satisfaction of the DOH. The status of the former landfill is not known. A leaking underground storage tank site was located on state-owned land to the east of HC&S Field 912 and was cleaned up to the satisfaction of DOH.
- There are no known environmental liens or governmental notifications relating to past or recurrent violations of environmental laws with respect to the Subject Property.

8.0 FINDINGS AND OPINIONS

8.1 Site Description

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.2 User Provided Information

The User provided extensive historical information regarding the Subject Property uses and conditions. This User provided information is discussed further in Section 8.5. No other significant findings to indicate suspect RECs, historical RECs, or *de minimis* conditions were identified.

8.3 Records Review

8.3.1 Standard Environmental Record Sources

Federal NPL and Delisted NPL

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal CERCLIS and CERCLIS NFRAP

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal RCRA CORRACTS

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal RCRA (non-CORRACTS) TSD Facilities

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal RCRA Generator

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal Institutional Control/Engineering Control Registries

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal ERNS

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

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State Equivalent NPL and CERCLIS

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Landfill and/or Solid Waste Disposal

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Leaking Underground Storage Tanks

The Subject Property is located on a portion of the *Former Puumene Navy Airport*, which is identified as a LUST facility. ETC requested and reviewed the *Former Puumene Navy Airport (Facility ID 9-503623)* LUST facility file at the DOH SHWB. In addition, HC&S also provided ETC with documents pertaining to the former USTs at the *Former Puumene Navy Airport* facility. Review indicated that a total of nine (9) USTs were closed in 2000. All nine (9) USTs were situated east and north of the Subject Property across Mokuale Highway. The nine (9) USTs consisted of three (3) sites, Site 1 consisted of three (3) 50,000-gallon aviation fuel USTs, Site 2 consisted of four (4) 25,000-gallon aviation fuel USTs, and Site 3 consisted of two (2) 50,000-gallon aviation fuel USTs. The *Final Underground Storage Tank Closure Report*, dated July 2, 2001, prepared by Environmental Chemical Corporation (ECC) indicated that the Site 2 and Site 3 were located on the Subject Property within the south portion of Parcel 35. However, correspondence and historical facility maps provided by HC&S indicated that both Site 2 and Site 3 were in-fact located east and north of the Subject Property; and were incorrectly mapped in ECC's report. Note that no documentation of a correction to DOH's UST facility file regarding the former UST locations was found during ETC's file review. Review indicated that a release (DOH Release ID 000079) was observed and reported to the DOH during UST closure activities in 2000. Subsequent release response activities were completed including the over excavation and onsite aeration of approximately 15-cubic yards of petroleum contaminated soils. Following aeration and confirmation sampling, the soils were utilized as excavation backfill at the facility. As a result, the DOH issued the facility a letter dated May 1, 2001 indicating that 'no further action' was required in response to the release. Base on these findings, the UST release associated with the *Former Puumene Navy Airport* facility is not considered an REC for the Subject Property.

In addition to the LUST findings, document review and interview findings indicate that four additional aviation USTs/ASTs were likely located on the southwest portion of Parcel 35. Specifically, four (4) circular structures labeled as 'Gasoline Storage - Aviation' are depicted in a 1955 map of the NAS Puumene. Note that the circular structures appear similar to the depictions of the nine (9) former USTs removed in 2000. The capacity and status of the suspect USTs are unknown; and no evidence of the suspect USTs was noted during ETC's site reconnaissance activities. In addition, the location of these tanks has been used for sugarcane cultivation for over the past 30 years. ETC could not confirm or disconfirm the presence or absence of these suspect USTs. Therefore, based on these findings, ETC cannot dismiss the possibility that residual contamination associated with the suspect USTs may be present on the Subject Property. As such, the

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four (4) suspect UST identified on the southwest portion of Parcel 35 are considered RECs for the Subject Property.

State Registered Underground Storage Tanks

The Former Puunene Navy Airport (Facility ID 9-503623) facility located on the Subject Property was discussed as part of the Leaking Underground Storage Tanks review section and therefore will not be repeated here. In addition to the Subject Property findings, *DeKalb Pfizer Genetics* (Facility ID 9-501566) UST facility was identified to be situated on the a potential adjoining property. File review indicated that the *DeKalb Pfizer Genetics* (Facility ID 9-501566) was located on the south adjacent property to Parcel 34. File review indicated that a 1,000-gallon gasoline UST was removed in 2001. Site maps of the facility indicate that UST was located on the southwest corner of the facility near Pihani Highway which is approximately 0.2-miles south of the Parcel 34. No other information was found during ETC's file review. Based on these findings, ETC does not consider this finding to be an REC for the Subject Property. No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Institutional Control Registry

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Voluntary Cleanup/Response Sites

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Brownfields

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Unmappable/Orphan Sites

No significant findings to indicate suspect RECs, historical RECs, or *de minimis* conditions were identified.

8.3.2 Additional Environmental Record Sources

The Subject Property was identified to be in proximity to the NAS Puunene (also known as the *Maui Airport Military Reservation*) FUDS site. Historical records indicate that the Subject Property was in fact part of the former NAS Puunene site. Historical records indicate that the area north adjacent area to Parcel 34 was established by the Territory of Hawaii as a civil airfield known as the Puunene Airport in or around 1937. Navy use of the Puunene Airport began in or around 1940; and by 1942, the Puunene Airport and immediately adjacent areas which included the Subject Property were commissioned as Naval Air Station Maui. In 1943, the area was renamed NAS Puunene when the Naval Air Station Kahului (NASKA) was opened. In 1947, the NAS Puunene was reportedly released by the Navy to the Territory of Hawaii and was reused as Maui's

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civil airport (known as the Maui Airport). The Maui Airport was reportedly closed between 1961 and 1969.

File review of the *Maui Airport Military Reservation* at the DOH HEER Office indicated that in addition to the USTs discussed in Section 8.3.1, a transformer release site and a former landfill were located on the NAS Puunene. Review indicated that the transformer release site and former landfill are located on the north adjacent property to Parcel 34. The transformer release site was cleaned up including the removal and disposal of approximately 633-cubic yards of PCB-contaminated soil and concrete debris. The release site was subsequently backfilled and restored. As a result, the DOH HEER Office issued the facility a letter indicating that no further action (i.e. No Department of Defense Action Indicated) was required for the site. File review indicated that the *Maui Airport Landfill* reportedly consisted of a 20-acre dump site that was believed to contain the remains of aircraft and other equipment that were deemed surplus for military purposes. Environmental investigations were conducted on the former *Maui Airport Landfill* site which included soil and groundwater sampling and analyses. Investigative results indicated that elevated concentrations of arsenic, cadmium, lead, and PCBs were found in the soil. A feasibility study determined that surface capping with institutional controls and natural attenuation with institutional controls were determined to be two highest ranking remedial alternatives.

No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.3.3 Tier 1 Vapor Encroachment Screen (VES)

The Subject Property was not identified by the contracted database. However, the contracted database identified one (1) site within the specified radii of the Subject Property. All previously obtained data reviewed and discussed as part of this Phase I ESA (Section 1.0 to 8.0) were also evaluated as part of this Tier 1 VES. Review indicated that Phase I ESA findings (i.e. Sanborn Maps, Aerials, etc.) do not indicate any potential VECs in connection with the Subject Property. ETC performed a Tier 1 VES in conformance with the scope and limitations of ASTM Practice E2600-10 on the Subject Property. No evidence of VECs in connection with the Subject Property was identified.

8.3.4 Historical Use Information on the Subject and Adjoining Properties

Review of historical real property tax records, aerial photographs, and maps indicated the Subject Property was used for agricultural purposes as early as 1910. The historical usage and operations of the Subject Property is discussed further in Section 8.5. No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.4 Site Reconnaissance

Stockpiles of concrete, rock, asphalt, and scrap metal were observed on the Subject Property. While no petroleum products or hazardous substances were observed from the visible surface areas of these piles, the interior areas of the piles were not visible. ETC believes that it is not likely that these stockpiles have significantly impacted the Subject Property; however, the unknown contents of these piles are considered a data

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gap. Data gaps are discussed further in Section 9.0.

No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.5 Interviews

Interview findings indicate that pre-harvest burning of sugarcane has been conducted on the Subject Property as part of the sugarcane cultivation operations. Note that the primary concern regarding sugarcane burning is the airborne particulate matter. As such, the former sugarcane burning is not considered to be a REC for the Subject Property.

The Subject Property has been used for commercial sugarcane cultivation since as early as 1910. Activities commonly associated with commercial sugarcane cultivation include the use and application of pesticides. As described in Section 9 of the DOH HEER Office's November 2009 *Interim Final Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan* (HEER TGM), with the exception of arsenic, residual pesticides in former sugarcane fields are rarely detected above levels of potential concern. In addition, data gathered by the DOH over the past ten years indicate that dioxins in former sugarcane fields do not pose a significant health risk (DOH, 2009). Review the DOH HEER Office's *Summary of Pesticide and Dioxin Contamination Associated with Former Sugarcane Operations* indicated that elevated concentrations were not reported in the surface soils of sugarcane field(s) associated with the nearby Puunene Sugar Mill (DOH, 2011). No pesticide mixing sites are known to have been operated on the Subject Property. Although other contaminants associated with commercial sugarcane cultivation were not evaluated, based on these findings, the former agricultural usage of the Subject Property is considered a *de minimis* condition.

No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

9.0 DATA GAPS

Data gaps, which are defined as the lack of or inability to obtain information required for this Phase I ESA despite good faith efforts by the environmental professional to gather such information were identified during this Phase I ESA. ETC identified the following data gaps:

- Historical records sources within five year intervals were not available for review. However, since all available historical records were reviewed (i.e. aerial photos, Sanborn Maps, Chain of Title, etc.), ETC concludes that this 'data failure' does not represent a significant data gap.
- ETC personnel attempted to contact and interview a representative of DHHL, the current Subject Property land owner. The lack of interview information from the Subject Property land owner is considered a data gap for this report. At the time of this report, DHHL had not responded to ETC's request. However, information provided by a representative of the Subject Property operator (Mr. O'Keefe) coupled with the remaining Phase I ESA findings did not result in any conditions under which an REC determination could not be completed. In addition, HC&S has operated on the Subject Property from the 1960s to 2016. As such, this data gap is not considered significant. If at a later date DHHL provides information that significantly impacts the findings of this report; ETC will provide an addendum to this report.
- ETC did not inspect all areas of the Subject Property. Specifically, the guleh/ditch which traverses Parcel 34 was not inspected due to safety concerns; and inspection of these areas was limited to visual observations conducted from the borders along the ditch. In addition, the second floor of the two-story concrete structure observed on Parcel 35 was not accessible at the time of ETC's site reconnaissance; however, HC&S indicated that the second floor was empty except for an apparent AST which reportedly formerly contained water. The inability to access these areas of the Subject Property is considered a data gap for this report. However, based on information provided by the Subject Property Occupant (i.e. HC&S), site reconnaissance findings, and historic records, this data gap is not considered significant.
- Stockpiles of concrete, rock, asphalt, and scrap metal were observed on the Subject Property. In accordance with Hawaii Administrative Rules Title 11, Department of Health, Chapter 58.1 (HAR §11-58.1) property owners are responsible for "removing accumulated solid waste to an approved solid waste disposal facility." While no petroleum products or hazardous substances were observed from the visible surface areas of these piles; the interior areas of the piles were not visible. The quantity and size of these piles made it infeasible to adequately and fully characterize their potential environmental impact. As such, the unknown contents of these piles are considered a data gap. Based on interview findings the piles may have been created prior to 1969 and are suspected to contain demolition materials from the former NAS Puunene. While the contents of these piles are unknown, site reconnaissance findings

and information provided by HC&S do not indicate the presence of significant quantities hazardous substances or petroleum projects. Based on these findings, this data gap is not considered significant.

10.0 CONCLUSIONS

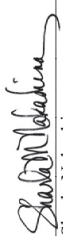
We have performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-13 of TMK (2) 3-8-8; Parcels 8, 34, 35, and 36 (portion), the Subject Property. Any exceptions to, or deletions from, the ASTM Practice E1527-13 are described in Section 11.0 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the Subject Property except for the following:

- The potential presence of residual contamination associated with the four (4) suspect aviation fuel USTs is considered a REC for the Subject Property.

11.0 ENVIRONMENTAL PROFESSIONAL CERTIFICATION

We declare that, to the best of our professional knowledge and belief, we meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Prepared by:



Sharia Nakashima
Environmental Professional
EnviroServices & Training Center, LLC

January 2017

12.0 DEVIATIONS AND ADDITIONAL SERVICES

No client imposed constraints or additions were requested. No additional services were requested by ETC's Client. As such, there were no deviations and/or deletions from the ASTM Practice E1527-13 upon completion of this Phase I ESA.

13.0 REFERENCES

- ASTM International. *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation E1527-13*.
- Hawaii State Department of Health (DOH), Hazard Evaluation and Emergency Response (HEER) Office. November 2009. *Technical Guidance Manual for Implementation of the Hawaii State Contingency plan, Interim Final*.
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- Environmental Chemical Corporation. July 2001. *Final Underground Storage Tank Closure Report, Removal of Underground Storage Tanks, Former Maui Airport Site, Puunene, Maui, Hawaii*. Prepared for the Department of the Army.
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- United States Army Corps of Engineers. September 2011. *Final Remedial Investigation / Feasibility Study, Former Maui Airport Landfill, Puunene, Maui, Hawaii, Project No. H09HI022503*.
- U.S. Department of Agriculture Soil Conservation Service. 1972. *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*.
- U.S. Department of Interior Geological Survey. 2013. *Puu O Kali Quadrangle, Island of Maui, 7.5 Minute Series (Topographic Maps)*.
- U.S. Department of Interior Geological Survey. 2013. *Maalaea Quadrangle, Island of Maui, 7.5 Minute Series (Topographic Maps)*

APPENDIX I
FIGURES

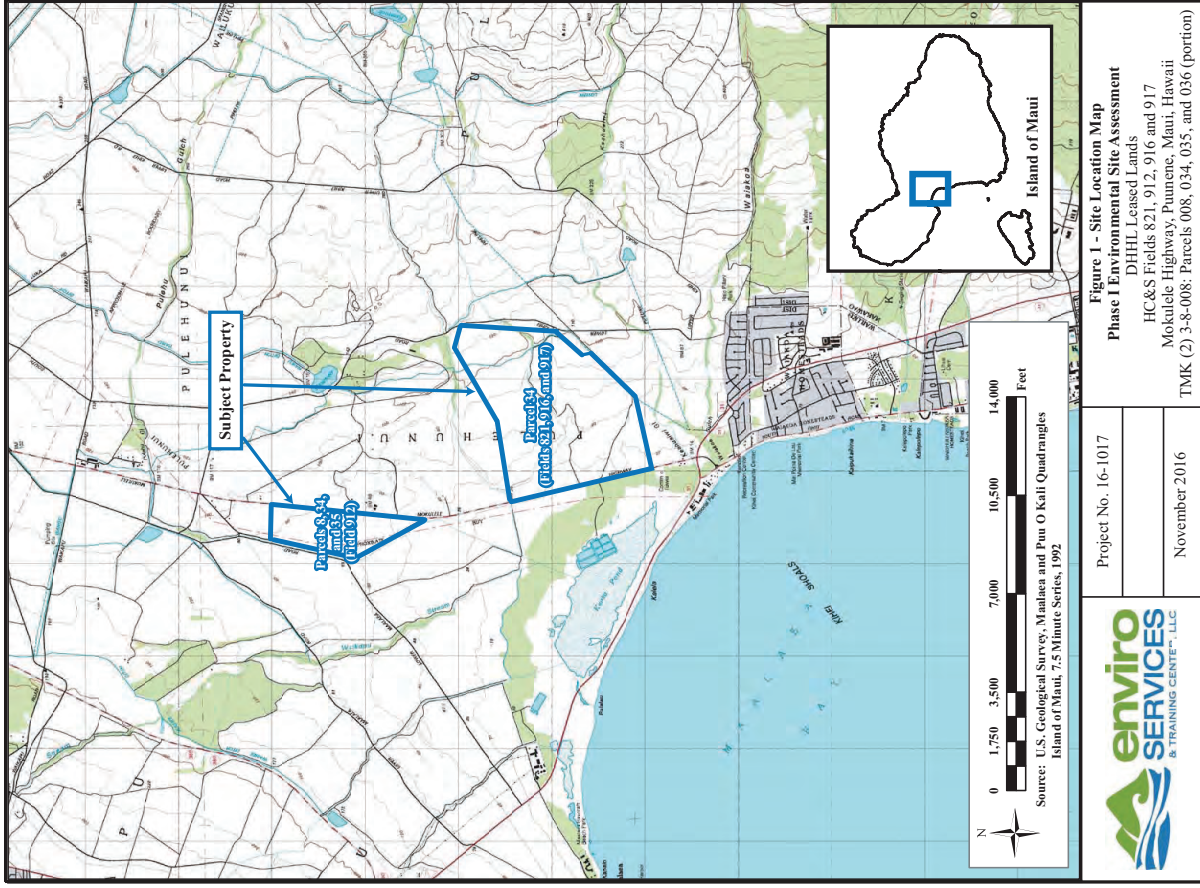




Figure 2 - Site Plan - Parcels 8, 35, and 36
Phase I Environmental Site Assessment
 DHHL Leased Lands
 HC&S Fields 821, 912, 916 and 917
 Mokuale Highway, Punene, Maui, Hawaii
 TMK (2) 3-8-008; Parcels 008, 034, 035, and 036 (portion)

| |
|---------------------|
| Project No. 16-1017 |
| November 2016 |



Figure 3 - Site Plan - Parcel 34
Phase I Environmental Site Assessment
 DHHL Leased Lands
 HC&S Fields 821, 912, 916 and 917
 Mokuale Highway, Punene, Maui, Hawaii
 TMK (2) 3-8-008; Parcels 008, 034, 035, and 036 (portion)

| |
|---------------------|
| Project No. 16-1017 |
| November 2016 |

APPENDIX II
PHOTOGRAPHIC DOCUMENTATION



Photograph 1: South view of Parcel 36 (Field 912).



Photograph 2: View of bunker located on the east portion of Parcel 36.



Photograph 3: Debris pile located within Parcel 35 (Field 912).



ETC Job: 16-1017
Page 1
November 2016

Photographic Documentation
Phase 1 Environmental Site Assessment
DHHL Leased Lands
HC&S Fields 821, 912, 916, and 917
Mokulele Highway, Punahoa, Maui, Hawaii
TMK (2) 3-8-008: Parcels 008, 034, 035, and 036 (portion)



Photograph 4: Exterior view of bunker located on the south portion of Parcel 35.



Photograph 5: Interior view of bunker located on the south portion of Parcel 35.



Photograph 6: View of asphalt-paved area located on the south portion of Parcel 8 (Field 912).



Photograph 7: View of the south portion of Parcel 34 (Field 917).



Photograph 8: Exterior view of one of the bunkers located in the south portion of Parcel 34 (Field 917).



Photograph 9: Interior view of one of the bunkers located on Parcel 34 (Field 917).



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Page 3
November 2016

Photographic Documentation
Phase 1 Environmental Site Assessment
DHHL Leased Lands
HC&S Fields 821, 912, 916, and 917
Mokulele Highway, Puunene, Maui, Hawaii
TMK (2) 3-8-008: Parcels 008, 034, 035, and 036 (portion)

Photographic Documentation
Phase 1 Environmental Site Assessment
DHHL Leased Lands
HC&S Fields 821, 912, 916, and 917
Mokulele Highway, Puunene, Maui, Hawaii
TMK (2) 3-8-008: Parcels 008, 034, 035, and 036 (portion)

ETC Job. 16-1017
Page 2
November 2016



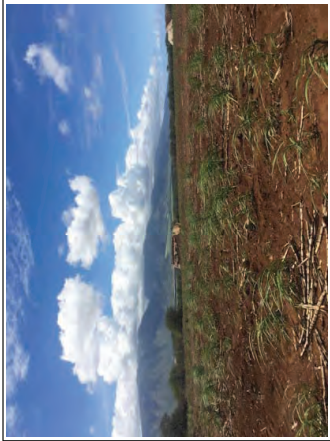
Photograph 10: View of pile located on the south portion of Parcel 34 (Field 917).



Photograph 11: View of pile located on the south portion of Parcel 34 (Field 917).



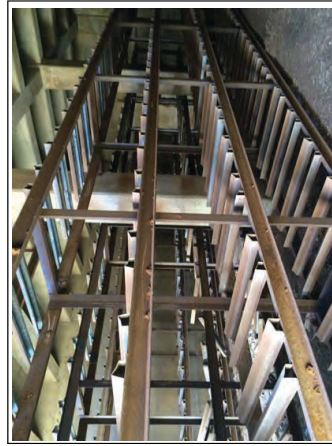
Photograph 12: East portion of Parcel 34 (Field 821).



Photograph 13: North portion of Parcel 34 (Field 916).



Photograph 14: Exterior view of one of the bunkers located on the north portion of Parcel 34 (Field 916).



Photograph 15: Interior view of one of the bunkers located on the north portion of Parcel 34 (Field 916).



Photographic Documentation
 Phase 1 Environmental Site Assessment
 DHHL Leased Lands
 HC&S Fields 821, 912, 916, and 917
 Mokulele Highway, Puunene, Maui, Hawaii
 TMK (2) 3-8-008: Parcels 008, 034, 035, and 036 (portion)

ETC Job. 16-1017
 Page 4
 November 2016

ETC Job. 16-1017
 Page 5
 November 2016

Photographic Documentation
 Phase 1 Environmental Site Assessment
 DHHL Leased Lands
 HC&S Fields 821, 912, 916, and 917
 Mokulele Highway, Puunene, Maui, Hawaii
 TMK (2) 3-8-008: Parcels 008, 034, 035, and 036 (portion)

APPENDIX III
RESEARCH DOCUMENTATION



Photograph 16: View of pile located on the north portion of Parcel 34 (Field 916).



Photograph 17: View of one of the concrete bunkers located on the north portion of Parcel 34 (Field 916).



Photograph 18: Interior view of one of the concrete bunkers located on Parcel 34 (Field 916).



ETC Job: 16-1017
Page 6
November 2016

Photographic Documentation
Phase I Environmental Site Assessment
DHHL Leased Lands
HC&S Fields 821, 912, 916, and 917
Mokulele Highway, Punahoa, Maui, Hawaii
TMK (2) 3-8-008: Parcels 008, 034, 035, and 036 (portion)

Fields 821, 916, and 917
Not Reported
Kihei, HI 96753

Inquiry Number: 4729934.3
September 19, 2016

Certified Sanborn® Map Report

| | |
|--|---|
| 09/19/16 | |
| Certified Sanborn® Map Report | |
| Site Name: | Client Name: |
| Fields 821, 916, and 917 Not Reported Kihei, HI 96753 EDR Inquiry # 4729934.3 | Enviro Svcs. and Trng. Center 505 Ward Avenue Honolulu, HI 96814 Contact: Sharla Nakashima |



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Certification # CE51-44BD-A371
PO # NA
Project 16-1017
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Field 912
Not Reported
Kihei, HI 96753
Inquiry Number: 47299333
September 19, 2016

| | |
|---|--|
| 09/19/16 | |
| Certified Sanborn® Map Report | |
| Site Name: Field 912 Not Reported Kihei, HI 96753 EDR Inquiry # 47299333 | Client Name: Enviro Svcs. and Trng. Center 505 Ward Avenue Honolulu, HI 96814 Contact: Sharla Nakashima |



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Certification # 0C8C-47D5-86E4

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Project 16-1017

UNMAPPED PROPERTY

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Certified Sanborn® Map Report

Fields 821, 916, and 917
Not Reported
Kihei, HI 96753

Inquiry Number: 4729934.4
September 19, 2016

EDR Historical Topo Map Report

09/19/16

Site Name:

Fields 821, 916, and 917
Not Reported
Kihei, HI 96753
EDR Inquiry # 4729934.4

Client Name:

Enviro Svcs. and Trng. Center
505 Ward Avenue
Honolulu, HI 96814
Contact: Sharia Nakashima



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Search Results:

P.O.# NA
Project: 16-1017

Coordinates:

Latitude: 20.799483 20° 47' 58" North
Longitude: -156.457142 -156° 27' 26" West
UTM Zone: Zone 4 North
UTM X Meters: 764692.98
UTM Y Meters: 2302042.83
Elevation: 61.62' above sea level

Maps Provided:

2013
1992, 1996
1983
1954

EDR Historical Topo Map Report
with QuadMatch™



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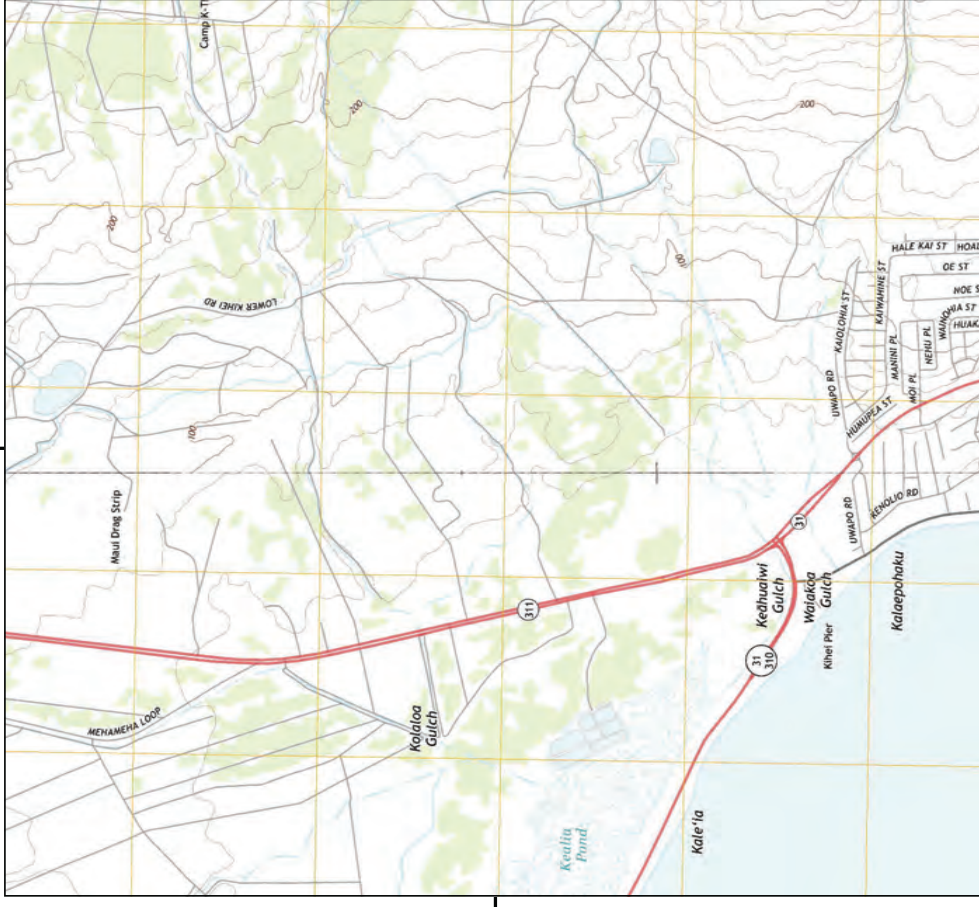
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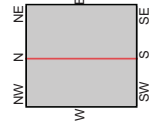


Historical Topo Map

2013



This report includes information from the following map sheet(s).



TP, Puu O Kali, 2013, 7.5-minute
SW, Maalaala, 2013, 7.5-minute

SITE NAME: Fields 821, 916, and 917

ADDRESS: Not Reported
Kihai, HI 96763

CLIENT: Enviro Svcs and Trng. Center



Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2013 Source Sheets



Maalaala
7.5-minute, 24000



Puu O Kali
7.5-minute, 24000

1992, 1996 Source Sheets



Puu O Kali
7.5-minute, 24000

Aerial Photo Revised 1992



Maalaala
7.5-minute, 24000

Aerial Photo Revised 1996

1983 Source Sheets



Puu O Kali
7.5-minute, 24000

Aerial Photo Revised 1976
Edited 1983



Maalaala
7.5-minute, 24000

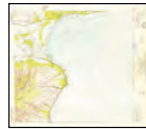
Aerial Photo Revised 1977
Edited 1983

1954 Source Sheets



Puu O Kali
7.5-minute, 24000

Aerial Photo Revised 1950



Maalaala
7.5-minute, 24000

Aerial Photo Revised 1950

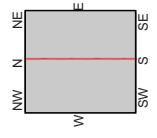
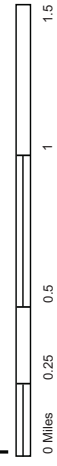
Historical Topo Map



1983



This report includes information from the following map sheet(s).



TP, Puu O Kali, 1983, 7.5-minute
SW, Maalea, 1983, 7.5-minute

SITE NAME: Fields 821, 916, and 917
ADDRESS: Not Reported
Kihai, HI 96753

CLIENT: Enviro Svcs. and Trng. Center

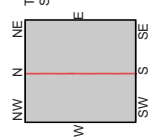
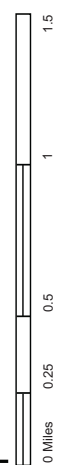
Historical Topo Map



1992, 1996



This report includes information from the following map sheet(s).



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SW, Maalea, 1996, 7.5-minute

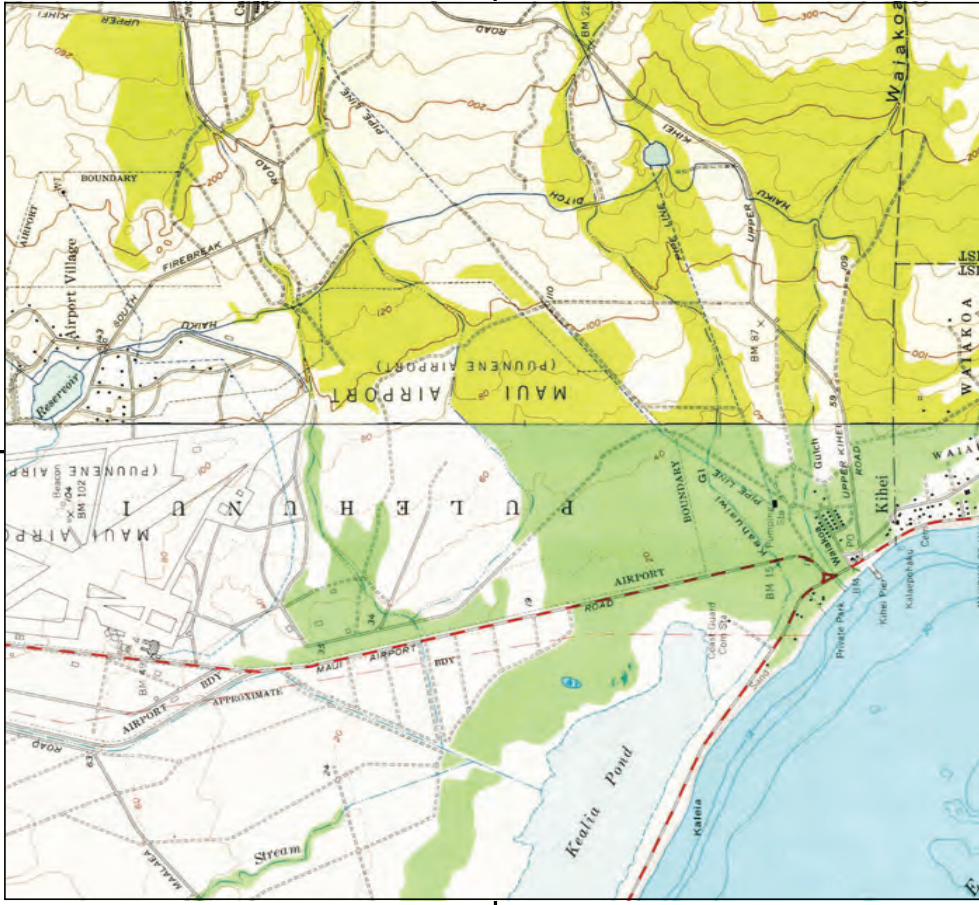
SITE NAME: Fields 821, 916, and 917
ADDRESS: Not Reported
Kihai, HI 96753

CLIENT: Enviro Svcs. and Trng. Center

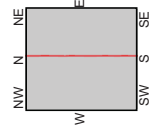


Historical Topo Map

1954



This report includes information from the following map sheet(s).



TP, Pua O Kali, 1954, 7.5-minute
SW, Maalea, 1954, 7.5-minute

SITE NAME: Fields 821, 916, and 917
ADDRESS: Not Reported
 Kihei, HI 96753
CLIENT: Enviro Svcs. and Trng. Center



Field 912
 Not Reported
 Kihei, HI 96753
 Inquiry Number: 4729933.4
 September 19, 2016

EDR Historical Topo Map Report with QuadMatch™



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|---------------------------------------|-------------------------------|----------|
| EDR Historical Topo Map Report | | 09/19/16 |
| Site Name: | Client Name: | |
| Field 912 | Enviro Svcs. and Trng. Center | |
| Not Reported | 505 Ward Avenue | |
| Kihai, HI 96753 | Honolulu, HI 96814 | |
| EDR Inquiry # 4729933.4 | Contact: Sharia Nakashima | |

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Search Results:

P.O.# NA
Project: 16-1017
Coordinates:
Latitude: 20.819106 20° 49' 9" North
Longitude: -156.469795 -156° 28' 11" West
UTM Zone: Zone 4 North
UTM X Meters: 763341.13
UTM Y Meters: 2304195.38
Elevation: 62.00' above sea level

Maps Provided:

- 2013
- 1992, 1996, 1997
- 1983
- 1954, 1955

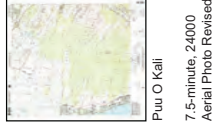
Topo Sheet Key

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2013 Source Sheets



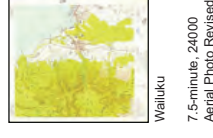
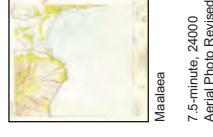
1992, 1996, 1997 Source Sheets



1983 Source Sheets



1954, 1955 Source Sheets

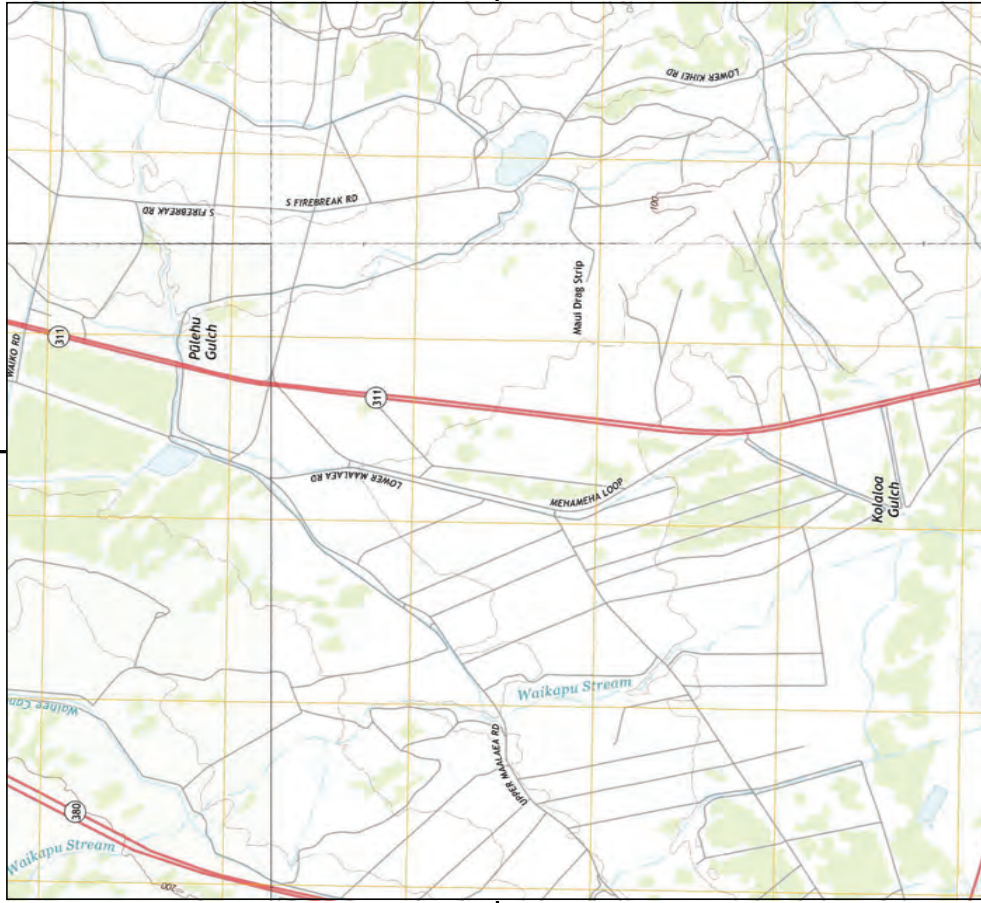


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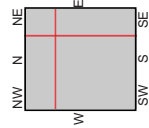
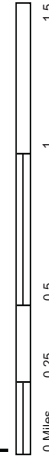


Historical Topo Map

2013



This report includes information from the following map sheet(s).



SITE NAME: Field 912
ADDRESS: Not Reported
Kihai, HI 96753

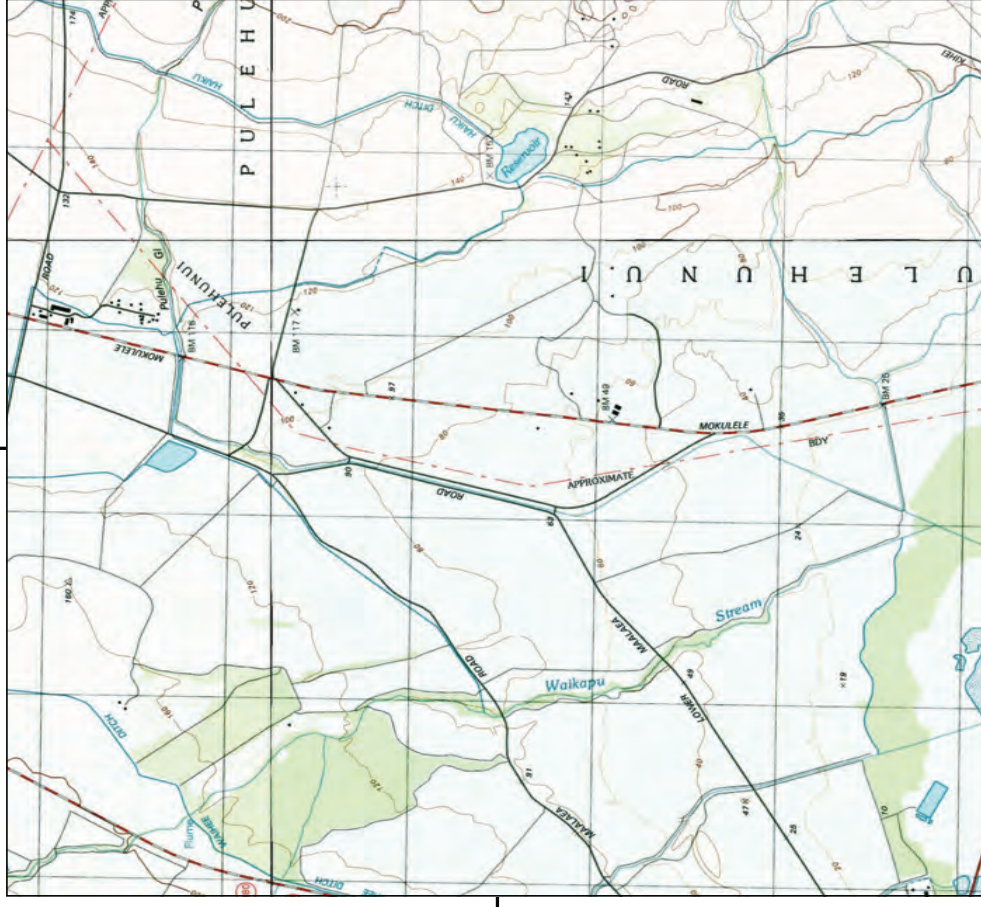
CLIENT: Enviro Svcs. and Trng. Center

TP, Maalea, 2013, 7.5-minute
NE, Paia, 2013, 7.5-minute
SE, Puu O Kahi, 2013, 7.5-minute
E NW, Wailuku, 2013, 7.5-minute

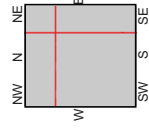
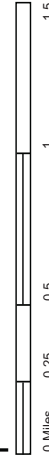


Historical Topo Map

1992, 1996, 1997



This report includes information from the following map sheet(s).



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ADDRESS: Not Reported
Kihai, HI 96753

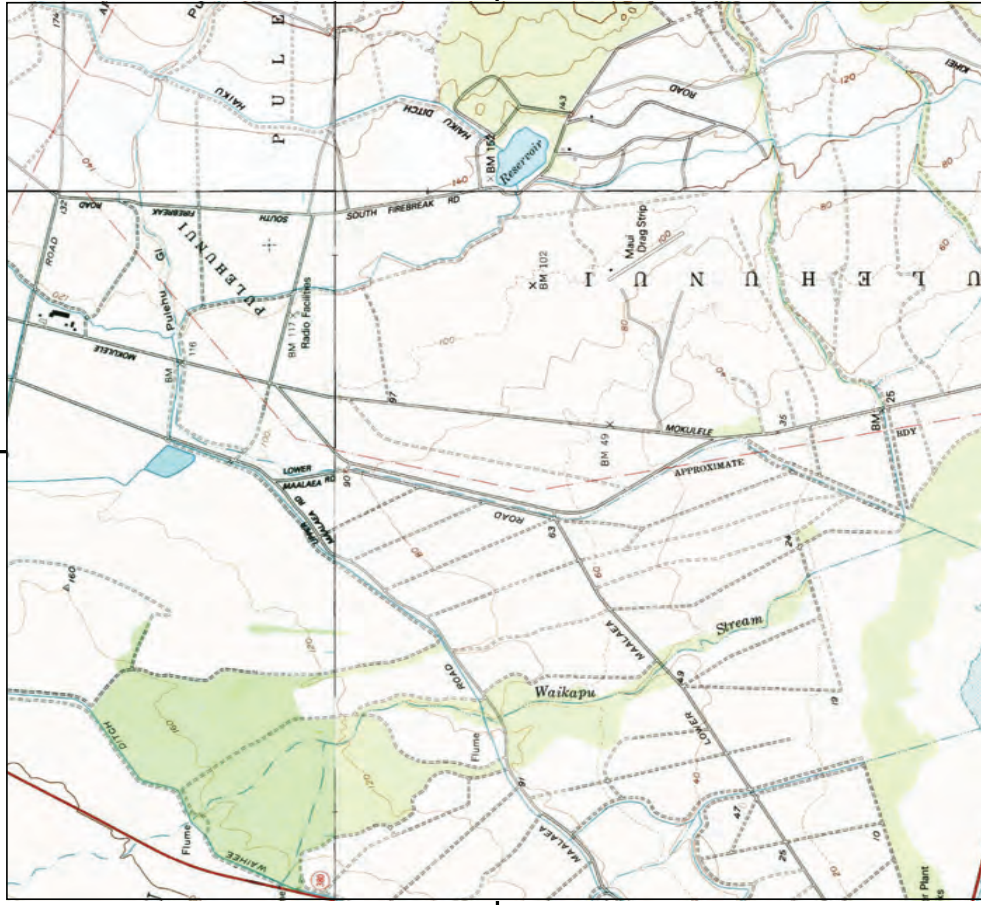
CLIENT: Enviro Svcs. and Trng. Center

TP, Maalea, 1996, 7.5-minute
NE, Paia, 1997, 7.5-minute
SE, Puu O Kahi, 1992, 7.5-minute
E NW, Wailuku, 1997, 7.5-minute

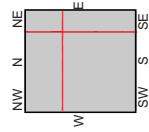
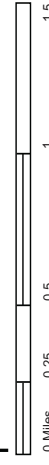


Historical Topo Map

1983



This report includes information from the following map sheet(s).



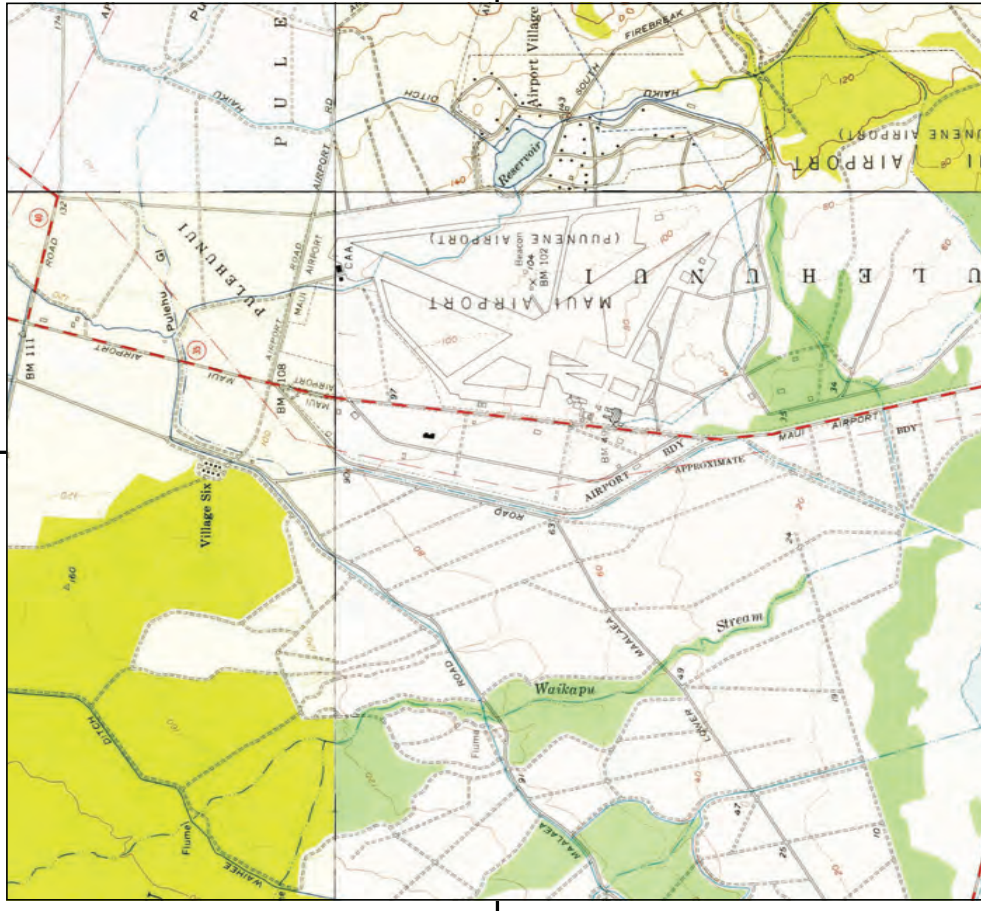
SITE NAME: Field 912
ADDRESS: Not Reported
Kihai, HI 96753

CLIENT: Enviro Svcs. and Trng. Center

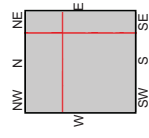
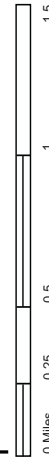


Historical Topo Map

1954, 1955



This report includes information from the following map sheet(s).




SITE NAME: Field 912
ADDRESS: Not Reported
Kihai, HI 96753

CLIENT: Enviro Svcs. and Trng. Center

Fields 821, 916, and 917
Not Reported
Kihei, HI 96753

Inquiry Number: 4729934.9
September 19, 2016

| | | |
|--|-------------------------------|---|
| EDR Aerial Photo Decade Package | | 09/19/16 |
| Site Name: | Client Name: |  |
| Fields 821, 916, and 917 | Enviro Svcs. and Trng. Center | |
| Not Reported | 505 Ward Avenue | |
| Kihei, HI 96753 | Honolulu, HI 96814 | |
| EDR Inquiry # 4729934.9 | Contact: Sharla Nakashima | |

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Search Results:

| Year | Scale | Details | Source |
|------|---------|-------------------------------------|-----------|
| 2000 | 1"=500' | Acquisition Date: November 08, 2000 | USGS/DOQQ |
| 1975 | 1"=500' | Flight Date: July 22, 1975 | USGS |
| 1954 | 1"=750' | Flight Date: April 04, 1954 | USGS |
| 1951 | 1"=500' | Flight Date: January 25, 1951 | USGS |

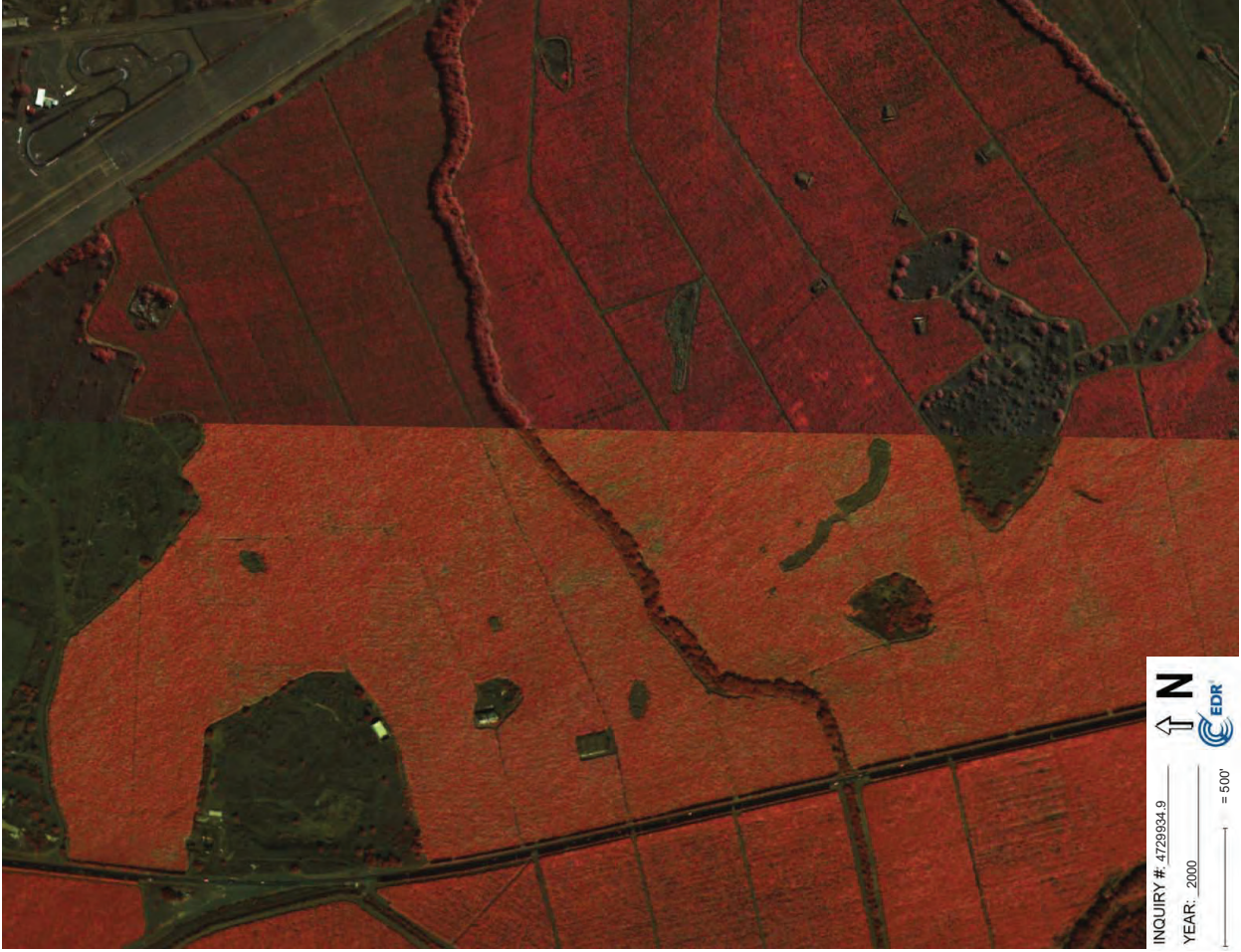
The EDR Aerial Photo Decade Package

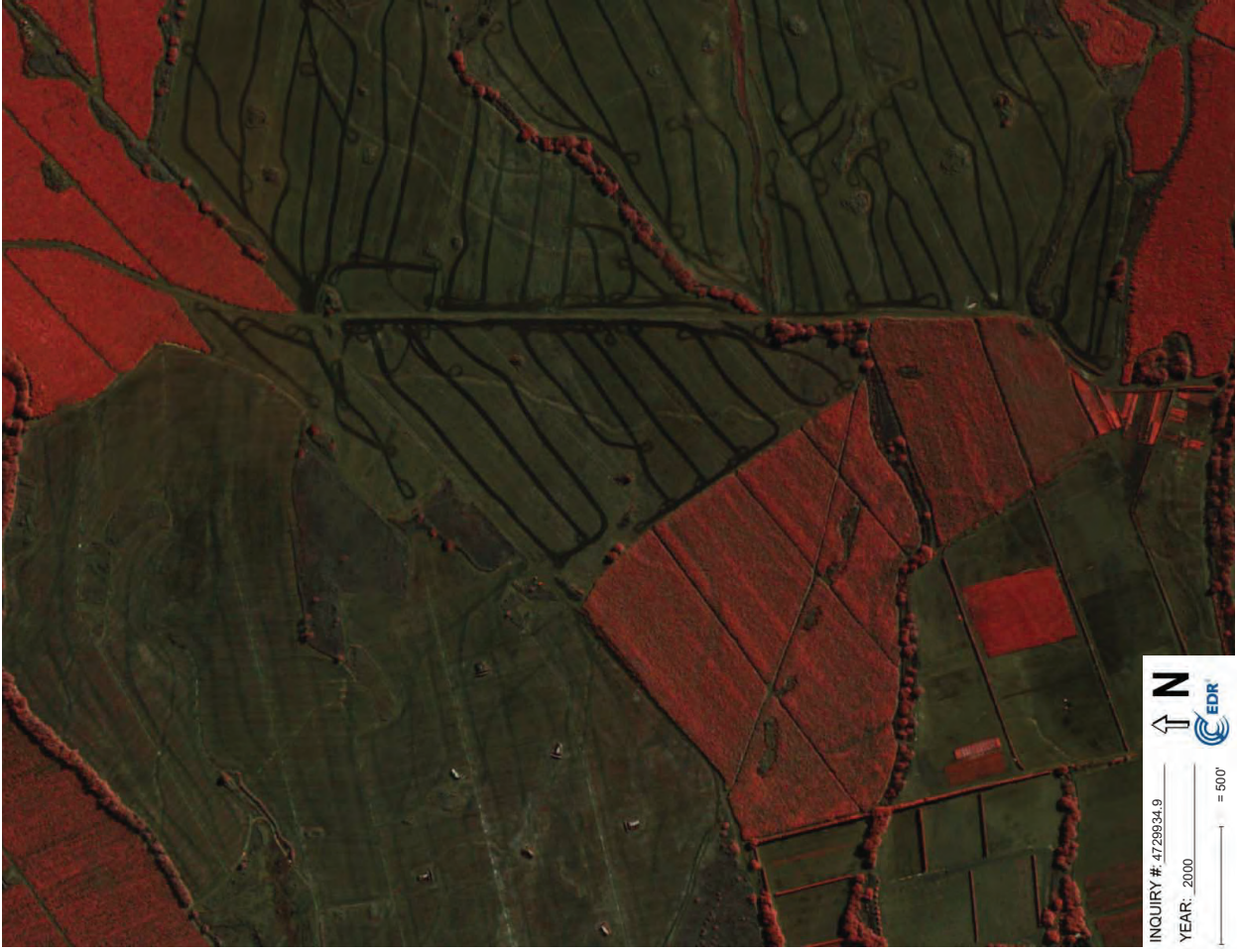
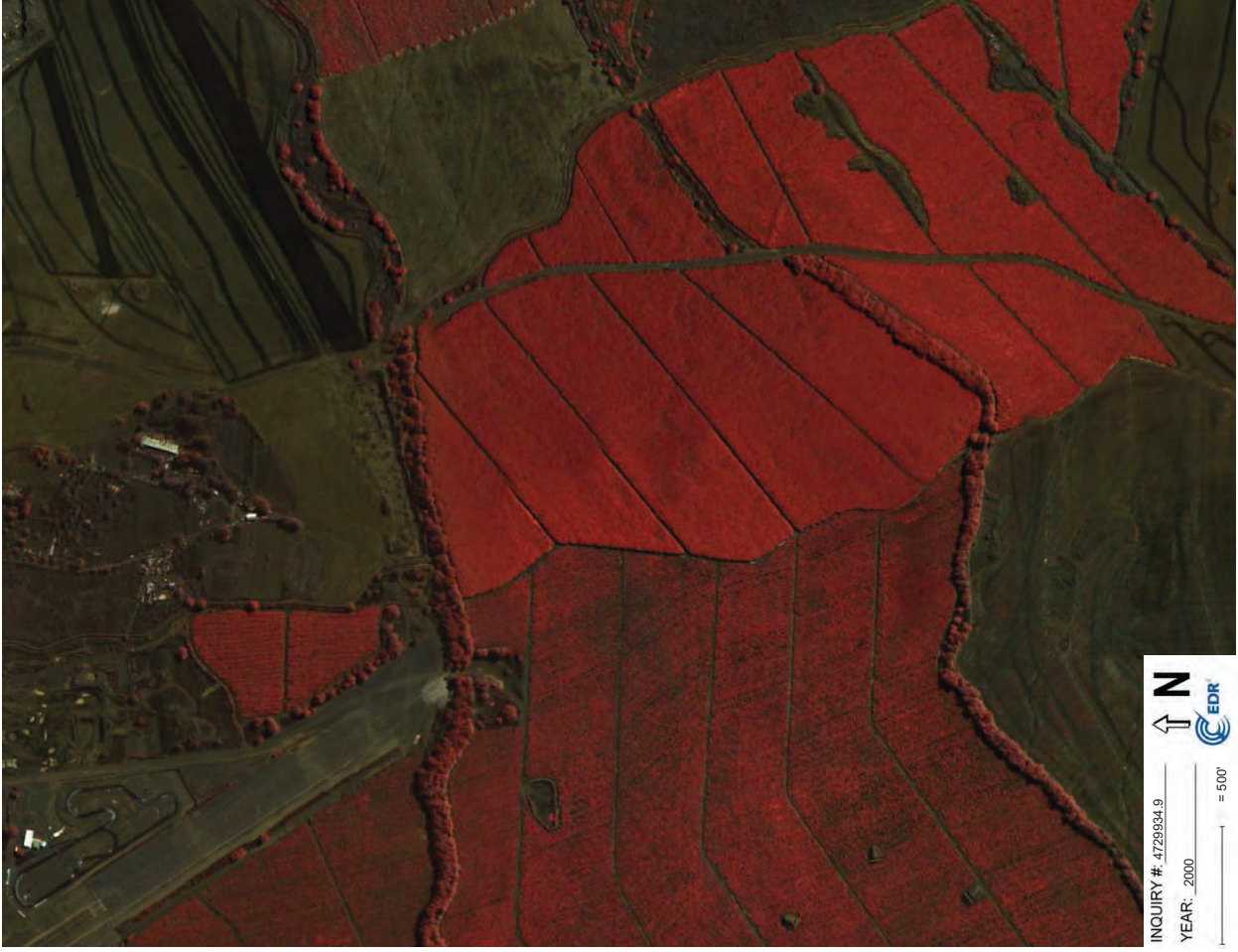


6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Field 912
Not Reported
Kihei, HI 96753
Inquiry Number: 4729933.9
September 20, 2016

The EDR Aerial Photo Decade Package



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Shelton, CT 06484
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| | |
|--|-------------------------------|
| 09/20/16 | |
| EDR Aerial Photo Decade Package | |
| Site Name: | Client Name: |
| Field 912 | Enviro Svcs. and Trng. Center |
| Not Reported | 505 Ward Avenue |
| Kihai, HI 96753 | Honolulu, HI 96814 |
| EDR Inquiry # 4729933.9 | Contact: Sharla Nakashima |



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Search Results:

| Year | Scale | Details | Source |
|------|----------|----------------------------------|-----------|
| 2000 | 1"=500' | Acquisition Date: April 12, 2000 | USGS/DOQQ |
| 1992 | 1"=1000' | Flight Date: September 21, 1992 | USGS |
| 1976 | 1"=1000' | Flight Date: December 20, 1976 | USGS |
| 1954 | 1"=750' | Flight Date: April 04, 1954 | USGS |
| 1950 | 1"=500' | Flight Date: September 28, 1950 | USGS |

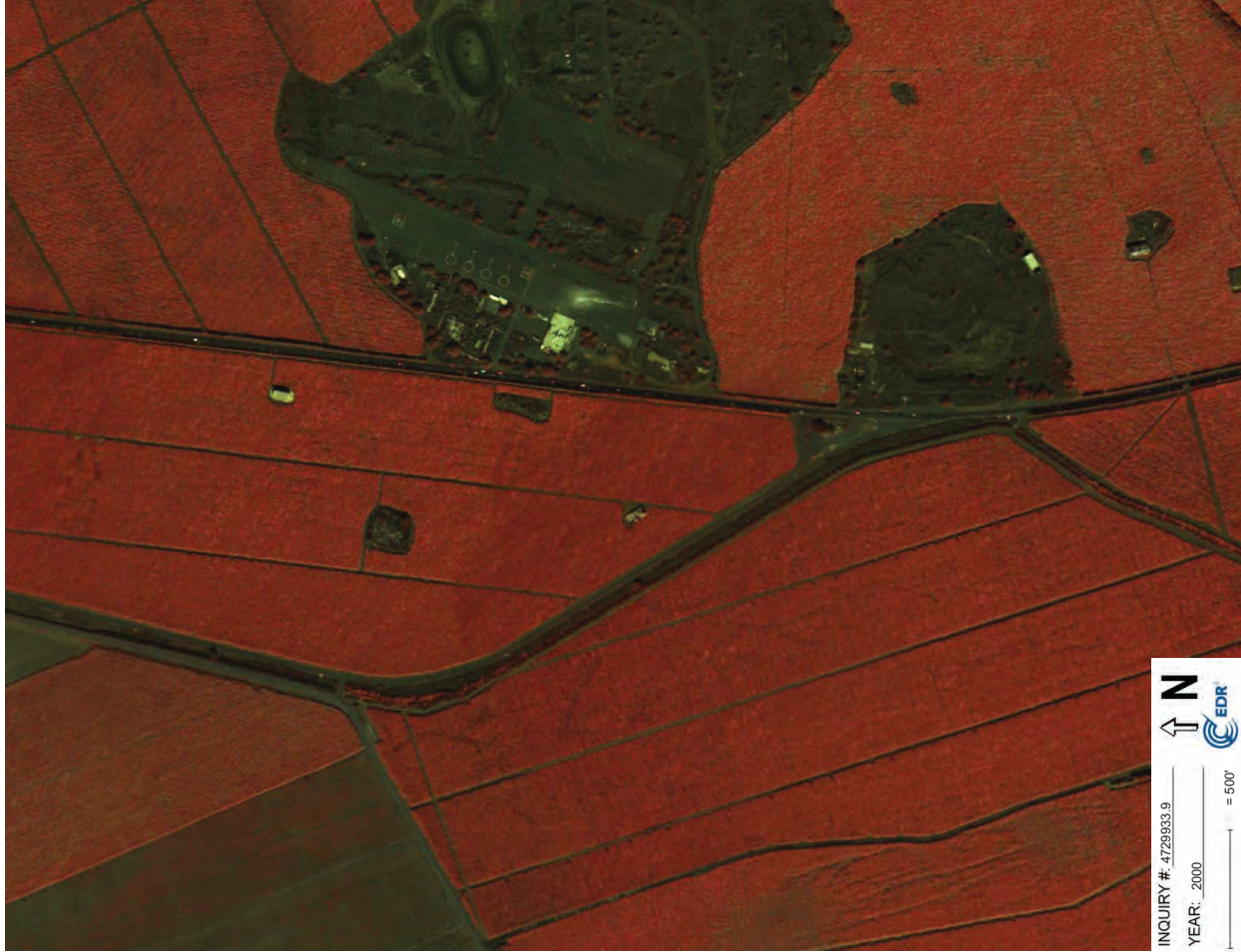
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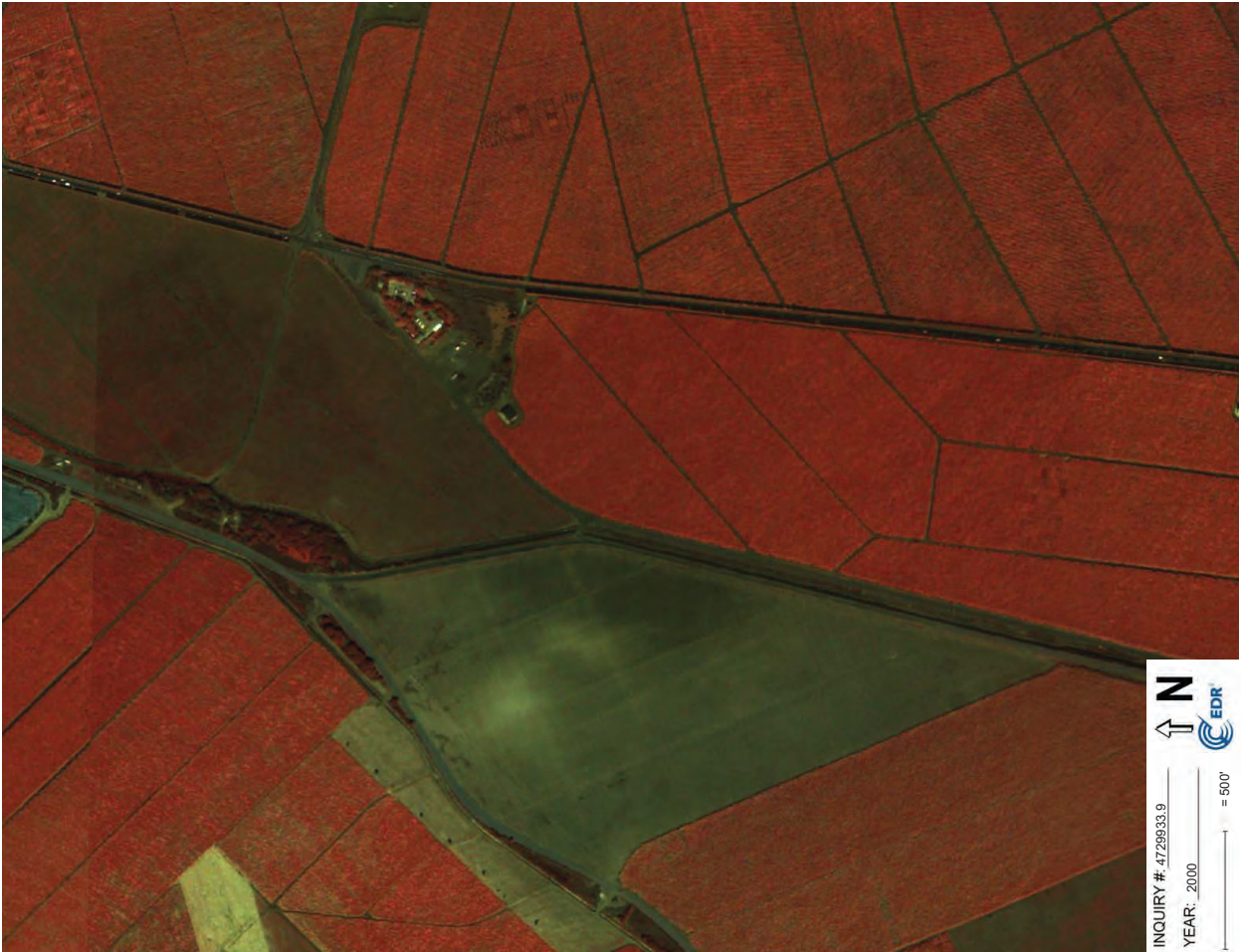
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INQUIRY # - 4729933.9
 YEAR - 2000

↑ N

1" = 500'







Fields 821, 916, and 917
 Not Reported
 Kihei, HI 96753
 Inquiry Number: 4729934.6s
 November 9, 2016

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 with any questions or comments.

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EDR Vapor Encroachment Screen

Prepared using EDR's Vapor Encroachment Worksheet

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 Sanborn, ME 04082
 Toll Free: 800.352.0050
 www.edrmet.com

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of the ASTM Standard Practice for Assessment of Vapor Encroachment into Structures on Property Involved in Real Estate Transactions (E 2600).

| STANDARD ENVIRONMENTAL RECORDS | Maximum Search Distance* | Summary | |
|---|--------------------------|---------|------------|
| | | 1/10 | 1/10 - 1/3 |
| Federal NPL | 0.333 | 0 | 0 |
| Federal CERCLIS | 0.333 | 0 | 0 |
| Federal RCRA CORRACTS facilities list | 0.333 | 0 | 0 |
| Federal RCRA TSD facilities list | 0.333 | 0 | 0 |
| Federal RCRA generators list | property | 0 | - |
| Federal institutional controls / engineering controls registries | 0.333 | 0 | 0 |
| Federal ERNS list | property | 0 | - |
| State and tribal - equivalent NPL | not searched | - | - |
| State and tribal - equivalent CERCLIS | 0.333 | 0 | 0 |
| State and tribal landfill / solid waste disposal | 0.333 | 0 | 0 |
| State and tribal leaking storage tank lists | 0.333 | 0 | 0 |
| State and tribal registered storage tank lists | property | 0 | - |
| State and tribal institutional control / engineering control registries | property | 0 | - |
| State and tribal voluntary cleanup sites | 0.333 | 0 | 0 |
| State and tribal Brownfields sites | 0.333 | 0 | 0 |
| Other Standard Environmental Records | 0.333 | 0 | 0 |

HISTORICAL USE RECORDS

| | | | | |
|------------------------------------|----------|---|---|---|
| Former manufactured Gas Plants | 0.333 | 0 | 0 | 0 |
| Historical Gas Stations | 0.125 | 0 | 0 | 0 |
| Historical Dry Cleaners | 0.125 | 0 | 0 | 0 |
| Exclusive Recovered Govt. Archives | property | 0 | - | - |

*Each category may include several separate databases, each having a different search distance. For each category, the table reports the maximum search distance applied. See the section "Record Sources and Currency" for information on individual databases.

EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

FIELDS 821, 916, AND 917
NOT REPORTED
KIHUI, HI 96753

COORDINATES

Latitude (North): 20.799483 - 20.47.58.136444"
Longitude (West): 156.457142 - 156.27.25.697021"
Elevation: 59 ft. above sea level

EXECUTIVE SUMMARY

PHYSICAL SETTING INFORMATION

Flood Zone: Available
 NWI Wetlands: Available

AQUIFLOW®
 Search Radius: 0.333 Mile.
 No Aquiflow sites reported.

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Pulehu
 Soil Surface Texture: silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | |
|------------------------|----------|-----------|--------------------|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | Saturated hydraulic conductivity (micro m/sec) | Soil Reaction (pH) |
| | Upper | Lower | | | | |
| 1 | 0 inches | 20 inches | silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|--------------------|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | Saturated hydraulic conductivity (micro m/sec) | Soil Reaction (pH) |
| | Upper | Lower | | | | |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 2

Soil Component Name: Waiakoa
 Soil Surface Texture: extremely stony silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 71 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | |
|------------------------|----------|-----------|---------------------------------|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | Saturated hydraulic conductivity (micro m/sec) | Soil Reaction (pH) |
| | Upper | Lower | | | | |
| 1 | 0 inches | 0 inches | extremely stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 0 inches | 20 inches | extremely stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|--|--|---|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 3 | 20 inches | 27 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 27 inches | 31 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max. Min: |

Soil Map ID: 3

Soil Component Name: Waiakoa
 Soil Surface Texture: very stony silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 84 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|----------|-----------|----------------------------|--|--|---|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 1 inches | very stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 1 inches | 25 inches | stony clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|--|--|---|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 3 | 25 inches | 33 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 33 inches | 37 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max. Min: |

Soil Map ID: 4

Soil Component Name: Water > 40 acres
 Soil Surface Texture: very stony silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Unknown
 Hydric Status: Not Reported
 Corrosion Potential - Uncoated Steel: > 0 inches
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches
 No Layer Information available.

Soil Map ID: 5

Soil Component Name: Kealia
 Soil Surface Texture: silt loam
 Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
 Soil Drainage Class:

EXECUTIVE SUMMARY

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 69 inches

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|---|--|----------------------|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) | |
| | Upper | Lower | | | | | AASHTO Group |
| 1 | 0 inches | 3 inches | silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS: Sands, Sands with fines, Silty Sand. | Max: 42 Min: 4.23 | Max: 8.4 Min: 7.9 |
| 2 | 3 inches | 18 inches | loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS: Sands, Sands with fines, Silty Sand. | Max: 42 Min: 4.23 | Max: 8.4 Min: 7.9 |
| 3 | 18 inches | 62 inches | fine sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS: Sands, Sands with fines, Silty Sand. | Max: 42 Min: 4.23 | Max: 8.4 Min: 7.9 |

Soil Map ID: 6

Soil Component Name: Alae

Soil Surface Texture: cobbly sandy loam

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|--|--|------------------------|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) | |
| | Upper | Lower | | | | | AASHTO Group |
| 1 | 0 inches | 7 inches | cobbly sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS: Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.3 Min: 6.6 |
| 2 | 7 inches | 14 inches | stratified sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS: Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.8 Min: 7.4 |
| 3 | 14 inches | 55 inches | gravelly coarse sand | Granular materials (35 pct. or less, passing No. 200). Stone Fragments, Gravel and Sand. | COARSE-GRAINED SOILS: Gravels, Clean gravels, Poorly Graded Gravel, COARSE-GRAINED SOILS: Gravels, Gravels with fines, Silty Gravel. | Max: 141 Min: 14.11 | Max: 8.4 Min: 7.9 |

Soil Map ID: 7

Soil Component Name: Pulehu

Soil Surface Texture: cobbly silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|--------------------|---|--|----------------------|
| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | Soil Texture Class | AASHTO Group | | |
| 1 | 0 inches | 20 inches | cobby silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 7.8 Min: 6.6 |

Soil Map ID: 8

Soil Component Name: Pulehu

Soil Surface Texture: silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | |
|------------------------|----------|-----------|--------------------|---|--|----------------------|
| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | Soil Texture Class | AASHTO Group | | |
| 1 | 0 inches | 20 inches | silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 7.3 Min: 6.6 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|--------------------|--|---|----------------------|
| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | Soil Texture Class | AASHTO Group | | |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 7.8 Min: 6.6 |

Soil Map ID: 9

Soil Component Name: Ewa

Soil Surface Texture: silty clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|--------------------|---|---|----------------------|
| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | Soil Texture Class | AASHTO Group | | |
| 1 | 0 inches | 18 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 7.8 Min: 6.6 |
| 2 | 18 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 7.8 Min: 6.6 |

EXECUTIVE SUMMARY

Soil Map ID: 10

Soil Component Name: Waiakoa
 Soil Surface Texture: silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Well drained
 Hydraulic Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 84 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|--|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 1 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 1 inches | 25 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |
| 3 | 25 inches | 33 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 33 inches | 37 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max: Min: |

Soil Map ID: 11

Soil Component Name: Pulehu
 Soil Surface Texture: cobbly silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained

EXECUTIVE SUMMARY

Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | cobbly silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 12

Soil Component Name: Waiakoa
 Soil Surface Texture: extremely stony silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Well drained
 Hydraulic Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 84 inches
 Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|---------------------------------|--|--|---|-----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification Unified Soil | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 1 inches | extremely stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 1 inches | 25 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |
| 3 | 25 inches | 33 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 33 inches | 37 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max: Min: |

Soil Map ID: 13

Soil Component Name: Alae

Soil Surface Texture: sandy loam

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|---|--|---|-----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification Unified Soil | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 7 inches | sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.8 Min: 7.4 |
| 2 | 7 inches | 14 inches | stratified sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.8 Min: 7.4 |
| 3 | 14 inches | 55 inches | gravelly coarse sand | Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand. | COARSE-GRAINED SOILS, Gravels, Clean Gravels, Poorly Graded Gravel, COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel. | Max: 141 Min: 14.11 | Max: 8.4 Min: 7.9 |

Soil Map ID: 14

Soil Component Name: Pulehu

Soil Surface Texture: clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|---|---|---|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 15

Soil Component Name: Alae
 Soil Surface Texture: cobbly sandy loam
 Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.
 Soil Drainage Class: Excessively drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|----------|----------|--------------------|--|--|---|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 7 inches | cobbly sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.3 Min: 6.6 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|----------------------|---|--|---|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 2 | 7 inches | 14 inches | cobbly sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.8 Min: 7.4 |
| 3 | 14 inches | 55 inches | gravelly coarse sand | Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand. | COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel, COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel. | Max: 141 Min: 14.11 | Max: 8.4 Min: 7.9 |

EXECUTIVE SUMMARY

SEARCH RESULTS

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

| Name | Address | Dist/Dir | Map ID | Page |
|--------------|---------|----------|--------|------|
| Not Reported | | | | |

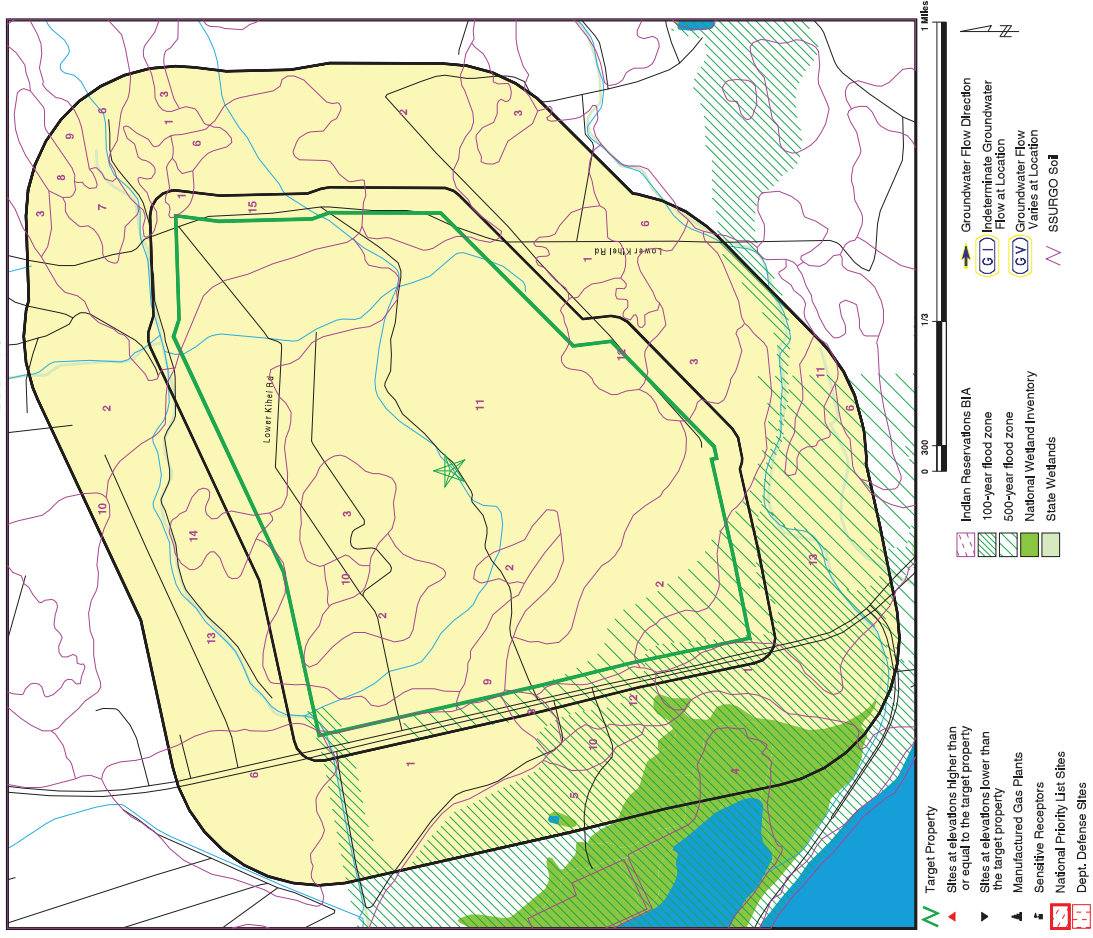
Not Reported

HISTORICAL USE RECORDS

| Name | Address | Dist/Dir | Map ID | Page |
|--------------|---------|----------|--------|------|
| Not Reported | | | | |

Not Reported

PRIMARY MAP - 4729934.6S



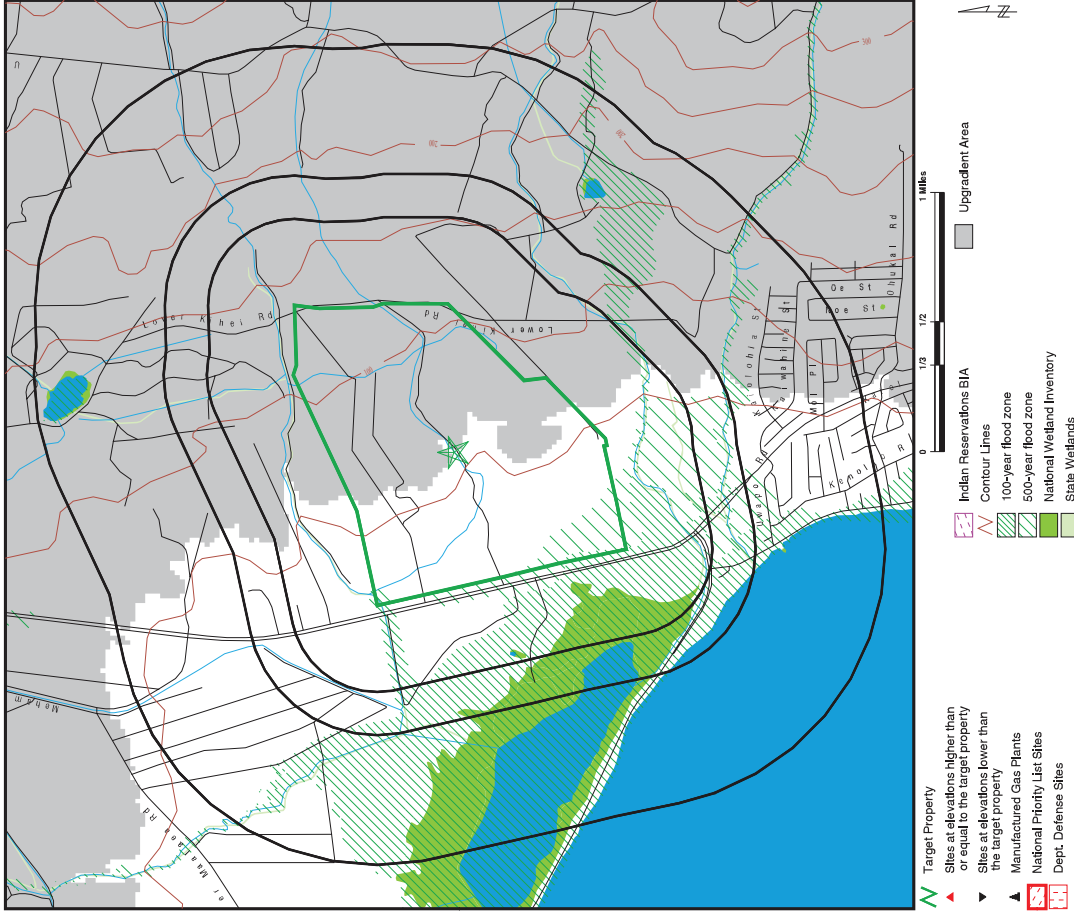
TC EXECUTIVE SUMMARY 17

SITE NAME: Fields 821, 916, and 917
 ADDRESS: Not Reported
 Kilauea HI 96753
 LAT/LONG: 20.789483 / 156.457142

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Alakashima
 INQUIRY #: 4729934.6S
 DATE: September 19, 2016 1:56 pm

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SECONDARY MAP - 4729934.6S



MAP FINDINGS

LEGEND

| FACILITY NAME FACILITY ADDRESS, CITY, ST, ZIP | EDR SITE ID NUMBER |
|--|---|
| <p>▼ MAP ID#</p> <p>Direction Distance Range (Distance feet / miles)</p> <p>Relative Elevation Feet/Above Sea Level</p> | <p>ASTM 2600 Record Sources found in this report. Each database is searched for applicable record categories. For detailed information about categorization, see the section of the report Records Searched and Currency.</p> |
| <p>Worksheet:</p> <p>Comments: Comments may be added on the online Vapor Encroachment Worksheet.</p> | |

DATABASE ACRONYM: Applicable categories (A hoverbox with database description).

| | |
|--|--|
| <p>SITE NAME: Fields 821, 916, and 917</p> <p>ADDRESS: Not Reported</p> <p>ADDRESS: Kirel HI 96753</p> <p>LAT/LONG: 20.789483 / 156.457142</p> | <p>CLIENT: Enviro Svcs. and Trng. Center</p> <p>CONTACT: Sharia Nakashima</p> <p>INQUIRY #: 4729934.6S</p> <p>DATE: September 19, 2016 1:53 pm</p> |
|--|--|

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RECORD SOURCES AND CURRENCY

To maintain currency of the following databases, EDR contacts the appropriate agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

PRP: Potentially Responsible Parties
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Number of Days to Update: 3
Last EDR Contact: 08/12/2016
Source: EPA
Telephone: 202-564-6023

RMP: Risk Management Plans
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(f) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes (a): Hazard assessment that details the potential effects of an accidental release, an accident history for the last five years, and an evaluation of worst-case and alternate accidental releases; Prevention program that includes safety and emergency health care, employee training measures and procedures for informing the public and response agencies (e.g. the fire department) should an accident occur.

Date of Government Version: 05/01/2016
Number of Days to Update: 89
Last EDR Contact: 07/25/2016
Source: Environmental Protection Agency
Telephone: 202-564-8600

AIRS: List of Permitted Facilities
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of permitted facilities in the state.

Date of Government Version: 04/14/2016
Number of Days to Update: 28
Last EDR Contact: 07/13/2016
Source: Department of Health
Telephone: 808-586-4249

BROWNFIELDS: Brownfields Sites
Standard Environmental Record Source: State and tribal Brownfields sites
Search Distance: 0.333 Mile

With certain legal exclusions and additions, the term "brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 05/06/2016
Number of Days to Update: 69
Last EDR Contact: 08/26/2016
Source: Department of Health
Telephone: 808-586-4249

CDL: Clandestine Drug Lab Listing
Standard Environmental Record Source: Other Standard Environmental Records

TC GR 1

RECORD SOURCES AND CURRENCY

Search Distance: Property

A listing of clandestine drug lab site locations.

Date of Government Version: 09/04/2010
Number of Days to Update: 42
Last EDR Contact: 09/12/2016
Source: Department of Health
Telephone: 808-586-4249

DRYCLEANERS: Permitted Drycleaner Facility Listing
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

A listing of permitted drycleaner facilities in the state.

Date of Government Version: 01/20/2016
Number of Days to Update: 28
Last EDR Contact: 09/16/2016
Source: Department of Health
Telephone: 808-586-4200

ENG CONTROLS: Engineering Control Sites
Standard Environmental Record Source: State and tribal institutional control / engineering control registries
Search Distance: Property

A listing of sites with engineering controls in place.

Date of Government Version: 05/06/2016
Number of Days to Update: 69
Last EDR Contact: 08/26/2016
Source: Department of Health
Telephone: 404-586-4249

Financial Assurance: Financial Assurance Information Listing
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 08/21/2016
Number of Days to Update: 39
Last EDR Contact: 09/12/2016
Source: Department of Health
Telephone: 808-586-4226

INST CONTROL: Sites with Institutional Controls
Standard Environmental Record Source: State and tribal institutional control / engineering control registries
Search Distance: Property

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 05/06/2016
Number of Days to Update: 69
Last EDR Contact: 08/26/2016
Source: Department of Health
Telephone: 808-586-4249

LUST: Leaking Underground Storage Tank Database
Standard Environmental Record Source: State and tribal leaking storage tank lists
Search Distance: 0.333 Mile

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

TC GR 2

RECORD SOURCES AND CURRENCY

Date of Government Version: 01/13/2016
 Number of Days to Update: 47
 Last EDR Contact: 08/31/2016
 Source: Department of Health
 Telephone: 808-586-4228

SHWS: Sites List
 Standard Environmental Record Source: State and tribal - equivalent CERCLIS
 Search Distance: 0.333 Mile
 Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 12ED (includes CERCLIS sites).

Date of Government Version: 05/06/2016
 Number of Days to Update: 69
 Last EDR Contact: 08/26/2016
 Source: Department of Health
 Telephone: 808-586-4249

SPILLS: Release Notifications
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property
 Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 01/14/2016
 Number of Days to Update: 42
 Last EDR Contact: 08/26/2016
 Source: Department of Health
 Telephone: 808-586-4249

SWFLF: Permitted Landfills in the State of Hawaii
 Standard Environmental Record Source: State and tribal landfill / solid waste disposal
 Search Distance: 0.333 Mile
 Solid Waste Facilities/landfill Sites: SWFLF type records typically contain an inventory of solid waste disposal facilities or landfills in the State of Hawaii. SWFLF records are subject to the RCRA 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/17/2012
 Number of Days to Update: 37
 Last EDR Contact: 07/01/2016
 Source: Department of Health
 Telephone: 808-586-4245

UIC: Underground Injection Wells Listing
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property
 A listing of underground injection well locations.

Date of Government Version: 02/07/2013
 Number of Days to Update: 56
 Last EDR Contact: 08/24/2016
 Source: Department of Health
 Telephone: 808-586-4258

UST: Underground Storage Tank Database
 Standard Environmental Record Source: State and tribal registered storage tank lists
 Search Distance: Property
 Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 01/13/2016
 Number of Days to Update: 47
 Source: Department of Health
 Telephone: 808-586-4228

RECORD SOURCES AND CURRENCY

Last EDR Contact: 08/31/2016
 VCP: Voluntary Response Program Sites
 Standard Environmental Record Source: State and tribal voluntary cleanup sites
 Search Distance: 0.333 Mile
 Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 05/06/2016
 Number of Days to Update: 69
 Last EDR Contact: 08/26/2016
 Source: Department of Health
 Telephone: 808-586-4249

2020 COR ACTION: 2020 Corrective Action Program List
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: 0.25 Mile
 The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others are in the early stages of investigation or remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
 Number of Days to Update: 6
 Last EDR Contact: 09/06/2016
 Source: Environmental Protection Agency
 Telephone: 703-308-4044

COAL ASH DOE: Steam-Electric Plant Operation Data
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property
 A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
 Number of Days to Update: 76
 Last EDR Contact: 09/09/2016
 Source: Department of Energy
 Telephone: 202-586-8719

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: 0.333 Mile
 A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
 Number of Days to Update: 40
 Last EDR Contact: 09/06/2016
 Source: Environmental Protection Agency
 Telephone: Not Reported

CONSENT: Superfund (CERCLA) Consent Decrees
 Standard Environmental Record Source: Federal NPL
 Search Distance: 0.333 Mile
 Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2015
 Number of Days to Update: 149
 Last EDR Contact: 07/15/2016
 Source: Department of Justice, Consent Decree Library
 Telephone: Varies

RECORD SOURCES AND CURRENCY

CORRACTS: Corrective Action Report
Standard Environmental Record Source: Federal RCRA CORRACTS facilities list
Search Distance: 0.333 Mile
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/27/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: EPA
Telephone: 800-424-9346

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
Standard Environmental Record Source: State and tribal landfill / solid waste disposal
Search Distance: 0.333 Mile
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Number of Days to Update: 137
Last EDR Contact: 07/20/2016
Source: EPA, Region 9
Telephone: 415-947-4219

DOCKET HWC: Hazardous Waste Compliance Docket Listing
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property
A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016
Number of Days to Update: 91
Last EDR Contact: 08/24/2016
Source: Environmental Protection Agency
Telephone: 202-564-0527

DOT OPS: Incident and Accident Data
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property
Department of Transportation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Number of Days to Update: 42
Last EDR Contact: 08/02/2016
Source: Department of Transportation, Office of Pipeline Safety
Telephone: 202-366-4595

Deleted NPL: National Priority List Deletions
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/07/2016
Number of Days to Update: 10
Last EDR Contact: 07/07/2016
Source: EPA
Telephone: Not Reported

ECHO: Enforcement & Compliance History Information
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

TC GR 5

RECORD SOURCES AND CURRENCY

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/20/2015
Number of Days to Update: 103
Last EDR Contact: 06/22/2016
Source: Environmental Protection Agency
Telephone: 202-564-2280

EPA WATCH LIST: EPA WATCH LIST
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property
EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA, a state or local environmental agency is warranted. The Watch List is not intended to represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Number of Days to Update: 88
Last EDR Contact: 08/08/2016
Source: Environmental Protection Agency
Telephone: 617-520-3000

ERNS: Emergency Response Notification System
Standard Environmental Record Source: Federal ERNS list
Search Distance: Property
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/28/2016
Number of Days to Update: 51
Last EDR Contact: 06/28/2016
Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180

FEMA LIST: Underground Storage Tank Listing
Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Number of Days to Update: 55
Last EDR Contact: 07/07/2016
Source: FEMA
Telephone: 202-646-5797

FINDS: Facility Index System/Facility Registry System
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property
Facility Index System. FINDS contains both facility information and "spikes" to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/20/2015
Number of Days to Update: 55
Last EDR Contact: 09/07/2016
Source: EPA
Telephone: Not Reported

TC GR 6

RECORD SOURCES AND CURRENCY

FTTS: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Number of Days to Update: 25
Last EDR Contact: 08/17/2016

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667

FTTS INSP: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Standard Environmental Record Source: Other Standard Environmental Records
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Number of Days to Update: 25
Last EDR Contact: 08/17/2016

Source: EPA
Telephone: 202-566-1667

FUDS: Formerly Used Defense Sites
Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Number of Days to Update: 37
Last EDR Contact: 09/09/2016

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285

FUELS PROGRAM: EPA Fuels Program Registered Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 05/24/2016
Number of Days to Update: 49
Last EDR Contact: 08/23/2016

Source: EPA
Telephone: 800-385-6164

FUSRAP: Formerly Utilized Sites Remedial Action Program

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/11/2016
Number of Days to Update: 80
Last EDR Contact: 07/26/2016

Source: Department of Energy
Telephone: 202-586-3559

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

Standard Environmental Record Source: Other Standard Environmental Records

RECORD SOURCES AND CURRENCY

Search Distance: Property

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Number of Days to Update: 40
Last EDR Contact: 12/17/2007

Source: Environmental Protection Agency
Telephone: 202-564-2501

HMIRS: Hazardous Materials Information Reporting System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 08/24/2015
Number of Days to Update: 68
Last EDR Contact: 06/28/2016

Source: U.S. Department of Transportation
Telephone: 202-366-4555

ICIS: Integrated Compliance Information System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Number of Days to Update: 31
Last EDR Contact: 07/07/2016

Source: Environmental Protection Agency
Telephone: 202-564-5088

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists

Search Distance: 0.333 Mile

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/27/2015
Number of Days to Update: 67
Last EDR Contact: 07/29/2016

Source: EPA Region 1
Telephone: 617-918-1313

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists

Search Distance: 0.333 Mile

A listing of leaking underground storage tank locations on Indian Land.

Source: EPA Region 10
Telephone: 206-553-2857

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists

Search Distance: 0.333 Mile

A listing of leaking underground storage tank locations on Indian Land.

Source: EPA Region 4
Telephone: 202-564-2501

RECORD SOURCES AND CURRENCY

Number of Days to Update: 35
Last EDR Contact: 07/26/2016
Telephone: 404-562-8677

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/17/2016
Number of Days to Update: 37
Last EDR Contact: 07/27/2016
Source: EPA, Region 5
Telephone: 312-886-7439

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 12/11/2015
Number of Days to Update: 105
Last EDR Contact: 07/27/2016
Source: EPA Region 6
Telephone: 214-665-6597

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/09/2015
Number of Days to Update: 112
Last EDR Contact: 07/27/2016
Source: EPA Region 7
Telephone: 913-551-7003

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/13/2015
Number of Days to Update: 118
Last EDR Contact: 07/27/2016
Source: EPA Region 8
Telephone: 303-312-6271

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 02/25/2016
Number of Days to Update: 37
Last EDR Contact: 07/27/2016
Source: Environmental Protection Agency
Telephone: 415-972-3372

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Number of Days to Update: 52
Last EDR Contact: 08/05/2016
Source: Environmental Protection Agency
Telephone: 703-308-8245

INDIAN UST R1: Underground Storage Tanks on Indian Land

RECORD SOURCES AND CURRENCY

Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/20/2015
Number of Days to Update: 67
Last EDR Contact: 07/29/2016
Source: EPA, Region 1
Telephone: 617-918-1313

INDIAN UST R10: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 01/07/2016
Number of Days to Update: 41
Last EDR Contact: 07/27/2016
Source: EPA, Region 10
Telephone: 206-553-2857

INDIAN UST R4: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/05/2016
Number of Days to Update: 35
Last EDR Contact: 07/26/2016
Source: EPA, Region 4
Telephone: 404-562-9424

INDIAN UST R5: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015
Number of Days to Update: 52
Last EDR Contact: 07/27/2016
Source: EPA, Region 5
Telephone: 312-886-6136

INDIAN UST R6: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 66 Tribes).

Date of Government Version: 12/03/2015
Number of Days to Update: 120
Last EDR Contact: 07/27/2016
Source: EPA, Region 6
Telephone: 214-665-7591

INDIAN UST R7: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Number of Days to Update: 65
Last EDR Contact: 07/27/2016
Source: EPA, Region 7
Telephone: 913-551-7003

RECORD SOURCES AND CURRENCY

INDIAN UST R8: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 01/26/2016
Number of Days to Update: 119
Last EDR Contact: 07/27/2016
Source: EPA Region 8
Telephone: 303-312-6137

INDIAN UST R9: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/25/2016
Number of Days to Update: 37
Last EDR Contact: 07/27/2016
Source: EPA Region 9
Telephone: 415-972-3368

INDIAN VCP R1: Voluntary Cleanup Priority Listing
Standard Environmental Record Source: State and tribal voluntary cleanup sites
Search Distance: Property

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Number of Days to Update: 142
Last EDR Contact: 07/01/2016
Source: EPA, Region 1
Telephone: 617-918-1102

INDIAN VCP R7: Voluntary Cleanup Priority Listing
Standard Environmental Record Source: State and tribal voluntary cleanup sites
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Number of Days to Update: 27
Last EDR Contact: 04/20/2009
Source: EPA, Region 7
Telephone: 913-551-7365

LEAD SMELTER 1: Lead Smelter Sites
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of former lead smelter site locations.

Date of Government Version: 03/07/2016
Number of Days to Update: 148
Last EDR Contact: 07/08/2016
Source: Environmental Protection Agency
Telephone: 703-603-8787

LEAD SMELTER 2: Lead Smelter Sites
Standard Environmental Record Source: Other Standard Environmental Records

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust.

Date of Government Version: 04/05/2001
Number of Days to Update: 36
Last EDR Contact: 12/02/2009
Source: American Journal of Public Health
Telephone: 703-305-6451

RECORD SOURCES AND CURRENCY

LIENS 2: CERCLA Lien Information
Standard Environmental Record Source: Federal CERCLIS
Search Distance: Property

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Number of Days to Update: 37
Last EDR Contact: 07/29/2016
Source: Environmental Protection Agency
Telephone: 202-564-6023

LUCIS: Land Use Control Information System
Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: 0.333 Mile

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015
Number of Days to Update: 13
Last EDR Contact: 08/12/2016
Source: Department of the Navy
Telephone: 843-820-7326

MLTS: Material Licensing Tracking System
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/07/2016
Number of Days to Update: 28
Last EDR Contact: 09/05/2016
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169

NPL: National Priority List
Standard Environmental Record Source: Federal NPL
Search Distance: 0.333 Mile

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/07/2016
Number of Days to Update: 10
Last EDR Contact: 07/07/2016
Source: EPA
Telephone: Not Reported

NPL Site Boundaries

Sources:
EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-566-0690

EPA Region 1
Telephone: 617-918-1102
EPA Region 2
Telephone: 212-637-4293

RECORD SOURCES AND CURRENCY

EPA Region 3
Telephone: 215-814-5418
EPA Region 4
Telephone: 404-562-8681
EPA Region 5
Telephone: 312-353-1063
EPA Region 6
Telephone: 214-655-6659
EPA Region 7
Telephone: 913-551-7247
EPA Region 8
Telephone: 303-312-6118
EPA Region 9
Telephone: 415-947-4579
EPA Region 10
Telephone: 206-553-4479

NPL LIENS: Federal Superfund Liens

Standard Environmental Record Source: Federal NPL

Search Distance: Property

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against property owners when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Number of Days to Update: 56
Last EDR Contact: 08/15/2011
Source: EPA
Telephone: 202-564-4257

ODI: Open Dump Inventory

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Number of Days to Update: 39
Last EDR Contact: 06/09/2004
Source: Environmental Protection Agency
Telephone: 800-424-9346

PADS: PCB Activity Database System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

PCB Activity Database. PADS identifies generators, transporters, commercial stores and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2016
Number of Days to Update: 127
Last EDR Contact: 07/15/2016
Source: EPA
Telephone: 202-566-0500

PCB TRANSFORMER: PCB Transformer Registration Database

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The database of PCB transformer registrations that includes all PCB registration submittals.

RECORD SOURCES AND CURRENCY

Date of Government Version: 02/01/2011
Number of Days to Update: 83
Last EDR Contact: 07/29/2016
Source: Environmental Protection Agency
Telephone: 202-566-0517

Proposed NPL: Proposed National Priority List Sites

Standard Environmental Record Source: Federal NPL

Search Distance: 0.333 Mile

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/07/2016
Number of Days to Update: 10
Last EDR Contact: 07/07/2016
Source: EPA
Telephone: Not Reported

RAATS: RCRA Administrative Action Tracking System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RCRA Administrative Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administrative actions after September 30, 1985, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Number of Days to Update: 35
Last EDR Contact: 06/02/2008
Source: EPA
Telephone: 202-564-4104

RADINFO: Radiation Information Database

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2015
Number of Days to Update: 69
Last EDR Contact: 07/07/2016
Source: Environmental Protection Agency
Telephone: 202-343-9775

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/21/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-CEQS: RCRA - Conditionally Exempt Small Quantity Generators

Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RECORD SOURCES AND CURRENCY

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016 Source: Environmental Protection Agency
 Number of Days to Update: 64 Telephone: 703-308-8895
 Last EDR Contact: 06/30/2016

RCRA-LQG: RCRA - Large Quantity Generators

Standard Environmental Record Source: Federal RCRA generators list
 Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016 Source: Environmental Protection Agency
 Number of Days to Update: 64 Telephone: 703-308-8895
 Last EDR Contact: 06/30/2016

RCRA-SQG: RCRA - Small Quantity Generators

Standard Environmental Record Source: Federal RCRA generators list
 Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/21/2016 Source: Environmental Protection Agency
 Number of Days to Update: 64 Telephone: 703-308-8895
 Last EDR Contact: 06/30/2016

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

Standard Environmental Record Source: Federal RCRA TSD facilities list
 Search Distance: 0.333 Mile

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSD's treat, store, or dispose of the waste.

Date of Government Version: 06/21/2016 Source: Environmental Protection Agency
 Number of Days to Update: 64 Telephone: 703-308-8895
 Last EDR Contact: 06/30/2016

ROD: Records Of Decision

Standard Environmental Record Source: Federal NPL
 Search Distance: 0.333 Mile

Record of Decision, ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013 Source: EPA

RECORD SOURCES AND CURRENCY

Number of Days to Update: 74 Telephone: 703-416-0223
 Last EDR Contact: 09/09/2016

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: 0.333 Mile

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA, Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently, the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011 Source: Environmental Protection Agency
 Number of Days to Update: 54 Telephone: 615-532-8599
 Last EDR Contact: 08/15/2016

SEMS: Superfund Enterprise Management System

Standard Environmental Record Source: Federal CERCLIS
 Search Distance: 0.333 Mile

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly known as the Superfund Sites List and was managed by the states, the states, and potentially hazardous sites that are not currently reported to the USEPA. The states, municipalities, and tribes are responsible for the management of the sites. Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 03/07/2016 Source: EPA
 Number of Days to Update: 10 Telephone: 800-424-9346
 Last EDR Contact: 07/22/2016

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: 0.333 Mile

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS-ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site investigations or SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL). Unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 03/07/2016 Source: EPA
 Number of Days to Update: 10 Telephone: 800-424-9346
 Last EDR Contact: 07/22/2016

SSTS: Section 7 Tracking Systems

Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009 Source: EPA
 Number of Days to Update: 77 Telephone: 202-564-4203

RECORD SOURCES AND CURRENCY

Last EDR Contact: 07/25/2016

TRIS: Toxic Chemical Release Inventory System
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III, Section 313.

Date of Government Version: 12/31/2014
Number of Days to Update: 133
Last EDR Contact: 08/26/2016
Source: EPA
Telephone: 202-566-0250

TSCA: Toxic Substances Control Act
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Number of Days to Update: 14
Last EDR Contact: 06/24/2016
Source: EPA
Telephone: 202-260-5521

UMTRA: Uranium Mill Tailings Sites
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Number of Days to Update: 146
Last EDR Contact: 09/09/2016
Source: Department of Energy
Telephone: 505-845-0011

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from the monitoring stations at the facilities, and is used to track emissions and compliance data from industrial plants, universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/20/2015
Number of Days to Update: 69
Last EDR Contact: 06/22/2016
Source: EPA
Telephone: 202-564-2496

US AIRS MINOR: Air Facility System Data
Standard Environmental Record Source: Other Standard Environmental Records
A listing of minor source facilities.

Date of Government Version: 10/20/2015
Number of Days to Update: 69
Source: EPA
Telephone: 202-564-2496

RECORD SOURCES AND CURRENCY

Last EDR Contact: 06/22/2016

US BROWNFIELDS: A Listing of Brownfields Sites
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvigorating these properties takes development pressure off of undeveloped, vacant, or blighted areas, and both improves and protects the environment. Cleanup activities are supported by the Superfund program, the Small Business Technology Transfer (STTR) program, Assessment, Cleanup and Remediation Grants, and the Superfund Innovative Remediation Technology Demonstration Program. The Superfund program provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 06/21/2016
Number of Days to Update: 72
Last EDR Contact: 06/22/2016
Source: Environmental Protection Agency
Telephone: 202-566-2777

US CDL: Clandestine Drug Labs
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department of Justice, but rather the law enforcement agency that reported the location. The Department of Justice must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/04/2016
Number of Days to Update: 40
Last EDR Contact: 08/31/2016
Source: Drug Enforcement Administration
Telephone: 202-307-1000

US ENG CONTROLS: Engineering Controls Sites List
Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: Property

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or affect human health.

Date of Government Version: 05/09/2016
Number of Days to Update: 93
Last EDR Contact: 08/31/2016
Source: Environmental Protection Agency
Telephone: 703-603-0695

US FIN ASSUR: Financial Assurance Information
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-obscure care of their facilities.

Date of Government Version: 05/08/2016
Number of Days to Update: 107
Last EDR Contact: 08/17/2016
Source: Environmental Protection Agency
Telephone: 202-566-1917

US HIST CDL: National Clandestine Laboratory Register
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 05/04/2016
Number of Days to Update: 40
Last EDR Contact: 05/31/2016

Source: Drug Enforcement Administration
Telephone: 202-307-1000

US INST CONTROL: Sites with Institutional Controls

Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: Property

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 05/09/2016
Number of Days to Update: 93
Last EDR Contact: 09/31/2016

Source: Environmental Protection Agency
Telephone: 703-603-0695

US MINES: Mines Master Index File

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/09/2016
Number of Days to Update: 44
Last EDR Contact: 09/01/2016

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

DOD: Department of Defense Sites

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Number of Days to Update: 62
Last EDR Contact: 07/15/2016

Source: USGS
Telephone: 888-275-8747

INDIAN RESERV: Indian Reservations

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Number of Days to Update: 34
Last EDR Contact: 07/15/2016

Source: USGS
Telephone: 202-208-3710

PWS: Public Water System Data

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

This Safe Drinking Water Information System (SDWIS) file contains public water systems name and address, population served and the primary source of water.

Date of Government Version: 12/17/2013
Number of Days to Update: 279
Last EDR Contact: 08/29/2016

Source: EPA
Telephone: Not Reported

RECORD SOURCES AND CURRENCY

HISTORICAL USE RECORDS

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List
Standard Environmental Record Source: Exclusive Recovered Govt. Archives
Search Distance: Property

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: Not Reported
Number of Days to Update: 191
Last EDR Contact: 06/01/2012
Source: Department of Health
Telephone: Not Reported

RGA LF: Recovered Government Archive Solid Waste Facilities List
Standard Environmental Record Source: Exclusive Recovered Govt. Archives
Search Distance: Property

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: Not Reported
Number of Days to Update: 200
Last EDR Contact: 06/01/2012
Source: Department of Health
Telephone: Not Reported

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank
Standard Environmental Record Source: Exclusive Recovered Govt. Archives
Search Distance: Property

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: Not Reported
Number of Days to Update: 186
Last EDR Contact: 06/01/2012
Source: Department of Health
Telephone: Not Reported

EDR Hist Auto: EDR Exclusive Historic Gas Stations
Standard Environmental Record Source: Historical Gas Stations
Search Distance: 0.125 Mile

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/serve on sites that were available EDR researchers. EDR's review was limited to those categories of sources listed in the EDR's "High Risk Historical Records", or HRHR. The categories of sources reviewed include gas stations, filling stations, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: 02/20/2007
Number of Days to Update: 42
Last EDR Contact: 02/21/2007
Source: EDR, Inc.
Telephone: Not Reported

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners
Standard Environmental Record Source: Historical Dry Cleaners
Search Distance: 0.125 Mile

RECORD SOURCES AND CURRENCY

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available EDR researchers. EDR's review was limited to those categories of sources listed in the EDR's "High Risk Historical Records", or HRHR. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundries, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: 02/20/2007
Number of Days to Update: 42
Last EDR Contact: 02/21/2007
Source: EDR, Inc.
Telephone: Not Reported

EDR MGP: EDR Proprietary Manufactured Gas Plants
Standard Environmental Record Source: Former manufactured Gas Plants
Search Distance: 0.333 Mile

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800s to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that was heated to produce gas. The gas was then passed through a series of processes including scrubbing, gas production, and containing volatile and non-volatile chemicals, sludges, oils and other compounds that are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: 03/28/2009
Number of Days to Update: 55
Last EDR Contact: 11/30/2012
Source: EDR, Inc.
Telephone: Not Reported

RECORD SOURCES AND CURRENCY

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)

Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5' minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U. S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[®] Information System

Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW[®] information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

STATSGO: State Soil Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services. The U. S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)

Telephone: 800-672-5559

SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

STREET AND ADDRESS INFORMATION

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**Field 912
Not Reported
Kihei, HI 96753
Inquiry Number: 4729933.6s
November 9, 2016**

EDR Vapor Encroachment Screen
Prepared using EDR's Vapor Encroachment Worksheet



Environmental Data Resources Inc

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S. Armstrong, PA 15106
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www.edrnet.com

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of the ASTM Standard Practice for Assessment of Vapor Encroachment into Structures on Property Involved in Real Estate Transactions (E 2600).

| STANDARD ENVIRONMENTAL RECORDS | Maximum Search Distance* | Property | Summary |
|---|--------------------------|----------|-------------|
| | | 1/10 | 1/10 - 1/13 |
| Federal NPL | 0.333 | 0 | 0 |
| Federal CERCLIS | 0.333 | 0 | 0 |
| Federal RCRA CORRACTS facilities list | 0.333 | 0 | 0 |
| Federal RCRA TSD facilities list | 0.333 | 0 | 0 |
| Federal RCRA generators list | property | 0 | - |
| Federal institutional controls / engineering controls registries | 0.333 | 0 | 0 |
| Federal ERNS list | property | 0 | - |
| State and tribal - equivalent NPL | not searched | - | - |
| State and tribal - equivalent CERCLIS | 0.333 | 0 | 0 |
| State and tribal landfill / solid waste disposal | 0.333 | 0 | 0 |
| State and tribal leaking storage tank lists | 0.333 | 0 | 1 |
| State and tribal registered storage tank lists | property | 0 | - |
| State and tribal institutional control / engineering control registries | property | 0 | - |
| State and tribal voluntary cleanup sites | 0.333 | 0 | 0 |
| State and tribal Brownfields sites | 0.333 | 0 | 0 |
| Other Standard Environmental Records | 0.333 | 0 | 0 |

| HISTORICAL USE RECORDS | Property | Summary |
|------------------------------------|----------|---------|
| Former manufactured Gas Plants | 0 | 0 |
| Historical Gas Stations | 0 | 0 |
| Historical Dry Cleaners | 0 | 0 |
| Exclusive Recovered Govt. Archives | 0 | - |

*Each category may include several separate databases, each having a different search distance. For each category, the table reports the maximum search distance applied. See the section Record Sources and Currency for information on individual databases.

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The EDR Vapor Encroachment Worksheet enables EDR's customers to make certain online modifications that affects maps, text and calculations contained in this Report. As a result, maps, text and calculations contained in this Report may have been so modified. EDR has not taken any action to verify any such modifications, and this report and the findings set forth herein must be read in light of this fact. Environmental Data Resources shall not be responsible for any customer's decision to include or not include in any final report any records determined to be within the relevant minimum search distances.

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EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

FIELD 912
NOT REPORTED
KIHEI, HI 96753

COORDINATES

Latitude (North): 20.819106 - 20.49 8.778534
Longitude (West): 156.469795 - 156.28 11.235352
Elevation: 62 ft. above sea level

EXECUTIVE SUMMARY

PHYSICAL SETTING INFORMATION

Flood Zone: Available
NWI Wetlands: Available

AQUIFLOW®

Search Radius: 0.333 Mile.
No Aquiflow sites reported.

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Jaucas
Soil Surface Texture: sand
Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.
Soil Drainage Class: Excessively drained
Hydric Status: Not hydric
Corrosion Potential - Uncoated Steel: Moderate
Depth to Bedrock Min: > 0 inches
Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | AAASHTO Group | Classification | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 12 inches | sand | Granular materials (35 pct or less passing No. 200) Fine Sand. | COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141 Min: 42.34 | Max: 7.3 Min: 6.6 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 2 | 12 inches | 59 inches | sand | Granular materials (95 pct. or less passing No. 200), Fine Sand. | COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand. | Max: 141 Min: 42.34 | Max: 8.4 Min: 6.6 |

Soil Map ID: 2

Soil Component Name: Pulehu

Soil Surface Texture: silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|---|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 3

Soil Component Name: Pulehu

Soil Surface Texture: cobbly silt loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | cobbly silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

EXECUTIVE SUMMARY

Soil Map ID: 4

Soil Component Name: Ewa

Soil Surface Texture: cobbly silty clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|------------------------|--|--|--|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity (micro m/sec) |
| | Upper | Lower | | AASHTO Group | Unified Soil | |
| 1 | 0 inches | 18 inches | cobbly silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 |
| 2 | 18 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 |

Soil Map ID: 5

Soil Component Name: Ewa

Soil Surface Texture: silty clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

EXECUTIVE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|--------------------|--|--|--|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity (micro m/sec) |
| | Upper | Lower | | AASHTO Group | Unified Soil | |
| 1 | 0 inches | 18 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 |
| 2 | 18 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 |

Soil Map ID: 6

Soil Component Name: Waiakoa

Soil Surface Texture: extremely stony silty clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 71 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|---------------------------------|---|---|---|-----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification Unified Soil | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 0 inches | extremely stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 0 inches | 20 inches | extremely stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |
| 3 | 20 inches | 27 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 27 inches | 31 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max: Min: |

Soil Map ID: 7

Soil Component Name: Waiakoa

Soil Surface Texture: silty clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 84 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|---|---|---|-----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification Unified Soil | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 1 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 1 inches | 25 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |
| 3 | 25 inches | 33 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 33 inches | 37 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max: Min: |

Soil Map ID: 8

Soil Component Name: Alae

Soil Surface Texture: sandy loam

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|-----------------------|--|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 7 inches | sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.8 Min: 7.4 |
| 2 | 7 inches | 14 inches | stratified sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.8 Min: 7.4 |
| 3 | 14 inches | 55 inches | gravelly coarse sand | Granular materials (35 pct. or less, passing No. 200). Stone Fragments, Gravel and Sand. | COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel, COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel. | Max: 141 Min: 14.11 | Max: 8.4 Min: 7.9 |

Soil Map ID: 9

Soil Component Name: Pulehu
 Soil Surface Texture: cobbly silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | cobbly silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 10

Soil Component Name: Alae
 Soil Surface Texture: cobbly sandy loam
 Hydrologic Group: Class A - High infiltration rates. Silts are deep, well drained to excessively drained sands and gravels.
 Soil Drainage Class: Excessively drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

Soil Layer Information

| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
|-------|----------|----------|--------------------|---|--|--|----------------------|
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 7 inches | cobbly sandy loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14.11 | Max: 7.3 Min: 6.6 |

EXECUTIVE SUMMARY

| Soil Layer Information | | | | | | |
|------------------------|-----------|-----------|---|---|---|----------------------|
| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | AASHTO Group | Unified Soil | | |
| 2 | 7 inches | 14 inches | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 42 Min: 14,11 | Max: 7.8 Min: 7.4 |
| 3 | 14 inches | 55 inches | Granular materials (35 pct. or less passing No. 200). Stone Fragments, Gravel and Sand. | COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel, COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel. | Max: 141 Min: 14,11 | Max: 8.4 Min: 7.9 |

EXECUTIVE SUMMARY

SEARCH RESULTS

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

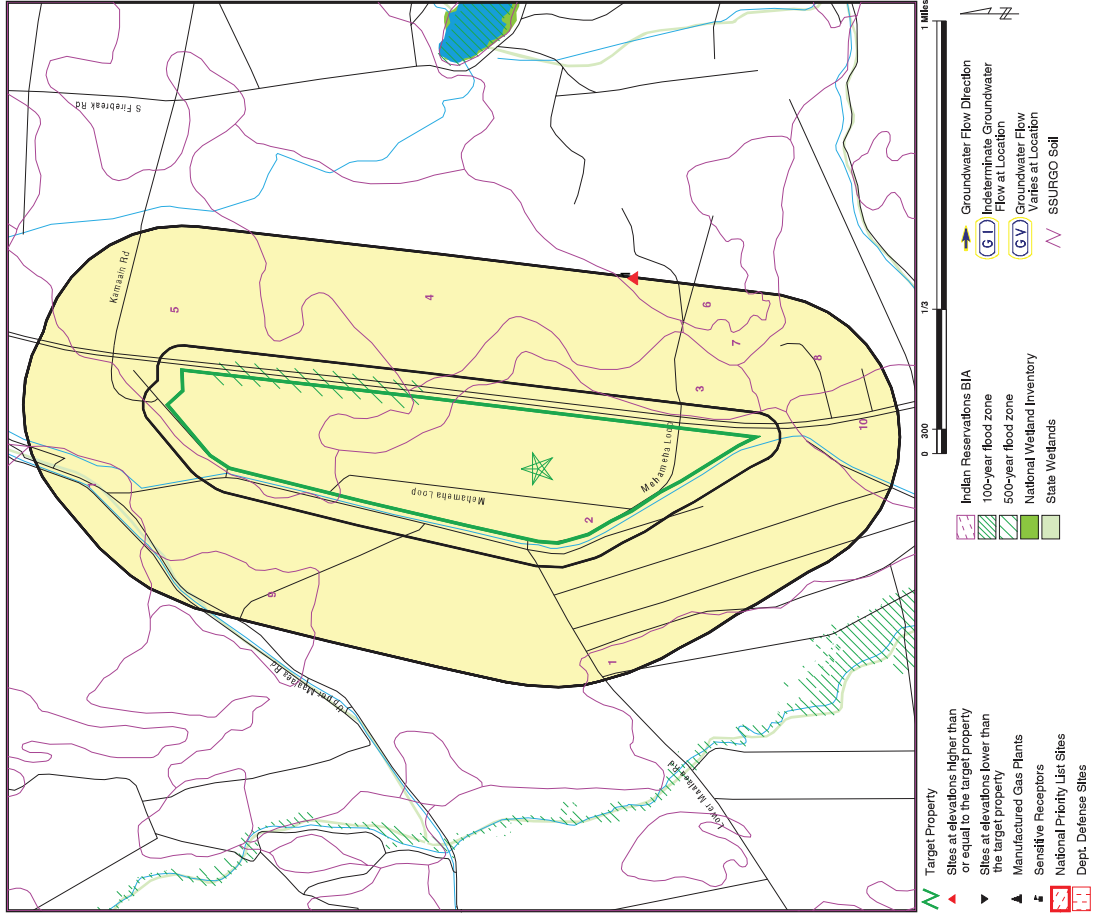
| | | | | |
|-----------------------------|-------------------|-----------------|---------------|-------------|
| Name | Address | Dist/Dir | Map ID | Page |
| FORMER PUUNENE NAVY AIRPORT | SOUTH OF MOKULELE | 1/10 - 1/3 ESE | ▲ 1 | 17 |

UST: State and Tribal registered storage tank lists
LUST: State and Tribal leaking storage tank lists

HISTORICAL USE RECORDS

| | | | | |
|--------------|----------------|-----------------|---------------|-------------|
| Name | Address | Dist/Dir | Map ID | Page |
| Not Reported | | | | |

PRIMARY MAP - 4729933.6S

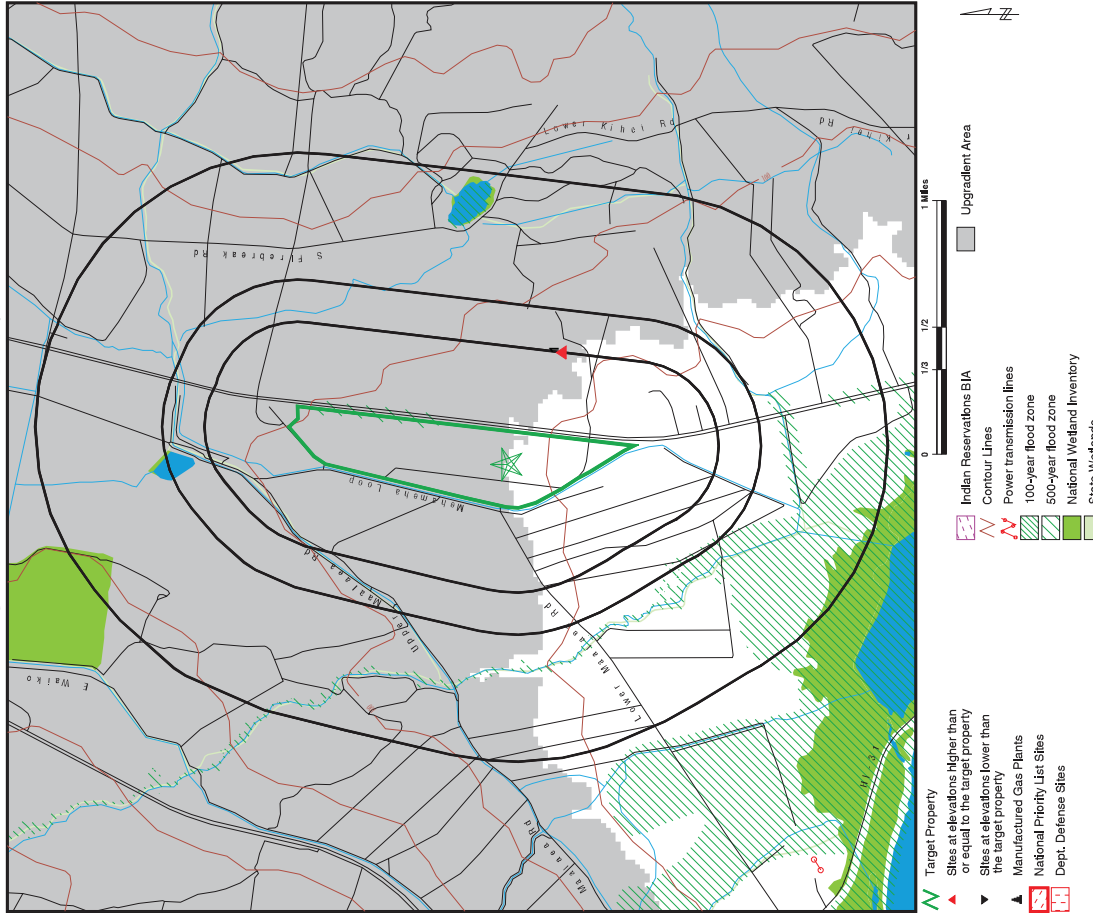


SITE NAME: Field 912
 ADDRESS: Not Reported
 CONTACT: Shara Akashima
 INQUIRY #: 4729933.6S
 LAT/LONG: 20.819106 / 156.468795

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Akashima
 INQUIRY #: 4729933.6S
 DATE: September 19, 2016 1:52 pm

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SECONDARY MAP - 4729933.6S



SITE NAME: Field 912
 ADDRESS: Not Reported
 CONTACT: Shara Akashima
 INQUIRY #: 4729933.6S
 LAT/LONG: 20.819106 / 156.468795

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Akashima
 INQUIRY #: 4729933.6S
 DATE: September 19, 2016 1:50 pm

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LEGEND

| | | |
|---|--|--|
| FACILITY NAME FACILITY ADDRESS, CITY, ST, ZIP | | EDR SITE ID NUMBER |
| ▼ MAP ID# | Direction Distance Range Relative Elevation | ASTM 2860 Record Sources found in this report. Each data record is assigned to one or more categories. For detailed information about categorization, see the section of the report Records Searched and Currency. |
| Worksheet: | | |
| Comments: Comments may be added on the online Vapor Encroachment Worksheet. | | |

DATABASE ACRONYM: Applicable categories (A hoverbox with database description).

| | | |
|--|---|--|
| FORMER PUUNENE NAVY AIRPORT SOUTH OF MOKULELE, PUUNENE, HI, 96784 | | U003732390 |
| ▲ 1 | ESE 1/10 - 1/3 17 ft. Higher Elevation | (1746 ft. / 0.331 mi.) 79 ft. Above Sea Level |
| Worksheet: State and tribal leaking storage tank lists | | |

UST: State and tribal registered storage tank lists

Facility ID: 9-503623
 Owner: U.S. DEPT OF THE NAVY
 Owner Address: Not Reported
 Owner City/ST/Zip: Puunene, 96784, 96784
 Latitude: 20.815813
 Longitude: -156.462737
 Horizontal Reference Datum Name: Not Reported
 Horizontal Collection Method Name: Not Reported
 Tank ID: R-1A
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 03/30/2000
 Tank Capacity: 50000
 Substance: Other
 Tank ID: R-1B
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 03/30/2000
 Tank Capacity: 50000
 Substance: Other
 Tank ID: R-1C

FORMER PUUNENE NAVY AIRPORT, SOUTH OF MOKULELE, PUUNENE, HI 96784 (Continued)

Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 03/30/2001
 Tank Capacity: 50000
 Substance: Other
 Tank ID: R-2A
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 10/04/2000
 Tank Capacity: 25000
 Substance: Other
 Tank ID: R-2B
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 10/04/2000
 Tank Capacity: 25000
 Substance: Other
 Tank ID: R-2C
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 04/10/2000
 Tank Capacity: 25000
 Substance: Other
 Tank ID: R-2D
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 04/10/2000
 Tank Capacity: 25000
 Substance: Other
 Tank ID: R-3A
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 11/16/2000
 Tank Capacity: 50000
 Substance: Other
 Tank ID: R-3B
 Date Installed: Not Reported
Tank Status: Permanently Out of Use
 Date Closed: 11/16/2000
 Tank Capacity: 50000
 Substance: Other

LUST: State and tribal leaking storage tank lists

IMAP FINDINGS

RECORD SOURCES AND CURRENCY

FORMER PUUNENE NAVY AIRPORT, SOUTH OF MOKULELE, PUUNENE, HI 96784 (Continued)

Facility ID: 9-503823
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 06/13/2001
Release ID: 000079
Project Officer: Jose Ruiz

To maintain currency of the following databases, EDR contacts the appropriate agency on a monthly or quarterly basis, as required.
Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

PRP: Potentially Responsible Parties
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Number of Days to Update: 3
Last EDR Contact: 08/12/2016
Source: EPA
Telephone: 202-564-6023

RMP: Risk Management Plans
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history over the last five years, and an evaluation of worst-case and alternative accidental releases. Prevention program that includes safety procedures, employee training, and emergency response procedures. Emergency response procedures that include drills, spills out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g. the fire department) should an accident occur.

Date of Government Version: 05/01/2016
Number of Days to Update: 99
Last EDR Contact: 07/25/2016
Source: Environmental Protection Agency
Telephone: 202-564-8600

AIRS: List of Permitted Facilities
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of permitted facilities in the state.

Date of Government Version: 04/14/2016
Number of Days to Update: 28
Last EDR Contact: 07/13/2016
Source: Department of Health
Telephone: 808-586-4200

BROWNFIELDS: Brownfields Sites
Standard Environmental Record Source: State and tribal Brownfields sites
Search Distance: 0.333 Mile

With certain legal exclusions and additions, the term "brownfield sites" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 05/06/2016
Number of Days to Update: 69
Last EDR Contact: 08/26/2016
Source: Department of Health
Telephone: 808-586-4249

CDL: Clandestine Drug Lab Listing
Standard Environmental Record Source: Other Standard Environmental Records

RECORD SOURCES AND CURRENCY

Search Distance: Property
 A listing of clandestine drug lab site locations.

Date of Government Version: 09/04/2010
 Number of Days to Update: 42
 Last EDR Contact: 09/12/2016

DRYCLEANERS: Permitted Drycleaner Facility Listing
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: 0.25 Mile

A listing of permitted drycleaner facilities in the state.

Date of Government Version: 01/20/2016
 Number of Days to Update: 28
 Last EDR Contact: 09/16/2016

ENG CONTROLS: Engineering Control Sites
 Standard Environmental Record Source: State and tribal institutional control / engineering control registries
 Search Distance: Property

A listing of sites with engineering controls in place.

Date of Government Version: 05/06/2016
 Number of Days to Update: 69
 Last EDR Contact: 08/26/2016

Financial Assurance: Financial Assurance Information Listing
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/21/2016
 Number of Days to Update: 39
 Last EDR Contact: 09/12/2016

INST CONTROL: Sites with Institutional Controls
 Standard Environmental Record Source: State and tribal institutional control / engineering control registries
 Search Distance: Property

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 05/06/2016
 Number of Days to Update: 69
 Last EDR Contact: 08/26/2016

LUST: Leaking Underground Storage Tank Database
 Standard Environmental Record Source: State and tribal leaking storage tank lists
 Search Distance: 0.333 Mile

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported, leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

RECORD SOURCES AND CURRENCY

Date of Government Version: 01/13/2016
 Number of Days to Update: 47
 Last EDR Contact: 08/31/2016

Source: Department of Health
 Telephone: 808-586-4228

SHWS: Sites List
 Standard Environmental Record Source: State and tribal - equivalent CERCLIS
 Search Distance: 0.333 Mile

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 05/06/2016
 Number of Days to Update: 69
 Last EDR Contact: 08/26/2016

SPILLS: Release Notifications
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property

Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 01/14/2016
 Number of Days to Update: 42
 Last EDR Contact: 08/26/2016

SWPLF: Permitted Landfills in the State of Hawaii
 Standard Environmental Record Source: State and tribal landfill / solid waste disposal
 Search Distance: 0.333 Mile

Solid Waste Facilities/Landfill Sites. SWPLF lists records typically contain an inventory of solid waste disposal facilities or landfills in the state. Distinguishes between permitted and unpermitted facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/17/2012
 Number of Days to Update: 37
 Last EDR Contact: 07/01/2016

Source: Department of Health
 Telephone: 808-586-4245

UIC: Underground Injection Wells Listing
 Standard Environmental Record Source: Other Standard Environmental Records
 Search Distance: Property

A listing of underground injection well locations.

Date of Government Version: 02/07/2013
 Number of Days to Update: 56
 Last EDR Contact: 08/24/2016

Source: Department of Health
 Telephone: 808-586-4258

UST: Underground Storage Tank Database
 Standard Environmental Record Source: State and tribal registered storage tank lists
 Search Distance: Property

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 01/13/2016
 Number of Days to Update: 47

Source: Department of Health
 Telephone: 808-586-4228

RECORD SOURCES AND CURRENCY

Last EDR Contact: 09/31/2016

VCP: Voluntary Response Program Sites
Standard Environmental Record Source: State and tribal voluntary cleanup sites
Search Distance: 0.333 Mile

Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily clean up properties.

Date of Government Version: 05/06/2016 Source: Department of Health
Number of Days to Update: 69 Telephone: 808-586-4249
Last EDR Contact: 09/26/2016

2020 COR ACTION: 2020 Corrective Action Program List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others are in the early stages of cleanup or remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013 Source: Environmental Protection Agency
Number of Days to Update: 6 Telephone: 703-308-4044
Last EDR Contact: 09/06/2016

COAL ASH DOE: Steam-Electric Plant Operation Data
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005 Source: Department of Energy
Number of Days to Update: 76 Telephone: 202-586-8719
Last EDR Contact: 09/09/2016

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014 Source: Environmental Protection Agency
Number of Days to Update: 40 Telephone: Not Reported
Last EDR Contact: 09/06/2016

CONSENT: Superfund (CERCLA) Consent Decrees
Standard Environmental Record Source: Federal NPL
Search Distance: 0.333 Mile

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2015 Source: Department of Justice, Consent Decree Library
Number of Days to Update: 149 Telephone: Varies
Last EDR Contact: 07/15/2016

TC GR 4

RECORD SOURCES AND CURRENCY

CORRACTS: Corrective Action Report
Standard Environmental Record Source: Federal RCRA CORRACTS facilities list
Search Distance: 0.333 Mile

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 08/27/2016 Source: EPA
Number of Days to Update: 64 Telephone: 800-424-9346
Last EDR Contact: 06/30/2016

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
Standard Environmental Record Source: State and tribal landfill/ solid waste disposal
Search Distance: 0.333 Mile

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009 Source: EPA, Region 9
Number of Days to Update: 137 Telephone: 415-947-4219
Last EDR Contact: 07/20/2016

DOCKET HWC: Hazardous Waste Compliance Docket Listing
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016 Source: Environmental Protection Agency
Number of Days to Update: 91 Telephone: 202-564-0527
Last EDR Contact: 08/24/2016

DOT OPS: Incident and Accident Data
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Department of Transportation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012 Source: Department of Transportation, Office of Pipeline Safety
Number of Days to Update: 42 Telephone: 202-366-4695
Last EDR Contact: 08/02/2016

Delisted NPL: National Priority List Deletions
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425 (e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/07/2016 Source: EPA
Number of Days to Update: 10 Telephone: Not Reported
Last EDR Contact: 07/07/2016

ECHO: Enforcement & Compliance History Information
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

TC GR 5

RECORD SOURCES AND CURRENCY

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/20/2015
Source: Environmental Protection Agency
Number of Days to Update: 103
Last EDR Contact: 06/22/2016

EPA WATCH LIST: EPA WATCH LIST

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or state or local environmental agency is warranted. The Watch List is not intended to represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Source: Environmental Protection Agency
Number of Days to Update: 88
Last EDR Contact: 08/09/2016

ERNS: Emergency Response Notification System

Standard Environmental Record Source: Federal ERNS list
Search Distance: Property

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/28/2016
Source: National Response Center, United States Coast Guard
Number of Days to Update: 51
Last EDR Contact: 06/28/2016

FEMA LIST: Underground Storage Tank Listing

Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Source: FEMA
Number of Days to Update: 55
Last EDR Contact: 07/07/2016

FINDS: Facility Index/Facility Registry System

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Facility Index System. FINDS contains both facility information and "pointers" to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIFS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PAUS (PCB Activity Data System).

Date of Government Version: 07/20/2015
Source: EPA
Number of Days to Update: 55
Last EDR Contact: 09/07/2016

RECORD SOURCES AND CURRENCY

FTTS: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Number of Days to Update: 25
Telephone: 202-566-1667

Last EDR Contact: 08/17/2016

FTTS INSP: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Standard Environmental Record Source: Other Standard Environmental Records
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009

Source: EPA

Telephone: 202-566-1667

Number of Days to Update: 25

Last EDR Contact: 08/17/2016

FUDS: Formerly Used Defense Sites

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/13/2015

Source: U.S. Army Corps of Engineers

Telephone: 202-528-4285

Number of Days to Update: 97

Last EDR Contact: 09/09/2016

FUELS PROGRAM: EPA Fuels Program Registered Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 05/24/2016

Source: EPA

Telephone: 800-385-6164

Number of Days to Update: 49

Last EDR Contact: 08/23/2016

FUSRAP: Formerly Utilized Sites Remedial Action Program

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/11/2016

Source: Department of Energy

Telephone: 202-586-3559

Number of Days to Update: 80

Last EDR Contact: 07/26/2016

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

Standard Environmental Record Source: Other Standard Environmental Records

RECORD SOURCES AND CURRENCY

Search Distance: Property

A complete administrative case listing from the EFRA/TSCA Tracking System (FTTS) for all EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006 Source: Environmental Protection Agency
Number of Days to Update: 40 Telephone: 202-564-2501
Last EDR Contact: 12/17/2007

HMIRS: Hazardous Materials Information Reporting System

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Hazardous Materials Incident Report System: HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/24/2015 Source: U.S. Department of Transportation
Number of Days to Update: 68 Telephone: 202-366-4555
Last EDR Contact: 06/28/2016

ICIS: Integrated Compliance Information System

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015 Source: Environmental Protection Agency
Number of Days to Update: 31 Telephone: 202-564-5088
Last EDR Contact: 07/07/2016

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
Search Distance: 0.333 Mile

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/27/2015 Source: EPA Region 1
Number of Days to Update: 67 Telephone: 617-918-1313
Last EDR Contact: 07/29/2016

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 01/07/2016 Source: EPA Region 10
Number of Days to Update: 41 Telephone: 206-553-2857
Last EDR Contact: 07/27/2016

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/05/2016 Source: EPA Region 4

RECORD SOURCES AND CURRENCY

Number of Days to Update: 35 Telephone: 404-562-8677
Last EDR Contact: 07/26/2016

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/17/2016 Source: EPA, Region 5
Number of Days to Update: 37 Telephone: 312-886-7439
Last EDR Contact: 07/27/2016

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 12/11/2015 Source: EPA Region 6
Number of Days to Update: 105 Telephone: 214-665-6597
Last EDR Contact: 07/27/2016

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/09/2015 Source: EPA Region 7
Number of Days to Update: 112 Telephone: 913-551-7003
Last EDR Contact: 07/27/2016

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/13/2015 Source: EPA Region 8
Number of Days to Update: 118 Telephone: 303-312-6271
Last EDR Contact: 07/27/2016

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 02/25/2016 Source: Environmental Protection Agency
Number of Days to Update: 37 Telephone: 415-972-3372
Last EDR Contact: 07/27/2016

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998 Source: Environmental Protection Agency
Number of Days to Update: 52 Telephone: 703-308-8245
Last EDR Contact: 08/05/2016

INDIAN UST R1: Underground Storage Tanks on Indian Land

RECORD SOURCES AND CURRENCY

Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/20/2015
Number of Days to Update: 67
Last EDR Contact: 07/29/2016
Source: EPA, Region 1
Telephone: 617-918-1313

INDIAN UST R10: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 01/07/2016
Number of Days to Update: 41
Last EDR Contact: 07/27/2016
Source: EPA, Region 10
Telephone: 206-553-2857

INDIAN UST R4: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations).

Date of Government Version: 02/05/2016
Number of Days to Update: 35
Last EDR Contact: 07/26/2016
Source: EPA, Region 4
Telephone: 404-562-9424

INDIAN UST R5: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015
Number of Days to Update: 52
Last EDR Contact: 07/27/2016
Source: EPA, Region 5
Telephone: 312-886-6136

INDIAN UST R6: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 69 Tribes).

Date of Government Version: 12/03/2015
Number of Days to Update: 120
Last EDR Contact: 07/27/2016
Source: EPA, Region 6
Telephone: 214-665-7591

INDIAN UST R7: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Number of Days to Update: 65
Last EDR Contact: 07/27/2016
Source: EPA, Region 7
Telephone: 913-551-7003

TC GR 10

RECORD SOURCES AND CURRENCY

INDIAN UST R8: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 01/26/2016
Number of Days to Update: 119
Last EDR Contact: 07/27/2016
Source: EPA, Region 8
Telephone: 303-312-6137

INDIAN UST R9: Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal registered storage tank lists
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/25/2016
Number of Days to Update: 37
Last EDR Contact: 07/27/2016
Source: EPA, Region 9
Telephone: 415-972-3388

INDIAN VCP R1: Voluntary Cleanup Priority Listing
Standard Environmental Record Source: State and tribal voluntary cleanup sites
Search Distance: Property
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Number of Days to Update: 142
Last EDR Contact: 07/01/2016
Source: EPA, Region 1
Telephone: 617-918-1102

INDIAN VCP R7: Voluntary Cleanup Priority Listing
Standard Environmental Record Source: State and tribal voluntary cleanup sites
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Number of Days to Update: 27
Last EDR Contact: 04/20/2009
Source: EPA, Region 7
Telephone: 913-551-7365

LEAD SMELTER 1: Lead Smelter Sites
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property
A listing of former lead smelter site locations.

Date of Government Version: 03/07/2016
Number of Days to Update: 148
Last EDR Contact: 07/08/2016
Source: Environmental Protection Agency
Telephone: 703-603-8787

LEAD SMELTER 2: Lead Smelter Sites
Standard Environmental Record Source: Other Standard Environmental Records
A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust.

Date of Government Version: 04/05/2001
Number of Days to Update: 36
Last EDR Contact: 12/02/2009
Source: American Journal of Public Health
Telephone: 703-305-6451

TC GR 11

RECORD SOURCES AND CURRENCY

LIENS 2: CERCLA Lien Information
Standard Environmental Record Source: Federal CERCLIS
Search Distance: Property

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014 Source: Environmental Protection Agency
Number of Days to Update: 37 Telephone: 202-564-6023
Last EDR Contact: 07/29/2016

LUCIS: Land Use Control Information System
Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: 0.333 Mile

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015 Source: Department of the Navy
Number of Days to Update: 13 Telephone: 843-820-7328
Last EDR Contact: 08/12/2016

MLTS: Material Licensing Tracking System
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/07/2016 Source: Nuclear Regulatory Commission
Number of Days to Update: 28 Telephone: 301-415-7169
Last EDR Contact: 09/05/2016

NPL: National Priority List
Standard Environmental Record Source: Federal NPL
Search Distance: 0.333 Mile

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for cover of the NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/07/2016 Source: EPA
Number of Days to Update: 10 Telephone: Not Reported
Last EDR Contact: 07/07/2016

NPL Site Boundaries
Sources:
EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-566-0690

EPA Region 1
Telephone: 617-918-1102
EPA Region 2
Telephone: 212-637-4293

RECORD SOURCES AND CURRENCY

EPA Region 3
Telephone: 215-814-5418
EPA Region 4
Telephone: 404-562-8681
EPA Region 5
Telephone: 312-353-1063
EPA Region 6
Telephone: 214-655-6659
EPA Region 7
Telephone: 913-551-7247
EPA Region 8
Telephone: 303-312-6118
EPA Region 9
Telephone: 415-947-4579
EPA Region 10
Telephone: 206-553-4479

NPL LIENS: Federal Superfund Liens
Standard Environmental Record Source: Federal NPL
Search Distance: Property

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file a lien against the real property of a party when the property owner received notification of potential liability. USEPA completes a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991 Source: EPA
Number of Days to Update: 56 Telephone: 202-564-4267
Last EDR Contact: 08/15/2011

ODI: Open Dump Inventory
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985 Source: Environmental Protection Agency
Number of Days to Update: 39 Telephone: 800-424-9346
Last EDR Contact: 06/09/2004

PADS: PCB Activity Database System
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

PCB Activity Database. PADS identifies generators, transporters, commercial stores and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2016 Source: EPA
Number of Days to Update: 127 Telephone: 202-566-0500
Last EDR Contact: 07/15/2016

PCB TRANSFORMER: PCB Transformer Registration Database
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

The database of PCB transformer registrations that includes all PCB registration submittals.

RECORD SOURCES AND CURRENCY

Date of Government Version: 02/01/2011
Number of Days to Update: 83
Last EDR Contact: 07/29/2016
Source: Environmental Protection Agency
Telephone: 202-566-0517

Proposed NPL - Proposed National Priority List Sites
Standard Environmental Record Source: Federal NPL

Search Distance: 0.333 Mile

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register EPA then accepts public comments on the site, responds to the comments and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/07/2016
Number of Days to Update: 10
Last EDR Contact: 07/07/2016
Source: EPA
Telephone: Not Reported

RAATS: RCRA Administrative Action Tracking System
Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1985, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Number of Days to Update: 35
Last EDR Contact: 06/02/2008
Source: EPA
Telephone: 202-564-4104

RADINFO: Radiation Information Database
Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2015
Number of Days to Update: 69
Last EDR Contact: 07/07/2016
Source: Environmental Protection Agency
Telephone: 202-343-9775

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated
Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/21/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators
Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RECORD SOURCES AND CURRENCY

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-LQG: RCRA - Large Quantity Generators
Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-SQG: RCRA - Small Quantity Generators
Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/21/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-TSDF: RCRA - Treatment, Storage and Disposal
Standard Environmental Record Source: Federal RCRA TSD facilities list

Search Distance: 0.333 Mile

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/21/2016
Number of Days to Update: 64
Last EDR Contact: 06/30/2016
Source: Environmental Protection Agency
Telephone: 703-308-8895

ROD: Records Of Decision
Standard Environmental Record Source: Federal NPL

Search Distance: 0.333 Mile

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Source: EPA

RECORD SOURCES AND CURRENCY

Last EDR Contact: 06/22/2016

US BROWNFIELDS: A Listing of Brownfields Sites
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped or underused land, and both improves and protects the environment. Assessment, Cleanup and Remediation (ACR) grants are provided by EPA to help states and localities assess and clean up brownfields. Cleanup of brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRS Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 06/21/2016 Source: Environmental Protection Agency
Number of Days to Update: 72 Telephone: 202-566-2777
Last EDR Contact: 06/22/2016

US CDL: Clandestine Drug Labs
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department of Justice, but rather the law enforcement agency that reported the location. The Department of Justice must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/04/2016 Source: Drug Enforcement Administration
Number of Days to Update: 40 Telephone: 202-307-1000
Last EDR Contact: 08/31/2016

US ENG CONTROLS: Engineering Controls Sites List
Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: Property

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 05/09/2016 Source: Environmental Protection Agency
Number of Days to Update: 93 Telephone: 703-603-0695
Last EDR Contact: 08/31/2016

US FIN ASSUR: Financial Assurance Information
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 05/09/2016 Source: Environmental Protection Agency
Number of Days to Update: 107 Telephone: 202-566-1917
Last EDR Contact: 08/17/2016

US HIST CDL: National Clandestine Laboratory Register
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 05/04/2016 Source: Drug Enforcement Administration
Number of Days to Update: 40 Telephone: 202-307-1000
Last EDR Contact: 05/31/2016

US INST CONTROL: Sites with Institutional Controls
Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: Property

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 05/09/2016 Source: Environmental Protection Agency
Number of Days to Update: 93 Telephone: 703-603-0695
Last EDR Contact: 08/31/2016

US MINES: Mines Master Index File
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/20/2016 Source: Department of Labor, Mine Safety and Health
Number of Days to Update: 44 Administration
Last EDR Contact: 09/01/2016 Telephone: 303-231-5959

DOD: Department of Defense Sites
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005 Source: USGS
Number of Days to Update: 62 Telephone: 888-275-8747
Last EDR Contact: 07/15/2016

INDIAN RESERV: Indian Reservations
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005 Source: USGS
Number of Days to Update: 34 Telephone: 202-208-3710
Last EDR Contact: 07/15/2016

PWS: Public Water System Data
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

This Safe Drinking Water Information System (SDWIS) file contains public water systems name and address, population served and the primary source of water.

Date of Government Version: 12/17/2013

Number of Days to Update: 279

Last EDR Contact: 08/29/2016

Source: EPA

Telephone: Not Reported

RECORD SOURCES AND CURRENCY

HISTORICAL USE RECORDS

RGALHS: Recovered Government Archive State Hazardous Waste Facilities List
Standard Environmental Record Source: Exclusive Recovered Govt. Archives
Search Distance: Property

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: Not Reported

Number of Days to Update: 191

Last EDR Contact: 06/01/2012

Source: Department of Health

Telephone: Not Reported

RGALF: Recovered Government Archive Solid Waste Facilities List

Standard Environmental Record Source: Exclusive Recovered Govt. Archives

Search Distance: Property

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: Not Reported

Number of Days to Update: 200

Last EDR Contact: 06/01/2012

Source: Department of Health

Telephone: Not Reported

RGALUST: Recovered Government Archive Leaking Underground Storage Tank

Standard Environmental Record Source: Exclusive Recovered Govt. Archives

Search Distance: Property

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: Not Reported

Number of Days to Update: 186

Last EDR Contact: 06/01/2012

Source: Department of Health

Telephone: Not Reported

EDR Hist Auto: EDR Exclusive Historic Gas Stations

Standard Environmental Record Source: Historical Gas Stations

Search Distance: 0.125 Mile

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station serving EDR sites that were available to EDR researchers. EDR's review was limited to those categories of sources that were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records" or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: 02/20/2007

Number of Days to Update: 42

Last EDR Contact: 02/21/2007

Source: EDR, Inc.

Telephone: Not Reported

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

Standard Environmental Record Source: Historical Dry Cleaners

Search Distance: 0.125 Mile

RECORD SOURCES AND CURRENCY

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites within the United States. The listings include dry cleaning establishments. The categories reviewed included, but were not limited to, dry cleaners, cleaner/laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRRH. EDR's HRRH effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: 02/20/2007

Source: EDR, Inc.

Number of Days to Update: 42

Telephone: Not Reported

Last EDR Contact: 02/21/2007

EDR MGP: EDR Proprietary Manufactured Gas Plants
Standard Environmental Record Source: Former manufactured Gas Plants
Search Distance: 0.333 Mile

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used shale oil, resin, coal, or a mixture of coal, oil, and water that was gasified to produce manufactured gas. The gas was then used in a variety of ways, including for heating, lighting, and cooking. Some of the gas plants contained volatile and non-volatile chemicals, sulphides, oils and other compounds that are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: 08/28/2009

Source: EDR, Inc.

Number of Days to Update: 55

Telephone: Not Reported

Last EDR Contact: 11/30/2012

RECORD SOURCES AND CURRENCY

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)

Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5' minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[®] Information System

Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW[®] Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

STATSGO: State Soil Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services. The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

STREET AND ADDRESS INFORMATION

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APPENDIX IV
REGULATORY RECORDS DOCUMENTATION (*EDR Radius Map Report*)

Fields 821, 916, and 917
Not Reported
Kihei, HI 96753

Inquiry Number: 4729934.2s
September 19, 2016

The EDR Radius Map™ Report with GeoCheck®



6 Armstrong Road, 4th floor
Sunnyvale, CA 94085
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

NOT REPORTED
KIHAEI, HI 96753

COORDINATES

Latitude (North): 20.7994830 - 20.477 58.13"
Longitude (West): 156.4571420 - 156.27 25.71"
Universal Transverse Mercator: Zone 18
UTM X (Meters): 764897.1
UTM Y (Meters): 2301906.8
Elevation: 59 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map: 5941643 PUU O KALI, HI
Version Date: 2013
Southwest Map: 5941599 MAALAEA, HI
Version Date: 2013

MAPPED SITES SUMMARY

EXECUTIVE SUMMARY

Target Property Address:
NOT REPORTED
KIHEI, HI 96753

Click on Map ID to see full detail.

| MAP ID | SITE NAME | ADDRESS | DATABASE ACRONYMS | RELATIVE ELEVATION | DIST (ft. & mi.) | DIRECTION |
|--------|----------------------|--------------|-------------------|--------------------|------------------|-----------|
| 1 | DEKALB PFIZER GENETI | MOKULELE HWY | UST | Lower | 1199, 0.227, SSW | |

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

- NPL..... National Priority List
- Proposed NPL..... Proposed National Priority List Sites
- NPL LIENS..... Federal Superfund Liens

Federal Delisted NPL site list

- Delisted NPL..... National Priority List Deletions

Federal CERCLIS list

- FEDERAL FACILITY..... Federal Facility Site Information listing
- SEMS..... Superfund Enterprise Management System

Federal CERCLIS MFRAP site list

- SEMS-ARCHIVE..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

- CORRACTS..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

- RCRA-TSDF..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

- RCRA-LQG..... RCRA - Large Quantity Generators
- RCRA-SQG..... RCRA - Small Quantity Generators
- RCRA-CESQG..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

- LUCIS..... Land Use Control Information System
- US ENG CONTROLS..... Engineering Controls Sites List

EXECUTIVE SUMMARY

US INST CONTROL..... Sites with Institutional Controls

Federal ERMS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS..... Sites List

State and tribal landfill and/or solid waste disposal site lists

SWW/LF..... Permitted Landfills in the State of Hawaii

State and tribal leaking storage tank lists

LUST..... Leaking Underground Storage Tank Database

INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing

INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

ENG CONTROLS..... Engineering Control Sites

INST CONTROL..... Sites with Institutional Controls

State and tribal voluntary cleanup sites

VCP..... Voluntary Response Program Sites

INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

ODI..... Open Dump Inventory

DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... De-listed National Clandestine Laboratory Register

CDL..... Clandestine Drug Lab Listing

EXECUTIVE SUMMARY

US CDL..... National Clandestine Laboratory Register

Local Land Records

LIENS 2..... CERCLA Lien Information

Records of Emergency Release Reports

HMIRS..... Hazardous Materials Information Reporting System

SPILLS..... Release Notifications

SPILLS 90..... SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR..... RCRA - Non Generators / No Longer Regulated Formerly Used Defense Sites

DOD..... Department of Defense Sites

SCRD DRYCLEANERS..... State Coalition for Remediation of Drycleaners Listing

US FIN ASSUP..... Financial Assurance Information

EPA WATCH LIST..... EPA WATCH LIST

2020 COR ACTION..... 2020 Corrective Action Program List

TSCA..... Toxic Substances Control Act

TRIS..... Toxic Chemical Release Inventory System

SSTS..... Section 7 Tracking Systems

ROD..... Records Of Decision

RMP..... Risk Management Plans

RAA/TS..... RCRA Administrative Action Tracking System

PRP..... Potentially Responsible Parties

PADS..... PCB Activity Database System

ICIS..... Integrated Compliance Information System

FTTS..... FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

MLTS..... Material Licensing Tracking System

COAL ASH DOE..... Steam-Electric Plant Operation Data

COAL ASH EPA..... Coal Combustion Residues Surface Impoundments List

PCB TRANSFORMER..... PCB Transformer Registration Database

RADINFO..... Radiation Information Database

HIST FTTS..... FIFRA/TSCA Tracking System Administrative Case Listing

DOT OPS..... Incident and Accident Data

CONSENT..... Superfund (CERCLA) Consent Decrees

INDIAN RESERV..... Indian Reservations

FUSRAP..... Formerly Utilized Sites Remedial Action Program

UMTRA..... Uranium Mill Tailings Sites

LEAD SMELTERS..... Lead Smelter Sites

US AIRS..... Aerometric Information Retrieval System Facility Subsystem

US MINES..... Mines Master Index File

FINDS..... Facility Index System/Facility Registry System

UXO..... Unexploded Ordnance Sites

DOCKET HWC..... Hazardous Waste Compliance Docket Listing

AIRS..... List of Permitted Facilities

DRYCLEANERS..... Permitted Drycleaner Facility Listing

Financial Assurance..... Financial Assurance Information Listing

UIC..... Underground Injection Wells Listing

FUELS PROGRAM..... EPA Fuels Program Registered Listing

ECHO..... Enforcement & Compliance History Information

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

- EDR MGP..... EDR Proprietary Manufactured Gas Plants
- EDR Hist Auto..... EDR Exclusive Historic Gas Stations
- EDR Hist Cleaner..... EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

- RGA HWS..... Recovered Government Archive State Hazardous Waste Facilities List
- RGA LF..... Recovered Government Archive Solid Waste Facilities List
- RGA LUST..... Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property. Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in **bold italics** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

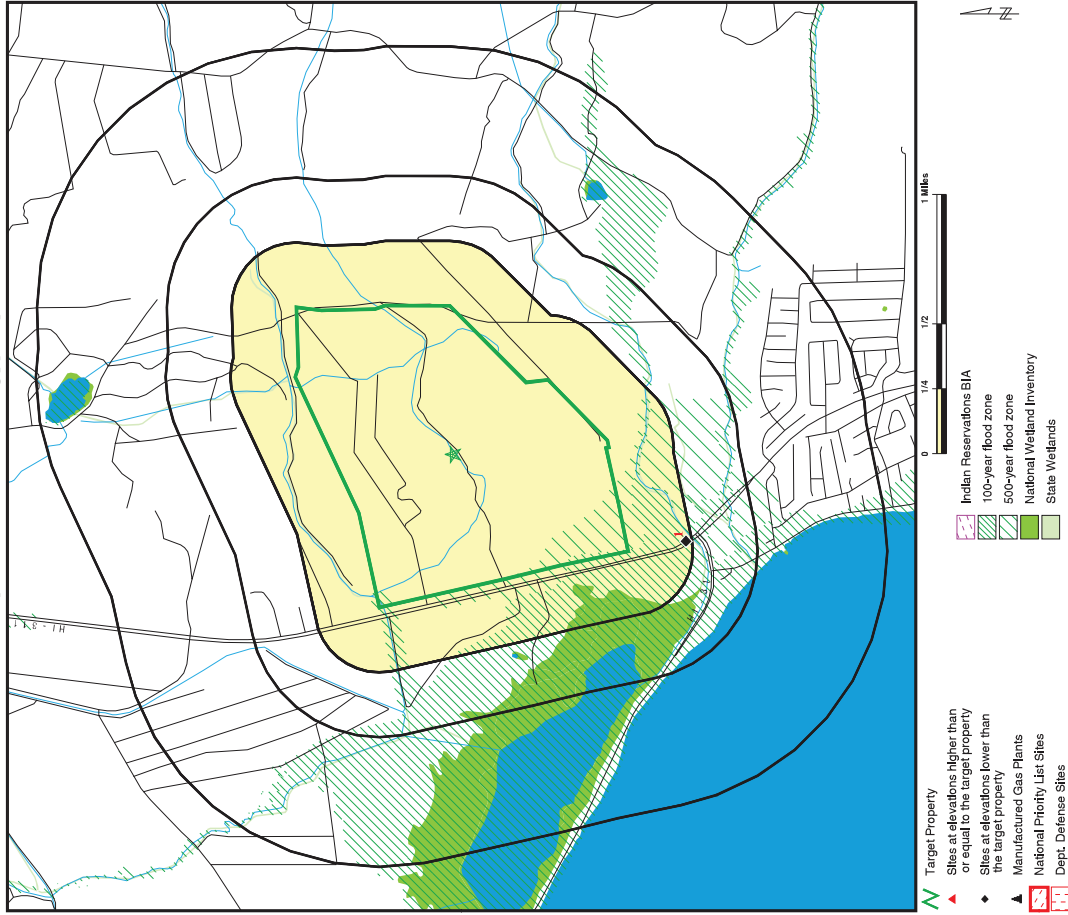
State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Health's Listing of Underground Storage Tanks.

A review of the UST list, as provided by EDR, and dated 01/13/2016 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|--|--------------|---------------------------|--------|------|
| DEKALB PFIZER GENETI Tank Status: Permanently Out of Use Facility Id: 9-001566 | MOKULELE HWY | SSW 1/8 - 1/4 (0.227 mi.) | 1 | 8 |

OVERVIEW MAP - 4729934.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands

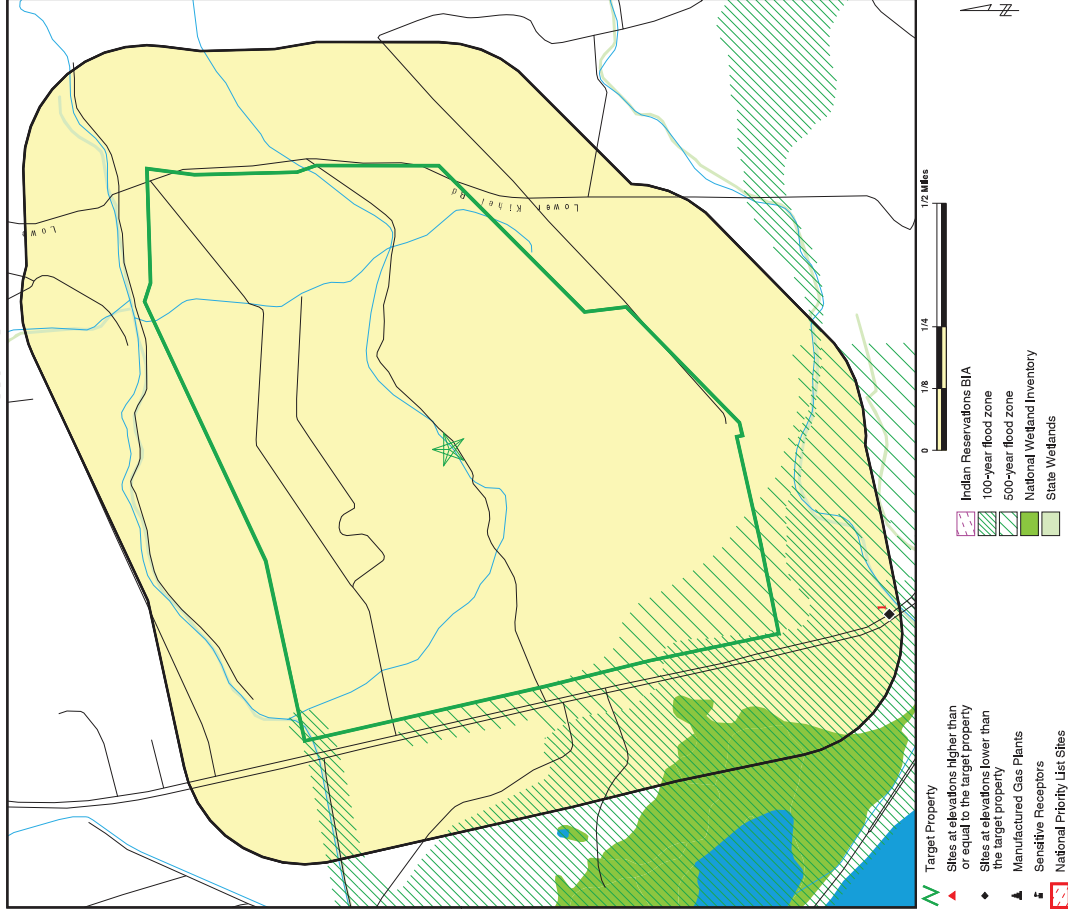
This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Fields 821, 916, and 917
 ADDRESS: Not Reported
 Kirel HI 96753
 LAT/LONG: 20.789483 / 156.457142

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Sharia Alkashima
 INQUIRY #: 4729934.2S
 DATE: September 19, 2016 1:01 pm

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DETAIL MAP - 4729934.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Fields 821, 916, and 917
 ADDRESS: Not Reported
 Kirel HI 96753
 LAT/LONG: 20.789483 / 156.457142

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Sharia Alkashima
 INQUIRY #: 4729934.2S
 DATE: September 19, 2016 1:02 pm

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MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| STANDARD ENVIRONMENTAL RECORDS | | | | | | | | |
| <i>Federal NPL site list</i> | | | | | | | | |
| NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| Proposed NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| NPL LIENS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Federal Delisted NPL site list</i> | | | | | | | | |
| Delisted NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| <i>Federal CERCLIS list</i> | | | | | | | | |
| FEDERAL FACILITY | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| SEMS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal CERCLIS NFRAP site list</i> | | | | | | | | |
| SEMS-ARCHIVE | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal RCRA CORRACTS facilities list</i> | | | | | | | | |
| CORRACTS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| <i>Federal RCRA non-CORRACTS TSD facilities list</i> | | | | | | | | |
| RCRA-TSDF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal RCRA generators list</i> | | | | | | | | |
| RCRA-LOG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-SQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-CESQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| <i>Federal institutional controls / engineering controls registries</i> | | | | | | | | |
| LUCIS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US ENG CONTROLS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US INST CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal ERNS list</i> | | | | | | | | |
| ERNS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>State- and tribal - equivalent CERCLIS</i> | | | | | | | | |
| SHWS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| <i>State and tribal landfill and/or solid waste disposal site lists</i> | | | | | | | | |
| SWIFLF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal leaking storage tank lists</i> | | | | | | | | |
| LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INDIAN LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal registered storage tank lists</i> | | | | | | | | |
| FEMA UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|--|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| UST | 0.250 | | 0 | 1 | NR | NR | NR | 1 |
| INDIAN UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| <i>State and tribal institutional control / engineering control registries</i> | | | | | | | | |
| ENG CONTROLS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INST CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal voluntary cleanup sites</i> | | | | | | | | |
| VCP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INDIAN VCP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal Brownfields sites</i> | | | | | | | | |
| BROWNFIELDS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ADDITIONAL ENVIRONMENTAL RECORDS | | | | | | | | |
| <i>Local / Brownfield lists</i> | | | | | | | | |
| US BROWNFIELDS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Local Lists of Landfill / Solid Waste Disposal Sites</i> | | | | | | | | |
| INDIAN ODI | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ODI | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| DEBRIS REGION 9 | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Local Lists of Hazardous waste / Contaminated Sites</i> | | | | | | | | |
| US HIST CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Local / Land Records</i> | | | | | | | | |
| LIENS 2 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Records of Emergency Release Reports</i> | | | | | | | | |
| HMIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS 90 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Other Ascertainable Records</i> | | | | | | | | |
| RCRA NonGen / NLR | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| FUDS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| DD | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| SCRD DRYCLEANERS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US FN ASSUR | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| EPA WATCH LIST | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| 2020 COR ACTION | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| TSCA | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| TRIS | 0.001 | | 0 | NR | NR | NR | NR | 0 |

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|

NOTES:
 TP = Target Property
 NR = Not Requested at this Search Distance
 Sites may be listed in more than one database

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|

| | | | | | | | | |
|---------------------|-------|--|----|----|----|----|----|---|
| SSTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| ROD | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| RMP | 0.001 | | NR | NR | NR | NR | NR | 0 |
| RWATS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| PRP | 0.001 | | NR | NR | NR | NR | NR | 0 |
| PADS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| IGIS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FTTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| MLTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| COALASHDOE | 0.001 | | NR | NR | NR | NR | NR | 0 |
| COALASHPEA | 0.500 | | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB TRANSFORMER | 0.001 | | NR | NR | NR | NR | NR | 0 |
| RADINFO | 0.001 | | NR | NR | NR | NR | NR | 0 |
| HIST FTTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| DOT OPS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| CONSENT | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| INDIAN RESERV | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FUSRAP | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| UMTRA | 0.500 | | 0 | 0 | 0 | 0 | 0 | 0 |
| LEAD SMELTERS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| US AIRS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| US AIRS | 0.250 | | 0 | 0 | 0 | 0 | 0 | 0 |
| US MINES | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FINDS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| UXO | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| DOCKET HWC | 0.001 | | NR | NR | NR | NR | NR | 0 |
| AIRS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| DRYCLEANERS | 0.250 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Financial Assurance | 0.001 | | NR | NR | NR | NR | NR | 0 |
| UIC | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FUELS PROGRAM | 0.250 | | 0 | 0 | 0 | 0 | 0 | 0 |
| ECHO | 0.001 | | NR | NR | NR | NR | NR | 0 |

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

| | | | | | | | | |
|------------------|-------|--|---|----|----|----|----|---|
| EDR MGP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| EDR Hist Auto | 0.125 | | 0 | NR | NR | NR | NR | 0 |
| EDR Hist Cleaner | 0.125 | | 0 | NR | NR | NR | NR | 0 |

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

| | | | | | | | | |
|----------|-------|--|---|----|----|----|----|---|
| RGA HWS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RGA LF | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RGA LUST | 0.001 | | 0 | NR | NR | NR | NR | 0 |

- Totals -- 0 1 0 0 0 0 1

Map ID
Direction
Distance
Elevation

MAP FINDINGS

EPA ID Number
EPA ID Number

Site

Database(s)

1 DEKALB PFIZER GENETICS

SSW
1/8-1/4
0.227 mi.
1199 ft.

UST U001236757
N/A

Relative:
Lower
Actual:
16 ft.

UST:
Facility ID: 9-501566
Owner: DEKALB PFIZER GENETICS
Owner Address: P. O. BOX 645
Owner City/State/Zip: Kiheti, 96753 96753
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-1
Date Installed: 03/20/1974
Tank Status: Permanently Out of Use
Date Closed: Not reported
Tank Capacity: 1000
Substance: Gasoline

Count: 0 records.
City
EPA ID
Site Name
Site Address
Database(s)
Zip
EPA ID Number
EPA ID Number
NO SITES FOUND

ORPHAN SUMMARY

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/07/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10
Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:
EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333
EPA Region 1
Telephone 617-918-1143
EPA Region 3
Telephone 215-814-5418
EPA Region 4
Telephone 404-562-8033
EPA Region 5
Telephone 312-886-6686
EPA Region 10
Telephone 206-553-8665
EPA Region 6
Telephone: 214-655-6659
EPA Region 7
Telephone: 913-551-7247
EPA Region 8
Telephone: 303-312-6774
EPA Region 9
Telephone: 415-947-4246

Proposed NPL - Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/07/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10
Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56
Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Delistions
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be delisted from the NPL where no further response is appropriate.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/07/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10
Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing
A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/13/2015
Date Data Arrived at EDR: 01/06/2016
Last EDR Contact: 07/06/2016
Date Made Active in Reports: 05/20/2016
Number of Days to Update: 135
Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 07/06/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly known as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/22/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10
Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/22/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, remained to SEMS-ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10
Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/22/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.
Date of Government Version: 06/27/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

Federal Institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 13
Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/12/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 05/09/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 93
Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 05/09/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 93
Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal ERNS list

ERNS: Emergency Response Notification System
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/28/2016
Date Data Arrived at EDR: 03/30/2016
Date Made Active in Reports: 05/20/2016
Number of Days to Update: 51
Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

State and tribal - equivalent CERCLIS

SHWS: Sites List
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 05/06/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 08/02/2016
Number of Days to Update: 69
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWP/LF: Permitted Landfills in the State of Hawaii
Solid Waste Facilities/Landfill Sites. SWP/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/17/2012
Date Data Arrived at EDR: 04/03/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 37
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 07/01/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 01/13/2016
Date Data Arrived at EDR: 01/15/2016
Date Made Active in Reports: 03/02/2016
Number of Days to Update: 47
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

INDIAN LUST RS: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/17/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/19/2016
Number of Days to Update: 41
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/09/2015
Date Data Arrived at EDR: 02/12/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 112
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/13/2015
Date Data Arrived at EDR: 10/23/2015
Date Made Active in Reports: 02/19/2016
Number of Days to Update: 116
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 02/25/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/27/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/05/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 35
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 12/11/2015
Date Data Arrived at EDR: 02/19/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 105
Source: EPA Region 6
Telephone: 214-665-6697
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Source: FEMA
Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Varies

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 01/13/2016
Date Data Arrived at EDR: 01/15/2016
Date Made Active in Reports: 03/02/2016
Number of Days to Update: 47
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 41
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/25/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 01/26/2016
Date Data Arrived at EDR: 02/05/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 119
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and Ten Tribal Nations).

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 12/03/2015
Date Data Arrived at EDR: 02/04/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 120
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015
Date Data Arrived at EDR: 11/13/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 52
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations).

Date of Government Version: 02/05/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 35
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites

A listing of sites with engineering controls in place.

Date of Government Version: 05/06/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 06/02/2016
Number of Days to Update: 69
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 05/06/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 06/02/2016
Number of Days to Update: 69
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Source: EPA, Region 1
Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Last EDR Contact: 07/01/2016
Next Scheduled EDR Contact: 10/10/2016
Number of Days to Update: 142
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Source: EPA, Region 7
Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Last EDR Contact: 05/19/2008
Next Scheduled EDR Contact: 07/20/2009
Number of Days to Update: 27
Data Release Frequency: Varies

VCP: Voluntary Response Program Sites

Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Source: Department of Health
Date of Government Version: 05/06/2016
Date Data Arrived at EDR: 05/25/2016
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 69
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites

With certain legal exclusions and additions, the term 'brownfield site' means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Source: Department of Health
Date of Government Version: 05/06/2016
Date Data Arrived at EDR: 05/25/2016
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 69
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfields sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Source: Environmental Protection Agency
Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/22/2016
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/03/2016
Number of Days to Update: 72
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.
Source: Environmental Protection Agency
Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Last EDR Contact: 08/05/2016
Next Scheduled EDR Contact: 11/14/2016
Number of Days to Update: 52
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Source: Environmental Protection Agency
Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Number of Days to Update: 39
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Source: EPA, Region 9
Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Last EDR Contact: 07/20/2016
Next Scheduled EDR Contact: 10/07/2016
Number of Days to Update: 137
Data Release Frequency: No Update Planned

Local Lists of Hazardous waste / Contaminated Sites

US HST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Source: Drug Enforcement Administration
Date of Government Version: 05/04/2016
Date Data Arrived at EDR: 06/03/2016
Last EDR Contact: 05/31/2016
Next Scheduled EDR Contact: 06/13/2016
Number of Days to Update: 40
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Listing

A listing of clandestine drug lab site locations.

Source: Department of Health
Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Last EDR Contact: 10/22/2010
Next Scheduled EDR Contact: 12/12/2016
Number of Days to Update: 42
Data Release Frequency: Varies

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 05/04/2016
 Date Data Arrived at EDR: 06/03/2016
 Last EDR Contact: 08/31/2016
 Next Scheduled EDR Contact: 12/1/2016
 Number of Days to Update: 40
 Source: Drug Enforcement Administration
 Telephone: 202-307-1000
 Last EDR Contact: 08/31/2016
 Next Scheduled EDR Contact: 12/1/2016
 Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information
 A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
 Date Data Arrived at EDR: 03/18/2014
 Date Made Active in Reports: 04/24/2014
 Number of Days to Update: 37
 Source: Environmental Protection Agency
 Telephone: 202-564-6023
 Last EDR Contact: 07/29/2016
 Next Scheduled EDR Contact: 11/07/2016
 Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System
 HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/24/2015
 Date Data Arrived at EDR: 06/25/2015
 Date Made Active in Reports: 09/02/2015
 Number of Days to Update: 68
 Source: U.S. Department of Transportation
 Telephone: 202-366-4555
 Last EDR Contact: 06/28/2016
 Next Scheduled EDR Contact: 10/10/2016
 Data Release Frequency: Annually

SPILLS: Release Notifications
 Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 01/14/2016
 Date Data Arrived at EDR: 02/24/2016
 Date Made Active in Reports: 04/06/2016
 Number of Days to Update: 42
 Source: Department of Health
 Telephone: 808-586-4249
 Last EDR Contact: 08/26/2016
 Next Scheduled EDR Contact: 12/05/2016
 Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
 Date Data Arrived at EDR: 07/03/2013
 Date Made Active in Reports: 02/11/2013
 Number of Days to Update: 39
 Source: FirstSearch
 Telephone: N/A
 Last EDR Contact: 01/03/2013
 Next Scheduled EDR Contact: N/A
 Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA Non-Gen / NLR: RCRA - Non Generators / No Longer Regulated
 RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 06/21/2016
 Date Data Arrived at EDR: 06/30/2016
 Last EDR Contact: 06/30/2016
 Next Scheduled EDR Contact: 10/17/2016
 Number of Days to Update: 64
 Source: Environmental Protection Agency
 Telephone: (415) 485-8895
 Last EDR Contact: 06/30/2016
 Next Scheduled EDR Contact: 10/17/2016
 Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
 Date Data Arrived at EDR: 07/08/2015
 Date Made Active in Reports: 10/13/2015
 Number of Days to Update: 97
 Source: U.S. Army Corps of Engineers
 Telephone: 202-526-4285
 Last EDR Contact: 09/09/2016
 Next Scheduled EDR Contact: 12/19/2016
 Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
 Date Data Arrived at EDR: 11/10/2006
 Date Made Active in Reports: 01/11/2007
 Number of Days to Update: 62
 Source: USGS
 Telephone: 888-275-8747
 Last EDR Contact: 07/15/2016
 Next Scheduled EDR Contact: 10/24/2016
 Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administered lands of the United States. Lands included are administered by: Army Corps of Engineers; Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
 Date Data Arrived at EDR: 02/06/2006
 Date Made Active in Reports: 01/11/2007
 Number of Days to Update: 339
 Source: U.S. Geological Survey
 Telephone: 888-275-8747
 Last EDR Contact: 07/15/2016
 Next Scheduled EDR Contact: 10/24/2016
 Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1988, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
 Date Data Arrived at EDR: 03/09/2011
 Date Made Active in Reports: 05/02/2011
 Number of Days to Update: 54
 Source: Environmental Protection Agency
 Telephone: 615-532-8599
 Last EDR Contact: 08/15/2016
 Next Scheduled EDR Contact: 11/28/2016
 Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 05/08/2016
 Date Data Arrived at EDR: 05/18/2016
 Date Made Active in Reports: 09/02/2016
 Number of Days to Update: 107
 Source: Environmental Protection Agency
 Telephone: 202-566-1917
 Last EDR Contact: 08/17/2016
 Next Scheduled EDR Contact: 11/28/2016
 Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 06/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88
Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/08/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6
Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 09/06/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14
Source: EPA
Telephone: 202-268-5521
Last EDR Contact: 06/24/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 133
Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77
Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74
Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 12/19/2016
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(i) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(1): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spalls out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 05/01/2016
Date Data Arrived at EDR: 05/28/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 99
Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administrative actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 06/07/1995
Number of Days to Update: 35
Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 08/12/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2016
Date Data Arrived at EDR: 04/28/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 127
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/06/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 31
Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Quarterly

FTTS: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/17/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/17/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 03/18/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 28
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/05/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 12/19/2016
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 09/06/2016
Next Scheduled EDR Contact: 12/19/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.
Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2015
Date Data Arrived at EDR: 07/09/2015
Date Made Active in Reports: 09/16/2015
Number of Days to Update: 69
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2009
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2009
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transportation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42
Source: Department of Transportation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 04/06/2016
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/10/2016
Number of Days to Update: 149

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LOG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Biennially

INDIAN RESERVE: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/09/2006
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/11/2016
Date Data Arrived at EDR: 03/15/2016
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/21/2016
Number of Days to Update: 80

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 146

Source: Department of Energy
Telephone: 305-846-0011
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/07/2016
Last EDR Contact: 07/08/2016
Next Scheduled EDR Contact: 10/17/2016
Number of Days to Update: 148

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/08/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Source: American Journal of Public Health
Telephone: 703-306-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/09/2016
Date Data Arrived at EDR: 03/02/2016
Last EDR Contact: 09/01/2016
Next Scheduled EDR Contact: 12/12/2016
Number of Days to Update: 44

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/01/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2006
Last EDR Contact: 09/02/2016
Next Scheduled EDR Contact: 12/12/2016
Number of Days to Update: 49

Source: USGS
Telephone: 703-646-7709
Last EDR Contact: 09/02/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 12/12/2016
Number of Days to Update: 97

Source: USGS
Telephone: 703-646-7709
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FINDS: Facility Index System/Facility Registry System
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

DOCKET HWC: Hazardous Waste Compliance Docket Listing
A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.
Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 55
Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 09/07/2016
Next Scheduled EDR Contact: 12/19/2016
Data Release Frequency: Quarterly

DOCKET HVC: Hazardous Waste Compliance Docket Listing
A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.
Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 91
Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 08/24/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites
A listing of unexploded ordnance site locations
Date of Government Version: 10/25/2015
Date Data Arrived at EDR: 01/29/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 67
Source: Department of Defense
Telephone: 571-373-0407
Last EDR Contact: 06/20/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Varies

AIRS: List of Permitted Facilities
A listing of permitted facilities in the state.
Date of Government Version: 04/14/2016
Date Data Arrived at EDR: 04/19/2016
Date Made Active in Reports: 05/17/2016
Number of Days to Update: 28
Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 07/13/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing
A listing of permitted drycleaner facilities in the state.
Date of Government Version: 01/20/2016
Date Data Arrived at EDR: 04/19/2016
Date Made Active in Reports: 05/17/2016
Number of Days to Update: 28
Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 09/16/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/24/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 39
Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 09/12/2016
Next Scheduled EDR Contact: 12/28/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UIC: Underground Injection Wells Listing
A listing of underground injection well locations.
Date of Government Version: 02/07/2013
Date Data Arrived at EDR: 02/12/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 56
Source: Department of Health
Telephone: 808-586-4258
Last EDR Contact: 08/24/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 05/24/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 49
Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 08/23/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information
ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.
Date of Government Version: 09/20/2015
Date Data Arrived at EDR: 09/23/2015
Date Made Active in Reports: 07/04/2016
Number of Days to Update: 103
Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oil waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Aut:

EDR Exclusive Historic Gas Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to, dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRRR. EDR's HRRR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Number of Days to Update: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGAs: Recovered Government Archive State Hazardous Waste Facilities List
The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Number of Days to Update: 191
Data Release Frequency: Varies

RGAs: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Number of Days to Update: 200
Data Release Frequency: Varies

RGAs: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Number of Days to Update: 186
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Oil/Gas Pipelines

Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/INGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/INGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:

Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing

Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes

Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools

Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools

Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK® - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

FIELDS 821, 916, AND 917
NOT REPORTED
KIHAI, HI 96753

TARGET PROPERTY COORDINATES

Latitude (North): 20 79'48.3" - 20 47' 58.14"
Longitude (West): 156 45'14.2" - 156 27' 25.71"
Universal Transverse Mercator:
Zone 4
UTM X (Meters): 764697.1
UTM Y (Meters): 2301906.8
Elevation: 59 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map: 5841643 PUUO KALI, HI
Version Date: 2013
Southwest Map: 5841589 MAALAEA, HI
Version Date: 2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

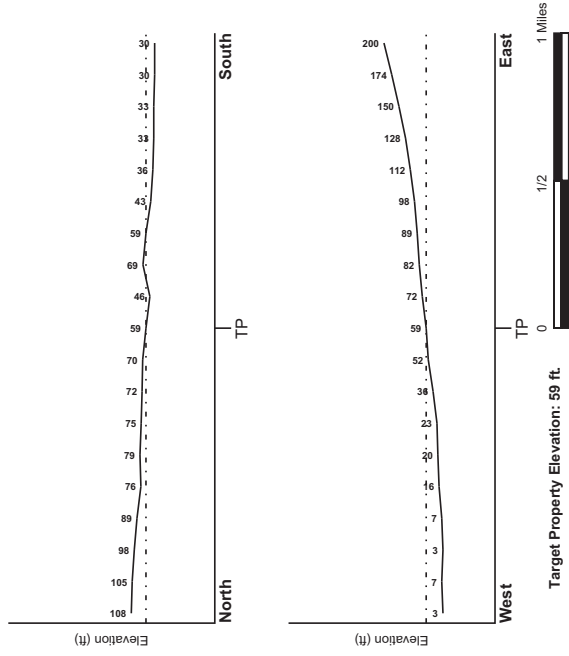
GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION
 Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

TOPOGRAPHIC INFORMATION
 Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY
 General Topographic Gradient: General West

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION
 Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE
 Flood Plain Panel at Target Property
 FEMA Source Type
 FEMA FIRM Flood data
 1500030580F
 Additional Panels in search area:
 FEMA Source Type
 FEMA Q3 Flood data
 1500030557G
 FEMA FIRM Flood data
 1500030559F

NATIONAL WETLAND INVENTORY
 NWI Electronic Data Coverage
 YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION
 Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®
 Search Radius: 1,000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID: Not Reported
 LOCATION FROM TP:
 GENERAL DIRECTION: GROUNDWATER FLOW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

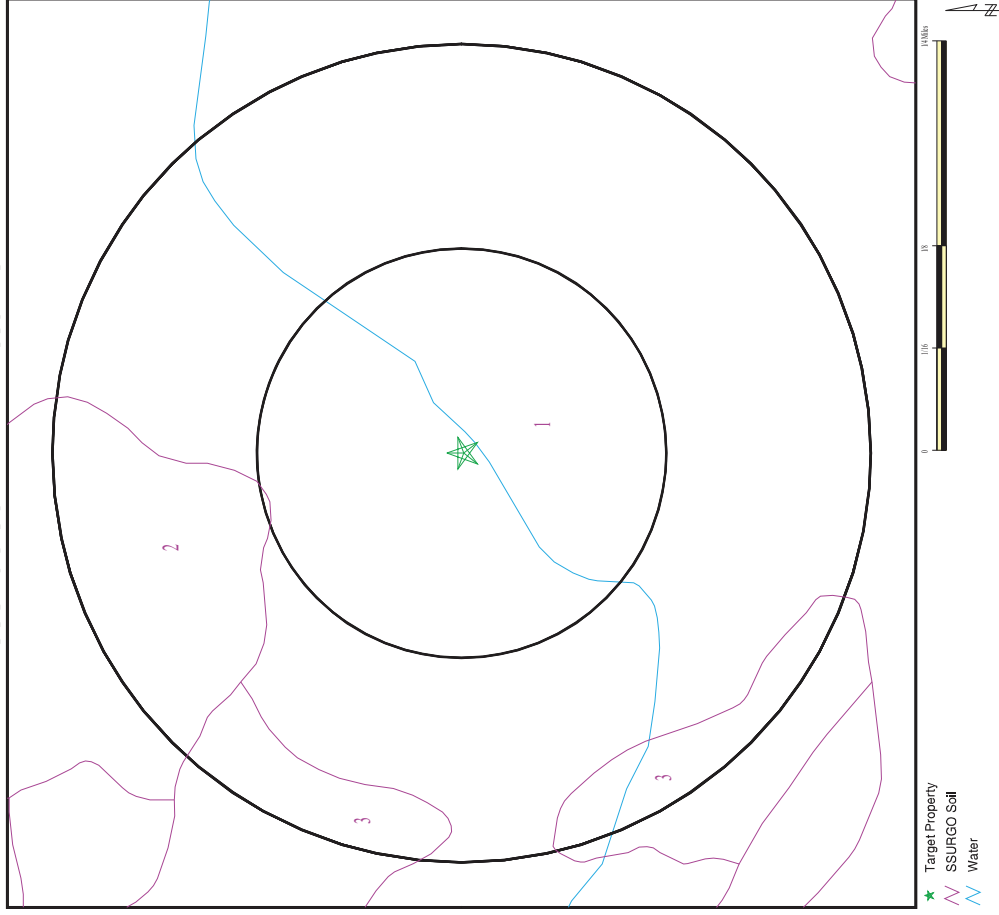
Era: -
 System: -
 Series: -
 Code: N/A (decoded above as Era, System & Series)

GEOLOGIC AGE IDENTIFICATION

Category: -

Geologic Age and Rock Stratigraphic Unit Sources: P.G., Schuben, R.E., Arndt and W.J., Bawiec, Geology of the Conterminous U.S., at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Belkman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 4729934.2s



SITE NAME: Fields 821, 916, and 917
 Not Reported
 ADDRESS: Kirel HI 96753
 LAT/LONG: 20.789483 / 156.457142

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Nakashima
 INQUIRY #: 4729934.2s
 DATE: September 19, 2016 1:02 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Pulehu
 Soil Surface Texture: cobbly silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Layer | Boundary | | Soil Layer Information | | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
|-------|-----------|-----------|------------------------|--|---|--|----------------------|
| | Upper | Lower | Soil Texture Class | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | cobbly silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 2

Soil Component Name: Waiakoa
 Soil Surface Texture: very stony silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 84 inches
 Depth to Waterable Min: > 0 inches

| Layer | Boundary | | Soil Layer Information | | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
|-------|-----------|-----------|----------------------------|--|--|--|----------------------|
| | Upper | Lower | Soil Texture Class | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 1 inches | very stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 1 inches | 25 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.1 |
| 3 | 25 inches | 33 inches | stony silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Silty Sand. | Max: 42.34 Min: 4.23 | Max: 8.4 Min: 7.4 |
| 4 | 33 inches | 37 inches | bedrock | Not reported | Not reported | Max: 0.42 Min: 0.02 | Max: Min: |

Soil Map ID: 3

Soil Component Name: Waiakoa
 Soil Surface Texture: extremely stony silty clay loam
 Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
 Soil Drainage Class: Well drained

Soil Map ID: 4

Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 71 inches
 Depth to Waterable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

| Soil Layer Information | | | |
|------------------------|-----------|-----------|---|
| Layer | Boundary | | Classification |
| | Upper | Lower | |
| 1 | 0 inches | 0 inches | Soil Texture Class extremely stony silty clay loam AASHTO Group Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. Unified Soil COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Saturated hydraulic conductivity (micro m/sec) Max: 14 Min: 4.23 Soil Reaction (pH) Max: 7.3 Min: 6.6 |
| 2 | 0 inches | 20 inches | Soil Texture Class extremely stony silty clay loam AASHTO Group Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. Unified Soil COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Saturated hydraulic conductivity (micro m/sec) Max: 14 Min: 4.23 Soil Reaction (pH) Max: 7.3 Min: 6.1 |
| 3 | 20 inches | 27 inches | Soil Texture Class stony silty clay loam AASHTO Group Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. Unified Soil COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. Saturated hydraulic conductivity (micro m/sec) Max: 42.34 Min: 4.23 Soil Reaction (pH) Max: 8.4 Min: 7.4 |
| 4 | 27 inches | 31 inches | Soil Texture Class bedrock AASHTO Group Not reported Unified Soil Not reported Saturated hydraulic conductivity (micro m/sec) Max: 0.42 Min: 0.02 Soil Reaction (pH) Max: Min: |

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

| DATABASE | SEARCH DISTANCE (miles) |
|------------------|--------------------------------|
| Federal USGS | 1,000 |
| Federal FRDS PWS | Nearest PWS within 0.001 miles |
| State Database | 1,000 |

FEDERAL USGS WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|--------|-----------------|--------------------|
| A1 | USGS40000268901 | 1/2 - 1 Mile South |
| B3 | USGS40000268910 | 1/2 - 1 Mile WSW |
| B4 | USGS40000268911 | 1/2 - 1 Mile WSW |

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|--------|-----------------|--------------------|
| B5 | USGS40000268912 | 1/2 - 1 Mile WSW |
| C10 | USGS40000268902 | 1/2 - 1 Mile SSW |
| C12 | USGS40000268899 | 1/2 - 1 Mile SSW |
| C14 | USGS40000268898 | 1/2 - 1 Mile SSW |
| D17 | USGS40000268917 | 1/2 - 1 Mile South |
| E20 | USGS40000268896 | 1/2 - 1 Mile South |
| Z2 | USGS40000268897 | 1/2 - 1 Mile SSW |

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

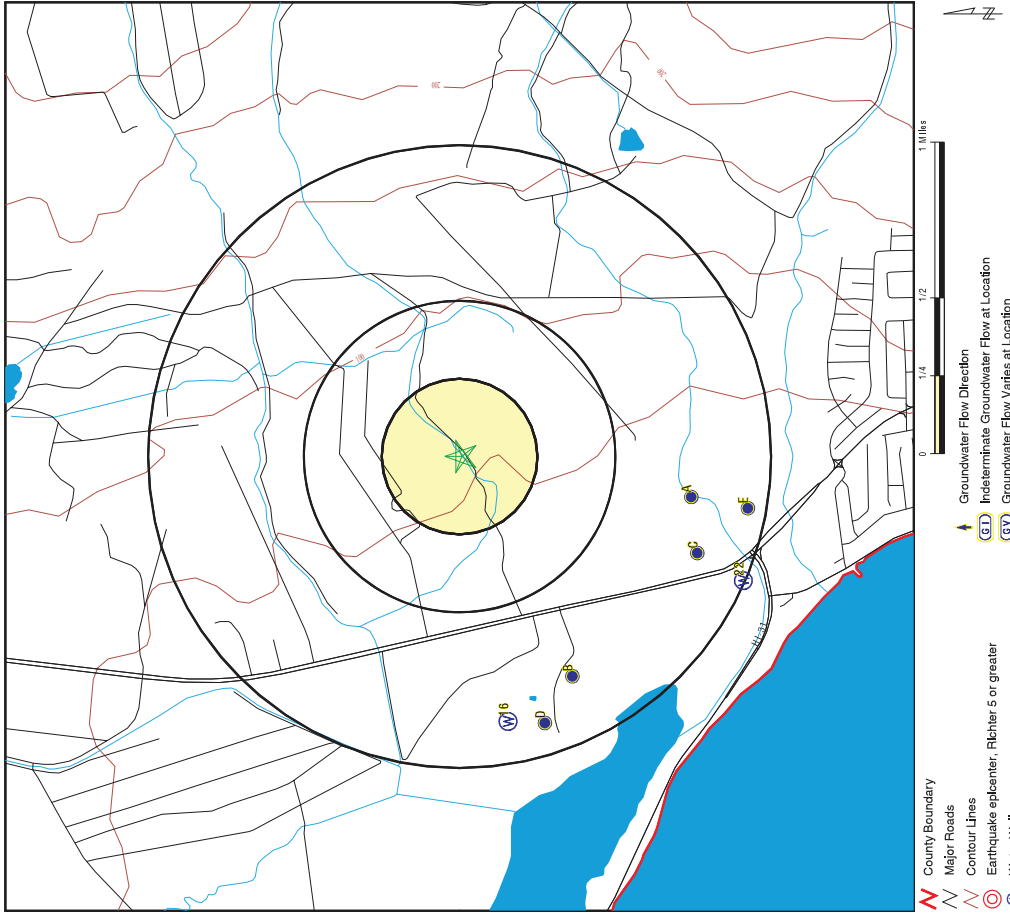
| MAP ID | WELL ID | LOCATION FROM TP |
|---------------------|---------|------------------|
| No PWS System Found | | |

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|--------|-----------------|--------------------|
| A2 | HI9000000003097 | 1/2 - 1 Mile South |
| B6 | HI9000000003103 | 1/2 - 1 Mile WSW |
| B7 | HI9000000003104 | 1/2 - 1 Mile WSW |
| B8 | HI9000000003106 | 1/2 - 1 Mile WSW |
| B9 | HI9000000003102 | 1/2 - 1 Mile WSW |
| C11 | HI9000000003094 | 1/2 - 1 Mile SSW |
| C13 | HI9000000003095 | 1/2 - 1 Mile SSW |
| C15 | HI9000000003096 | 1/2 - 1 Mile SSW |
| 16 | HI9000000003109 | 1/2 - 1 Mile West |
| D18 | HI9000000003105 | 1/2 - 1 Mile WSW |
| D19 | HI9000000003107 | 1/2 - 1 Mile WSW |
| E21 | HI9000000003091 | 1/2 - 1 Mile South |

PHYSICAL SETTING SOURCE MAP - 4729934.2s



GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID: A1
 Direction: South
 Distance: 12.1 Mile
 Elevation: Lower
 Database: USGS
 FED USGS: USGS40000268901
 EDR ID Number: USGS40000268901

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monoc name: USGS-204731156274301
 Monoc type: 64727-07 W252E
 Monoc desc: Not Reported
 Huc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea units: Not Reported
 Longitude: -156.459125
 Horiz Acc measure: 1
 Horiz Collection method: Interpolated from map
 Vert coord refs: NAD83
 Vert measure units: feet
 Vert acc measure units: feet
 Vertical collection method: Interpolated from topographic map
 Aquifer name: HILOCAL
 Formation type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19680101
 Welldepth units: ft
 Wellholedepth units: Not Reported

Ground-water levels, Number of Measurements: 0

A2
 South
 12.1 Mile
 Lower

Wid: 6-4727-007
 Well name: Kealia Pond
 Yr drilled: 1968
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: 5
 Long83dd: -156.459167
 Lat83dd: 20.788611
 Gps: 0
 Owner user: Trojan Seed Co.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 252-E
 Casing dia: 4
 Well depth: 60
 Solid case: Not Reported
 Use: IRR - Irrigation (non-domestic, non-agriculture)
 Use year: Not Reported
 Init head: Not Reported
 Init head2: Not Reported
 Init head3: Not Reported
 Test date: Not Reported

HI WELLS

H19000000003097

Island: Maui
 Old name: Not Reported
 Utm: -1
 Well type: ROT
 Ground el: Not Reported
 Perf case: Not Reported
 Init head2: Not Reported
 Test gpm: Not Reported

SITE NAME: Fields 821, 916, and 917
 ADDRESS: Not Reported
 Kml HI 96753
 LAT/LONG: 20.789483 / 156.457142

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Nakashima
 INQUIRY #: 4729934.2s
 DATE: September 19, 2016 1:02 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Test downvt: Not Reported
 Test temp: Not Reported
 Pump gpm: 0
 Drift mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yf: 0
 Drift yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported
 Pump mgd: 0
 Pump depth: Not Reported
 Aqu code: 60302
 Latest htd: Not Reported
 Pfr: Not Reported
 Surveyor: Not Reported
 T: Not Reported

FED USGS USGS-40000268910

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc Identifier: USGS-204751156281501
 Monloc name: 6-4728-01 W253A
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.4680135
 Horiz Acc measure: 1
 Horiz coord refsys: Interpolated from map
 Vert accmeasure units: NAD83
 Vert measure units: feet
 Vert coord refsys: feet
 Vertical collection method: Interpolated from topographic map
 Aquifername: HILOCAL
 Formation type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19700101
 Welldepth units: ft
 Wellholedepth units: Not Reported

Ground-water levels, Number of Measurements: 0

B4
WSW
1/2 - 1 Mile
Lower

FED USGS USGS-40000268911

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc Identifier: USGS-204751156281503
 Monloc name: 6-4728-03 W254C
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.4680135
 Horiz Acc measure: 5
 Horiz coord refsys: Interpolated from map
 Vert accmeasure units: NAD83
 Vert measure units: feet
 Vert coord refsys: feet
 Vertical collection method: Interpolated from topographic map
 Aquifername: HILOCAL
 Formation type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19700101
 Welldepth units: ft
 Wellholedepth units: Not Reported

Ground-water levels, Number of Measurements: 0

B5
WSW
1/2 - 1 Mile
Lower

FED USGS USGS-40000268912

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc Identifier: USGS-204751156281502
 Monloc name: 6-4728-02 W253B
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 20020000
 Drainagearea value: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.4680135
 Horiz Acc measure: 1
 Horiz coord refsys: Interpolated from map
 Vert accmeasure units: NAD83
 Vert measure units: feet
 Vert coord refsys: feet
 Vertical collection method: Interpolated from topographic map
 Aquifername: HILOCAL
 Formation type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19700101
 Welldepth units: ft
 Wellholedepth units: Not Reported

Ground-water levels, Number of Measurements: 0

B5
WSW
1/2 - 1 Mile
Lower

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc Identifier: USGS-204751156281503
 Monloc name: 6-4728-03 W254C
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.4680135
 Horiz Acc measure: 5
 Horiz coord refsys: Interpolated from map
 Vert accmeasure units: NAD83
 Vert measure units: feet
 Vert coord refsys: feet
 Vertical collection method: Interpolated from topographic map
 Aquifername: HILOCAL
 Formation type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19700101
 Welldepth units: ft
 Wellholedepth units: Not Reported

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation Database EDR ID Number
B6 WSW 1/2 - 1 Mile Lower HI WELLS HI9000000003103

Well name: Kealia Pond A2 Island: Maui
 Yr drilled: 1970 Not Reported
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: -156.468056
 Long83dd: 20.794167
 Lat83dd: 0
 Gps: 0
 Owner user: Fish Farms, Haw.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 253-B
 Casing dia: 4
 Well depth: 37
 Well type: Well type:
 Ground el: Ground el:
 Perf case: Perf case:
 Use: Other
 Use year: Not Reported
 Init head: Not Reported
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported
 Test ddown: Not Reported
 Test chlor: Not Reported
 Test unit: Not Reported
 Pump gpm: 0
 Draft mgt: Not Reported
 Draft ngy: Not Reported
 Max chlor: RA
 Geology: RA
 Pump yr: 0
 Draft yr: Not Reported
 Bot solid: Not Reported
 Bot perf: Not Reported
 Spec capact: Not Reported
 Pump mgd: Not Reported
 Pump depth: Not Reported
 Pump depth: 60301
 Aquic code: Not Reported
 Latest hd: 01-JAN-70
 Prc: Not Reported
 Surveyor: Not Reported
 T: Not Reported

B7 WSW 1/2 - 1 Mile Lower HI WELLS HI9000000003104
 Well name: Kealia Pond A3 Island: Maui
 Yr drilled: 1970 Not Reported
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: -156.468056
 Long83dd: 20.794167
 Lat83dd: 0
 Gps: 0
 Owner user: Fish Farms, Haw.
 Land owner: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pump insta: Not Reported
 Old number: 253-C
 Casing dia: 4
 Well depth: 37
 Well type: Well type:
 Ground el: Ground el:
 Perf case: Perf case:
 Use: Other
 Use year: Not Reported
 Init head: Not Reported
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported
 Test ddown: Not Reported
 Test chlor: Not Reported
 Test unit: Not Reported
 Pump gpm: 0
 Draft mgt: Not Reported
 Draft ngy: Not Reported
 Max chlor: RA
 Geology: RA
 Pump yr: 0
 Draft yr: Not Reported
 Bot solid: Not Reported
 Bot perf: Not Reported
 Spec capact: Not Reported
 Pump mgd: Not Reported
 Pump depth: Not Reported
 Pump depth: 60301
 Aquic code: Not Reported
 Latest hd: 01-JAN-70
 Prc: Not Reported
 Surveyor: Not Reported
 T: Not Reported

B8 WSW 1/2 - 1 Mile Lower HI WELLS HI9000000003106
 Well name: Kealia Pond A4 Island: Maui
 Yr drilled: 1970 Not Reported
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: -156.468056
 Long83dd: 20.794167
 Lat83dd: -1
 Gps: 0
 Owner user: Fish Farms, Haw.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 4
 Casing dia: 37
 Well depth: Not Reported
 Well type: Well type:
 Ground el: Ground el:
 Perf case: Perf case:
 Use: IRR - Habitat Maintenance
 Use year: Not Reported
 Init head: Not Reported
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 200
 Drift mgy: Not Reported
 Max chlor: Not Reported
 Geology: RA
 Pump yr: 0
 Drift yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported
 Pump mgd: 0
 Pump depth: Not Reported
 Aquil code: 60301
 Latest hd: Not Reported
 P/cr: Not Reported
 Surveyor: Not Reported
 T: Not Reported

Test chlor: Not Reported
 Test unit: Not Reported
 Head feet: Not Reported
 Min chlor: Not Reported
 RA
 Bot hole: Not Reported
 Bot perf: Not Reported
 Pump elev: Not Reported
 Trnk: (2) 3-8-005:002
 Wcr: 30-DEC-99
 Site id: HI9000000003106

B9
SSW
1/2 - 1 Mile
Lower

HI WELLS
HI9000000003102

Wid: 6-4728-001
 Well name: Kealia Pond A1
 Yr drilled: 1970
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: 6
 LongE3dd: -156.469056
 LatE3dd: 20.794167
 Gps: 0
 Owner user: Fish Farms Haw.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 253-A
 Casing dia: 4
 Well depth: 37
 Solid case: Not Reported
 Use: Other
 Use year: Not Reported
 Init head: Not Reported
 Init head3: Not Reported
 Init c: 0
 Test date: Not Reported
 Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 200
 Drift mgy: Not Reported
 Max chlor: RA
 Geology: 0
 Pump yr: Not Reported
 Drift yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pump mgd: 288
 Drift mgd: Not Reported
 Pump elev: Not Reported
 Trnk: (2) 3-8-005:002
 Aquil code: 60301
 Latest hd: Not Reported
 P/cr: Not Reported
 Surveyor: Not Reported
 T: Not Reported

C10
SSW
1/2 - 1 Mile
Lower

FED USGS
USGS40000268902

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monitor Identifier: USGS-20473156275401
 Monitor name: 6-4727-04 WZ52B
 Monitor type: Well
 Monitor desc: Not Reported
 Huc code: 20202000
 Drainagearea Units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.4621905
 Horiz Acc measure: 1
 Horiz coord refs: Interpolated from map
 Vert coord refs: NAD83
 Vert measure units: feet
 Vert accmeasure units: feet
 Vertical collection method: Interpolated from topographic map
 Aquifname: HILOCAL
 Formalon type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19380101
 Welldepth units: ft
 Wellholedepth: Not Reported
 Ground-water levels, Number of Measurements: 0

C11
SSW
1/2 - 1 Mile
Lower

HI WELLS
HI9000000003094

Wid: 6-4727-004
 Well name: Khei
 Yr drilled: 1968
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: 6
 LongE3dd: -156.462222
 LatE3dd: 20.786811
 Gps: 0
 Owner user: Trojan Sealed Co.
 Land owner: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pump insta: Not Reported
 Old number: 252-B
 Casing dia: 4
 Well depth: 20
 Solid case: Not Reported
 Use: IRR - Irrigation (non-domestic, non-agriculture)
 Init head: Not Reported
 Init head3: Not Reported
 Init c1: 0
 Test date: Not Reported
 Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 0
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported
 Pump mgd: 0
 Draft mgd: Not Reported
 Pump depth: 60301
 Aquic code: Not Reported
 Latest hd: Not Reported
 Pir: Not Reported
 Surveyor: Not Reported
 T: Not Reported

C12
SSW
1/2 - 1 Mile
Lower

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc Identifier: USGS-204730156275301
 Monloc name: 6-4727-05 W252C
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.4619027
 Horiz Acc measure: 5
 Horiz Collection method: Interpolated from map
 Vert coord refsys: NAD83
 Vert measure units: feet
 Vert collection method: Interpolated from topographic map
 Aquifname: HILICAL
 Formation type: Not Reported

FED USGS

USGS40000268899

Site id: HI9000000003094

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Aquifer type: Not Reported
 Construction date: 19680101
 Well depth units: ft
 Wellhole depth: Not Reported
 Wellhole depth units: Not Reported
 Ground-water levels, Number of Measurements: 0

C13
SSW
1/2 - 1 Mile
Lower

Well name: Well name: Maui
 Yr drilled: 1968
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: 6-4727-005
 Long53dd: -156.461944
 Lat63dd: 20.788333
 Gps: 0
 Owner user: Trojan Seed Co.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 252-C
 Casing dia: 4
 Well depth: 20
 Solid case: Not Reported
 Use: IRR - Irrigation (non-domestic, non-agriculture)
 Init head: Not Reported
 Init head3: Not Reported
 Init c1: 0
 Test date: Not Reported
 Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 0
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported
 Pump mgd: 0
 Draft mgd: Not Reported
 Pump depth: 60301
 Aquic code: Not Reported
 Latest hd: 01-JAN-68
 Pir: Not Reported
 Surveyor: Not Reported
 T: Not Reported

C14
SSW
1/2 - 1 Mile
Lower

FED USGS

USGS40000268898

Site id: HI9000000003095

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc identifier: USGS-204729156275201
 Monloc name: 6-4727-06 W252D
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: 20.7851887
 Source map scale: 24000
 Horiz Acc measure: -156.461625
 Horiz Collection method: Interpolated from map
 Horiz coord refsys: NAD83
 Vert measure units: feet
 Vert measure val: 18.00
 Vertacc measure val: 2
 Verticalization method: Interpolated from topographic map
 Aquifer name: HI-CAL
 Aquifer type: Not Reported
 Construction date: Not Reported
 Well depth units: ft
 Wellhole depth: Not Reported

Ground-water levels. Number of Measurements: 0

C15
West
1/2 - 1 Mile
Lower **HI WELLS** **H19000000003096**

Wid: 6-4727-006
 Well name: Kihai
 Yr drilled: 1968
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: -156.461667
 Long634d: 20.788056
 Lat834d: 0
 Gps: 0
 Owner user: Trojan Seed Co.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 252-D
 Casing dia: 4
 Well depth: 20
 Solid case: Not Reported
 Use: IRR - Irrigation (non-domestic, non-agriculture)
 Init head: Not Reported
 Init head3: Not Reported
 Init c: 0
 Test date: Not Reported
 Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 0
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pump mgd: 0
 Draft mgd: Not Reported
 Pump elev: Not Reported
 Pump depth: Not Reported
 Aquil code: 60301
 Latest hd: 01-JAN-68
 Plr: Not Reported
 Surveyor: Not Reported
 T: Not Reported
 Site id: H19000000003096

16
West
1/2 - 1 Mile
Lower **HI WELLS** **H19000000003109**

Wid: 6-4728-008
 Well name: New Kealia A5
 Yr drilled: 2009
 Driller: Not Reported
 Quad map: -156.470278
 Long634d: 20.797222
 Lat834d: 0
 Gps: 0
 Owner user: Not Reported
 Land owner: Not Reported
 Pump insta: Beylik Drilling & Pump Service Inc.
 Old number: Not Reported
 Casing dia: 12
 Well depth: 106
 Solid case: 20
 Use: Other
 Init head: Not Reported
 Init head3: 2.43
 Init c: 2.8
 Test date: 11/18/2009
 Test down: 13.36
 Test temp: 77
 Pump gpm: 700
 Draft mgy: 77
 Head feet: Not Reported
 Min chlor: Not Reported
 Geology: Not Reported
 Pump yr: 2014
 Draft yr: Not Reported
 Bot solid: -19.3
 Spec capac: Not Reported
 Pump mgd: 1.008
 Draft mgd: 25.94
 Aquil code: 60301
 Latest hd: 4/2/2014
 Plr: Not Reported
 Surveyor: Not Reported
 T: Not Reported
 Site id: H19000000003109

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID: D18
 Direction: WSW
 Distance: 1/2 - 1 Mile
 Elevation: Lower

Database: FED USGS
 EDR ID Number: USGS40000268917

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monic name: USGS/204755156282301
 Monic type: Well
 Monic desc: Not Reported
 Huc code: 20020000
 Drainagearea units: Not Reported
 Contrib drainagearea: Not Reported
 Longitude: -156.47702357
 Horiz Acc measure: 1
 Horiz Collection method: Interpolated from map
 Horiz coord refs: NAD83
 Vert measure units: feet
 Vert measure val: 10.00
 Vert acc measure units: feet
 Vert measure val: 2
 Vertical collection method: Interpolated from topographic map
 Aquifera name: HILOCAL
 Aquifer type: Not Reported
 Construction date: 19710101
 Well depth units: ft
 Well hole depth units: Not Reported

Ground-water levels. Number of Measurements: 0

D18 WSW 1/2 - 1 Mile Lower

Wid: 6-4728-004
 Well name: Kealia Pond B
 Yr drilled: 1971
 Driller: Ocean View Drilling Co., Ltd.
 Quad map: 6
 Long634d: -156.470278
 Lat834d: 20.795278
 Gps: 0
 Owner user: Fish Farms Haw.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 254
 Casing dia: 2
 Well depth: 200
 Solid case: UNU - Unused
 Use year: Not Reported
 Init head: Not Reported
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported
 Test date: Not Reported

HI WELLS

HI900000003105

Island: Maui
 Old name: Not Reported
 Utm: -1
 Well type: PER
 Ground el: Not Reported
 Perf case: Not Reported
 Init head2: Not Reported
 Test date: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 0
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot hole: Not Reported
 Bot perf: Not Reported
 Spec capac: Not Reported
 Pump mgd: 0
 Pump depth: Not Reported
 Pump elev: Not Reported
 Aquil code: 60301
 Latest hd: Not Reported
 Pfr: Not Reported
 Wcr: 01-JAN-71
 Surveyor: Not Reported
 Site id: HI900000003105

D19 WSW 1/2 - 1 Mile Lower

HI900000003107

Wid: 6-4728-006
 Well name: Kealia Pond C
 Yr drilled: 2010
 Driller: Not Reported
 Quad map: 6
 Long634d: -156.470556
 Lat834d: 20.795833
 Gps: 0
 Owner user: Fish Farms Haw.
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: Not Reported
 Casing dia: 8
 Well depth: 87
 Solid case: ABN - Sealed
 Use year: Not Reported
 Init head: Not Reported
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported
 Test date: Not Reported
 Pump gpm: 0
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot hole: -35.4
 Bot perf: Not Reported
 Spec capac: Not Reported

HI WELLS

HI900000003107

Island: Maui
 Old name: Not Reported
 Utm: -1
 Well type: Ground el
 Ground el: 4.6
 Perf case: Not Reported
 Init head2: Not Reported
 Test date: Not Reported
 Test date: Not Reported
 Pump gpm: Not Reported
 Draft mgy: Not Reported
 Head feet: Not Reported
 Min chlor: Not Reported
 Bot hole: -32.4
 Bot perf: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pump mgd: 0
 Draft mgd: Not Reported
 Pump elev: Not Reported
 Trnk: (2) 3-8-005:002
 Wcr: 29-JUN-10
 Latest hd: Not Reported
 Surveyor: Not Reported
 T: Not Reported
 Site id: HI900000003107

E20
South
1/2 - 1 Mile
Lower **FED USGS** **USGS-40000268896**

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc identifier: USGS-2047215627501
 Monloc name: 6-4727-01 S14
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 2020000
 Drainagearea value: Not Reported
 Contrib drainagearea: Not Reported
 Drainagearea Units: Not Reported
 Contrib drainagearea Units: Not Reported
 Longitude: -156.4598806
 Source map scale: 24000
 Horiz Acc measure: 1
 Horiz Collection method: Interpolated from map
 Horiz coord refs: NAD83
 Vert measure units: feet
 Vert acc measure units: feet
 Vert collection method: Interpolated from topographic map
 Countrycode: HI
 Aquifname: Not Reported
 Formation type: Not Reported
 Aquifer type: Not Reported
 Construction date: 19000101
 Welldepth units: ft
 Wellholedepth: Not Reported
 Ground-water levels, Number of Measurements: 0

E21
South
1/2 - 1 Mile
Lower **HI WELLS** **HI900000003091**

Well name: 6-4727-001
 Yr drilled: Kihel Shaft
 Driller: 1900
 Cased map: Not Reported
 Long63add: -156.459722
 Lat83add: 20.756833
 Gps: 0
 Owner user: Hawaiian Commercial & Sugar Co. (HC&S)
 Land owner: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Pump insta: Not Reported
 Old number: 14-SH
 Casing dia: Not Reported
 Well depth: 23
 Solid case: Not Reported
 Use: AGR - Crops and Processing
 Init head: Not Reported
 Perf case: Not Reported
 Init head2: Not Reported
 Init cl: 0
 Test date: Not Reported
 Test gpm: Not Reported
 Test chlor: Not Reported
 Test temp: 24.3
 Test unit: C
 Pump gpm: 3340
 Draft mgd: Not Reported
 Head feet: Not Reported
 Max chlor: Not Reported
 Min chlor: Not Reported
 Geology: Gas
 Pump yr: 1970
 Bot hole: Not Reported
 Bot perf: Not Reported
 Spec capac: Not Reported
 Pump mgd: 4.809
 Draft mgd: Not Reported
 Pump elev: Not Reported
 Trnk: (2) 3-8-005:000
 Aquic code: 60302
 Latest hd: 31-JUL-12
 Pir: Not Reported
 Surveyor: Not Reported
 T: Not Reported
 Site id: HI900000003091

22
SSW
1/2 - 1 Mile
Lower **FED USGS** **USGS-40000268897**

Org. Identifier: USGS-HI
 Formal name: USGS Hawaii Water Science Center
 Monloc identifier: USGS-2047215627501
 Monloc name: 6-4727-03 W252A
 Monloc type: Well
 Monloc desc: Not Reported
 Huc code: 2020000
 Drainagearea value: Not Reported
 Contrib drainagearea: Not Reported
 Drainagearea Units: Not Reported
 Contrib drainagearea Units: -156.4632916
 Longitude: 1
 Horiz Acc measure: Interpolated from map
 Horiz Collection method: NAD83
 Horiz coord refs: feet
 Vert measure units: feet
 Vert acc measure units: feet
 Vert collection method: Interpolated from topographic map
 Countrycode: US
 Aquifname: Not Reported
 Formation type: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

AREA RADON INFORMATION
 Federal EPA Radon Zone for MAUI County: 3
 Note: Zone 1 indoor average level > 4 pCi/L
 : Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L
 : Zone 3 indoor average level < 2 pCi/L

Aquifer type: Not Reported
 Construction date: 19880101
 Welldepth units: ft
 Wellholeddepth: Not Reported
 Wellholeddepth units: Not Reported
 Ground-water levels, Number of Measurements: 0

Federal Area Radon Information for Zip Code: 96753
 Number of sites tested: 10

| Area | Average Activity | % <= 4 pCi/L | % 4-20 pCi/L | % >20 pCi/L |
|-------------------------|------------------|--------------|--------------|--------------|
| Living Area - 1st Floor | 0.010 pCi/L | 100% | 0% | 0% |
| Living Area - 2nd Floor | Not Reported | Not Reported | Not Reported | Not Reported |
| Basement | Not Reported | Not Reported | Not Reported | Not Reported |

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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Field 912
Not Reported
Kihei, HI 96753

Inquiry Number: 4729933.2s
September 19, 2016

The EDR Radius Map™ Report with GeoCheck®



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Salem, MA 01970
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

NOT REPORTED
KIHAEI, HI 96753

COORDINATES

Latitude (North): 20.8191060 - 20.491 8.78"
Longitude (West): 156.4697950 - 156.28 11.26"
Universal Transverse Mercator: Zone 18Q
UTM X (Meters): 763345.2
UTM Y (Meters): 2304059.2
Elevation: 62 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

| | |
|----------------------|------------------------|
| Target Property Map: | 5941599 MAALAEA, HI |
| Version Date: | 2013 |
| Northeast Map: | 5941605 PAIA, HI |
| Version Date: | 2013 |
| Southeast Map: | 5941643 PUU O KALI, HI |
| Version Date: | 2013 |
| Northwest Map: | 5941607 WAILUKU, HI |
| Version Date: | 2013 |

MAPPED SITES SUMMARY

Target Property Address:
 NOT REPORTED
 KIHEI, HI 96753

Click on Map ID to see full detail.

| MAP ID | SITE NAME | ADDRESS | DATABASE ACRONYMS | RELATIVE ELEVATION | DIST (ft. & mi.) |
|--------|----------------------|-------------------|-------------------|--------------------|------------------|
| 1 | FORMER PUUNENE NAVY | SOUTH OF MOKULELE | LUST, LUST | Higher | 1746, 0.331, ESE |
| 2 | MAUI AIRPORT MILITAR | | FUDS | Higher | 2433, 0.461, NE |

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL..... National Priority List
 Proposed NPL..... Proposed National Priority List Sites
 NPL LIENS..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL..... National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY..... Federal Facility Site Information listing
 SEMS..... Superfund Enterprise Management System

Federal CERCLIS MFRAP site list

SEMS-ARCHIVE..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG..... RCRA - Large Quantity Generators
 RCRA-SQG..... RCRA - Small Quantity Generators
 RCRA-CESQG..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS..... Land Use Control Information System
 US ENG CONTROLS..... Engineering Controls Sites List

EXECUTIVE SUMMARY

US INST CONTROL..... Sites with Institutional Controls

Federal ERMS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS..... Sites List

State and tribal landfill and/or solid waste disposal site lists

SWW/LF..... Permitted Landfills in the State of Hawaii

State and tribal leaking storage tank lists

INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing

UST..... Underground Storage Tank Database

INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

ENG CONTROLS..... Engineering Control Sites

INST CONTROL..... Sites with Institutional Controls

State and tribal voluntary cleanup sites

VCP..... Voluntary Response Program Sites

INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

ODI..... Open Dump Inventory

DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... De-listed National Clandestine Laboratory Register

CDL..... Clandestine Drug Lab Listing

EXECUTIVE SUMMARY

US CDL..... National Clandestine Laboratory Register

Local Land Records

LIENS 2..... CERCLA Lien Information

Records of Emergency Release Reports

HMIRS..... Hazardous Materials Information Reporting System

SPILLS..... Release Notifications

SPILLS 90..... SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR..... RCRA - Non Generators / No Longer Regulated

DDD..... Department of Defense Sites

SCRD DRYCLEANERS..... State Coalition for Remediation of Drycleaners Listing

US FIN ASSUP..... Federal Assistance Information

EPA WATCH LIST..... EPA WATCH LIST

2020 COR ACTION..... 2020 Corrective Action Program List

TSCA..... Toxic Substances Control Act

TRIS..... Toxic Chemical Release Inventory System

SSTS..... Section 7 Tracking Systems

ROD..... Records Of Decision

RMP..... Risk Management Plans

RAATS..... RCRA Administrative Action Tracking System

PRP..... Potentially Responsible Parties

PADS..... PCB Activity Database System

ICIS..... Integrated Compliance Information System

FTTS..... FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

MLTS..... Material Licensing Tracking System

COAL ASH DOE..... Steam-Electric Plant Operation Data

COAL ASH EPA..... Coal Combustion Residues Surface Impoundments List

PCB TRANSFORMER..... PCB Transformer Registration Database

RADINFO..... Radiation Information Database

HIST FTTS..... FIFRA/TSCA Tracking System Administrative Case Listing

DOT OPS..... Incident and Accident Data

CONSENT..... Superfund (CERCLA) Consent Decreases

INDIAN RESERV..... Indian Reservations

FUSRAP..... Formerly Utilized Sites Remedial Action Program

UMTRA..... Uranium Mill Tailings Sites

US AIRS..... Lead Smelter Sites

US MINES..... Aesthetic Information Retrieval System Facility Subsystem

FINDS..... Mines Master Index File

UXO..... Facility Index System/Facility Registry System

DOCKET HWC..... Unexploded Ordnance Sites

DRYCLEANERS..... Hazardous Waste Compliance Docket Listing

AFRS..... List of Permitted Facilities

Financial Assurance..... Permitted Drycleaner Facility Listing

UIC..... Financial Assurance Information Listing

FUELS PROGRAM..... Underground Injection Wells Listing

ECHO..... EPA Fuels Program Registered Listing

Enforcement & Compliance History Information

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP..... EDR Proprietary Manufactured Gas Plants

EXECUTIVE SUMMARY

EDR Hist Auto..... EDR Exclusive Historic Gas Stations
EDR Hist Cleaner..... EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS..... Recovered Government Archive State Hazardous Waste Facilities List
RGA LF..... Recovered Government Archive Solid Waste Facilities List
RGA LUST..... Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property. Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in **bold italics** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Health's Active Leaking Underground Storage Tank Log Listing.

A review of the LUST list, as provided by EDR, and dated 01/13/2016 has revealed that there is 1 LUST site within approximately 0.5 miles of the target property.

| Equal/Higher Elevation | Address | Direction / Distance | Map ID | Page |
|---|--------------------------|----------------------------------|----------|----------|
| FORMER PUUNENE NAVY | SOUTH OF MOKULELE | ESE 1/4 - 1/2 (0.337 mi.) | 1 | 8 |
| Release ID: 000079 | | | | |
| Facility ID: 9-503623 | | | | |
| Facility Status: Site Cleanup Completed (NFA) | | | | |

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 01/31/2015 has revealed that there is 1 FUDS

EXECUTIVE SUMMARY

site within approximately 1 mile of the target property.

| Equal/Higher Elevation | Address | Direction / Distance | Map ID | Page |
|------------------------|---------|--------------------------|--------|------|
| MAUI AIRPORT MILITAR | | NE 1/4 - 1/2 (0.461 mi.) | 2 | 9 |

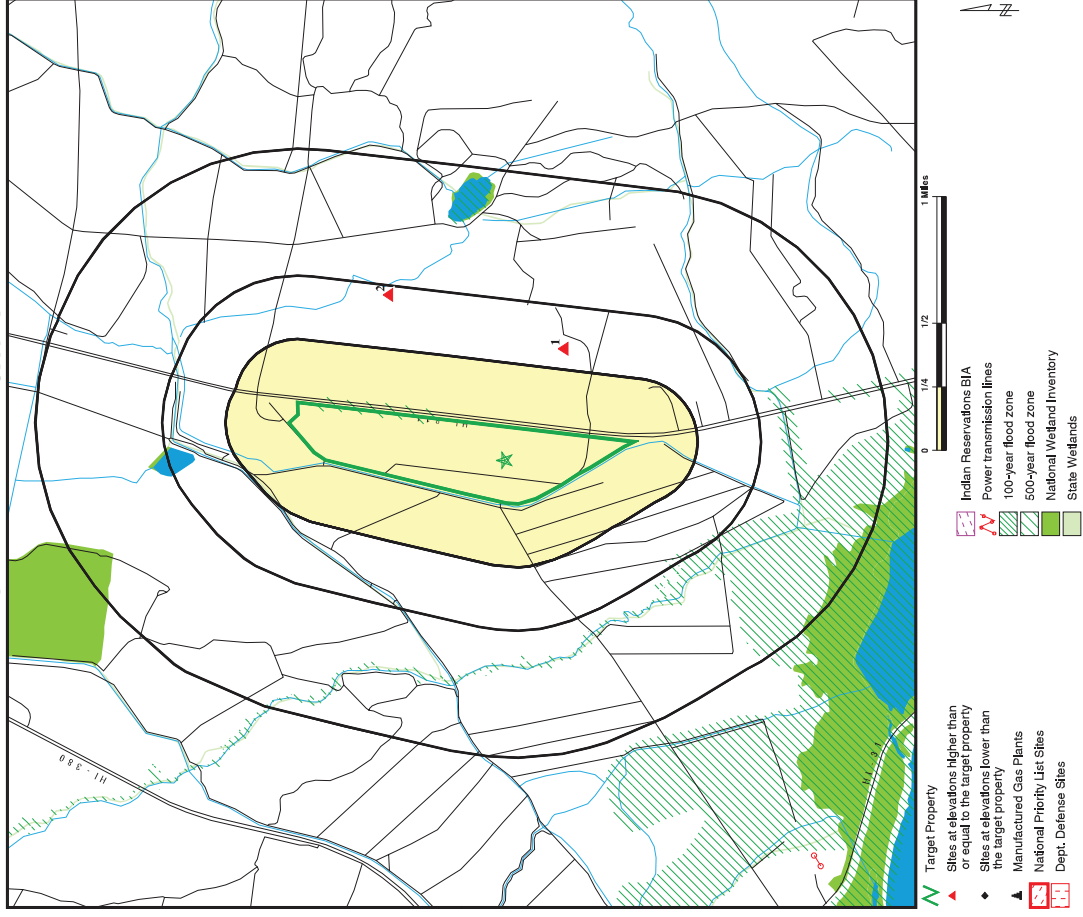
EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 1 records.

Site Name _____
 Database(s) _____
 SHWS _____

WAIKAPU DUMP-MAUI COUNTY DUMP

OVERVIEW MAP - 4729933.2S

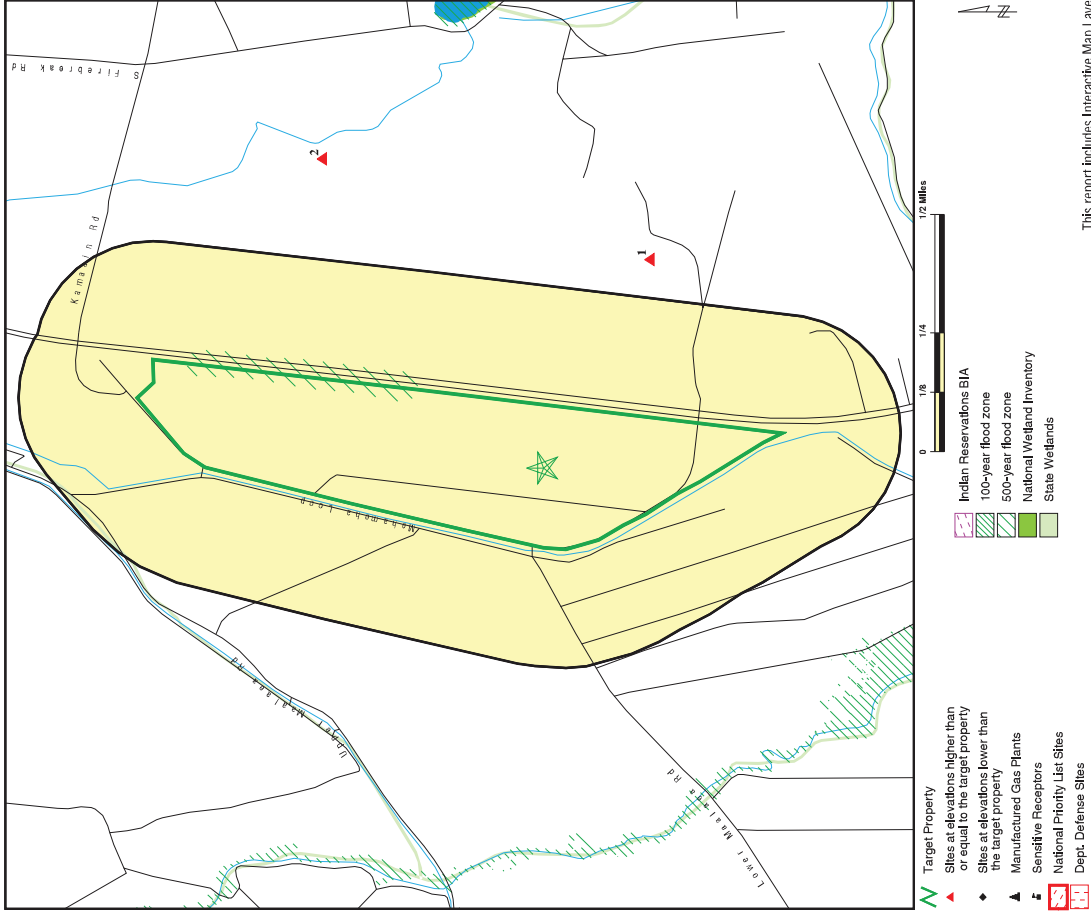


This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Nakashima
 INQUIRY #: 4729933.2S
 DATE: September 19, 2016 1:04 pm

SITE NAME: Field 912
 ADDRESS: Not Reported
 Kinet HI 96753
 LAT/LONG: 20.819106 / 156.468795

DETAIL MAP - 4729933.2S



SITE NAME: Field 912
ADDRESS: Not Reported
KINEL #: 96753
LAT/LONG: 20.819106 / 156.468785

CLIENT: Enviro Svcs. and Trng. Center
CONTACT: Sharia Nakashima
INQUIRY #: 4729933.2S
DATE: September 19, 2016 1:05 pm
Copyright © 2016 EDR, Inc. © 2015 TomTom Ltd. 2015.

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| STANDARD ENVIRONMENTAL RECORDS | | | | | | | | |
| Federal NPL site list | | | | | | | | |
| NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| Proposed NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| NPL LIENS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| Federal Delisted NPL site list | | | | | | | | |
| Delisted NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| Federal CERCLIS list | | | | | | | | |
| FEDERAL FACILITY | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| SEMS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| Federal CERCLIS NFRAP site list | | | | | | | | |
| SEMS-ARCHIVE | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| Federal RCRA CORRACTS facilities list | | | | | | | | |
| CORRACTS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| Federal RCRA non-CORRACTS TSD facilities list | | | | | | | | |
| RCRA-TSDF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| Federal RCRA generators list | | | | | | | | |
| RCRA-LQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-SQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-CESQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| Federal institutional controls / engineering controls registries | | | | | | | | |
| LUCIS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US ENG CONTROLS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US INST CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| Federal ERNS list | | | | | | | | |
| ERNS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| State- and tribal - equivalent CERCLIS | | | | | | | | |
| SHWS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| State and tribal landfill and/or solid waste disposal site lists | | | | | | | | |
| SWF/LF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| State and tribal leaking storage tank lists | | | | | | | | |
| LUST | 0.500 | | 0 | 0 | 1 | NR | NR | 1 |
| INDIAN LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| State and tribal registered storage tank lists | | | | | | | | |
| FEMA UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|--|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| INDIAN UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| State and tribal institutional control / engineering control registries | | | | | | | | |
| ENG CONTROLS | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| INST CONTROL | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| State and tribal voluntary cleanup sites | | | | | | | | |
| VCP | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| INDIAN VCP | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| State and tribal Brownfields sites | | | | | | | | |
| BROWNFIELDS | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| ADDITIONAL ENVIRONMENTAL RECORDS | | | | | | | | |
| Local Brownfield lists | | | | | | | | |
| US BROWNFIELDS | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| Local Lists of Landfill / Solid Waste Disposal Sites | | | | | | | | |
| INDIAN ODI | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| ODI | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| DEBRIS REGION 9 | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| Local Lists of Hazardous waste / Contaminated Sites | | | | | | | | |
| US HIST CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| Local Land Records | | | | | | | | |
| LIENS 2 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| Records of Emergency Release Reports | | | | | | | | |
| HMIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS 90 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| Other Ascertainable Records | | | | | | | | |
| RCFA NonGen / NLR | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| FUDS | 1.000 | | 0 | 0 | 1 | 0 | NR | 1 |
| DOD | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| SCRIP DRYCLEANERS | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| US FIN ASSUR | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| EPA WATCH LIST | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| 2020 COR ACTION | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| TSCA | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| TRIS | 0.001 | | 0 | NR | NR | NR | NR | 0 |

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| SSTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| ROD | 1.000 | | 0 | 0 | NR | NR | NR | 0 |
| RMP | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RMATS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PRP | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PADS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| ICIS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FTTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| MLTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| COALASH DOE | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| COALASH EPA | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| PCB TRANSFORMER | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RADINFO | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| HIST FTTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| DOT OPS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CONSENT | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| INDIAN RESERV | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FUSRAP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| UMTRA | 0.500 | | 0 | 0 | NR | NR | NR | 0 |
| LEAD SMELTERS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US AIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US AIRS | 0.250 | | 0 | NR | NR | NR | NR | 0 |
| US MINES | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FINDS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| UXO | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| DOCKET HWC | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| AIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| DRYCLEANERS | 0.250 | | 0 | NR | NR | NR | NR | 0 |
| Financial Assurance | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| UIC | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FUELS PROGRAM | 0.250 | | 0 | NR | NR | NR | NR | 0 |
| ECHO | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| EDR HIGH RISK HISTORICAL RECORDS | | | | | | | | |
| EDR Exclusive Records | | | | | | | | |
| EDR MGP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| EDR Hist Auto | 0.125 | | 0 | NR | NR | NR | NR | 0 |
| EDR Hist Cleaner | 0.125 | | 0 | NR | NR | NR | NR | 0 |
| EDR RECOVERED GOVERNMENT ARCHIVES | | | | | | | | |
| Exclusive Recovered Govt. Archives | | | | | | | | |
| RGAL HWS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RGAL LF | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RGAL LUST | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| - Totals -- | | | 0 | 0 | 2 | 0 | 0 | 2 |

MAP FINDINGS SUMMARY

Map ID
Direction
Distance
Elevation

Search Distance (Miles) Target Property < 1/8 1/8 - 1/4 1/4 - 1/2 1/2 - 1 > 1 Total Plotted

Site

EDR ID Number
EPA ID Number

1
ESE
1/4-1/2
0.331 mi.
1746 ft.

FORMER PUJUNENE NAVY AIRPORT
SOUTH OF MOKULELE
PUJUNENE, HI 96784

LUST

LUST
UST

U003732590
N/A

Relative: Higher
Actual: 79 ft.

Facility ID: 9-503623
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 06/13/2001
Release ID: 000079
Project Officer: Jose Ruiz

UST:

Facility ID: 9-503623
Owner: U.S. DEPT OF THE NAVY
Owner Address: Not reported
Owner City, St., Zip: Puunene, 96784 96784
Latitude: 20.815813
Longitude: -156.462737
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-1A
Date Installed: Not reported
Tank Status: Permanently Out of Use
Date Closed: 03/30/2000
Tank Capacity: 50000
Substance: Other

Tank ID: R-1B
Date Installed: Not reported
Tank Status: Permanently Out of Use
Date Closed: 03/30/2000
Tank Capacity: 50000
Substance: Other

Tank ID: R-1C
Date Installed: Not reported
Tank Status: Permanently Out of Use
Date Closed: 03/30/2001
Tank Capacity: 50000
Substance: Other

Tank ID: R-2A
Date Installed: Not reported
Tank Status: Permanently Out of Use
Date Closed: 10/04/2000
Tank Capacity: 25000
Substance: Other

Tank ID: R-2B
Date Installed: Not reported
Tank Status: Permanently Out of Use
Date Closed: 10/04/2000

NOTES:
TP = Target Property
NR = Not Requested at this Search Distance
Sites may be listed in more than one database

Map ID
Direction
Distance
Elevation

MAP FINDINGS

Map ID
Direction
Distance
Elevation

EDR ID Number
EPA ID Number

Database(s)

Site

EDR ID Number
EPA ID Number

Database(s)

Site

1007212729

MAUI AIRPORT MILITARY RES (Continued)

Not reported

The former Maui Airport Military Reservation consists of 1,875 acres and is located midway to Kihui on Mokuulele Highway. The airport was known as Puunene Naval Air Station and was built from 1936-1939. The airport was used by the Navy from 1940 to 1946 and was later returned for civilian uses. After the military left the site, the area was used for agriculture, ranging from sugar cultivation to animal husbandry. The current owner is the State of Hawaii.

Future Prog:
Description:

Current Program:
History:

Latitude Degree: 20
Latitude Minute: 50
Latitude Second: 33
Latitude Direction: N
Longitude Degree: -156
Longitude Minute: 28
Longitude Second: 35
Longitude Direction: E

U003732590

FORMER PUUNENE NAVY AIRPORT (Continued)

Tank Capacity:
Substance: 25000
Other

R-2C
Not reported
Permanently Out of Use
Date Installed: 04/10/2000
Date Closed:
Tank Capacity: 25000
Substance: Other

R-2D
Not reported
Permanently Out of Use
Date Installed: 04/10/2000
Date Closed:
Tank Capacity: 25000
Substance: Other

R-3A
Not reported
Permanently Out of Use
Date Installed: 11/16/2000
Date Closed:
Tank Capacity: 50000
Substance: Other

R-3B
Not reported
Permanently Out of Use
Date Installed: 11/16/2000
Date Closed:
Tank Capacity: 50000
Substance: Other

1007212729

FUDES

MAUI AIRPORT MILITARY RES

N/A

1007212729

MAUI AIRPORT MILITARY RES

PUUNENE, HI

Relative: Higher
Actual: 120 ft.

FUDES:
EPA Region: 09
Congressional District: 02
FUDS Number: H09H0225
State: HI
Facility Name: MAUI AIRPORT MILITARY RES
Fiscal Year: 2013
City: PUUNENE
Federal Facility ID: H0799F3960
Telephone: 808-835-4004
INST ID: 54616
County: MAUI
RAB: Not reported
CORPUS_DIST:
NFL Status: Honolulu District (POH)
Not Listed
CFC: 5173.6000000000004
Current Owner: State Government

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL - National Priority List
 National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/07/2016
 Date Data Arrived at EDR: 04/05/2016
 Date Made Active in Reports: 04/15/2016
 Number of Days to Update: 10
 Source: EPA
 Telephones: N/A
 Last EDR Contact: 07/07/2016
 Next Scheduled EDR Contact: 10/17/2016
 Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
 Telephone: 202-564-7333

EPA Region 1
 Telephone 617-918-1143
 EPA Region 6
 Telephone: 214-655-6659

EPA Region 3
 Telephone 215-814-5418
 EPA Region 7
 Telephone: 913-551-7247

EPA Region 4
 Telephone 404-562-8033
 EPA Region 8
 Telephone: 303-312-6774

EPA Region 5
 Telephone 312-886-6686
 EPA Region 9
 Telephone: 415-947-4246

EPA Region 10
 Telephone 206-553-8665

Proposed NPL - Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/07/2016
 Date Data Arrived at EDR: 04/05/2016
 Date Made Active in Reports: 04/15/2016
 Number of Days to Update: 10
 Source: EPA
 Telephones: N/A
 Last EDR Contact: 07/07/2016
 Next Scheduled EDR Contact: 10/17/2016
 Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
 Date Data Arrived at EDR: 02/02/1994
 Date Made Active in Reports: 03/30/1994
 Number of Days to Update: 56
 Source: EPA
 Telephone: 202-564-4267
 Last EDR Contact: 08/15/2011
 Next Scheduled EDR Contact: 11/28/2011
 Data Release Frequency: No Update Planned

Zip Database(s) 96732 SHWS

Site Address WAIKAPU RD

Site Name WAIKAPU DUMP-MAUI COUNTRY DUMP

EDR ID 1006819647

City KAHULUI

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate.

Source: EPA
Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Number of Days to Update: 10
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing
A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Source: Environmental Protection Agency
Date of Government Version: 11/13/2015
Date Data Arrived at EDR: 01/06/2016
Last EDR Contact: 07/06/2016
Next Scheduled EDR Contact: 10/17/2016
Number of Days to Update: 135
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly known as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Source: EPA
Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/22/2016
Next Scheduled EDR Contact: 10/31/2016
Number of Days to Update: 10
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS-ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be potential NPL site.

Source: EPA
Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Last EDR Contact: 07/22/2016
Next Scheduled EDR Contact: 10/31/2016
Number of Days to Update: 10
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Source: EPA
Date of Government Version: 06/27/2016
Date Data Arrived at EDR: 06/30/2016
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/10/2016
Number of Days to Update: 64
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal
RCRAinfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Source: Environmental Protection Agency
Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Number of Days to Update: 64
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators
RCRAinfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Source: Environmental Protection Agency
Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Number of Days to Update: 64
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

Federal Institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 13
Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/12/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 05/09/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 93
Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 05/09/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 93
Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal ERNS list

ERNS: Emergency Response Notification System
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/28/2016
Date Data Arrived at EDR: 03/30/2016
Date Made Active in Reports: 05/20/2016
Number of Days to Update: 51
Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

State and tribal - equivalent CERCLIS

SHWS: Sites List

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 05/06/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 06/02/2016
Number of Days to Update: 69
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Permitted Landfills in the State of Hawaii

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/17/2012
Date Data Arrived at EDR: 04/03/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 37
Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 07/01/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 01/13/2016
Date Data Arrived at EDR: 01/15/2016
Date Made Active in Reports: 03/02/2016
Number of Days to Update: 47
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

INDIAN LUST RS: Leaking Underground Storage Tanks on Indian Land

Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/17/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.
Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/19/2016
Number of Days to Update: 41
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska
Date of Government Version: 10/09/2015
Date Data Arrived at EDR: 02/12/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 112
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.
Date of Government Version: 10/13/2015
Date Data Arrived at EDR: 10/23/2015
Date Made Active in Reports: 02/19/2016
Number of Days to Update: 118
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada
Date of Government Version: 02/25/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.
Date of Government Version: 10/27/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.
Date of Government Version: 02/05/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 35
Source: EPA Region 4
Telephone: 404-562-3677
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.
Date of Government Version: 12/11/2015
Date Data Arrived at EDR: 02/19/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 105
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal registered storage tank lists
FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.
Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Varies

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.
Date of Government Version: 01/13/2016
Date Data Arrived at EDR: 01/15/2016
Date Made Active in Reports: 03/02/2016
Number of Days to Update: 47
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).
Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/19/2016
Number of Days to Update: 41
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).
Date of Government Version: 02/25/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: EPA Region 9
Telephone: 415-972-3388
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).
Date of Government Version: 01/26/2016
Date Data Arrived at EDR: 02/05/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 119
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).
Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 12/03/2015
Source: EPA Region 6
Telephone: 214-665-591
Date Data Arrived at EDR: 02/04/2016
Last EDR Contact: 07/27/2016
Date Made Active in Reports: 06/03/2016
Next Scheduled EDR Contact: 11/07/2016
Number of Days to Update: 120
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015
Source: EPA Region 5
Telephone: 312-886-6136
Date Data Arrived at EDR: 11/13/2015
Last EDR Contact: 07/27/2016
Date Made Active in Reports: 01/04/2016
Next Scheduled EDR Contact: 11/07/2016
Number of Days to Update: 52
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/05/2016
Source: EPA Region 4
Telephone: 404-562-3424
Date Data Arrived at EDR: 04/29/2016
Last EDR Contact: 07/26/2016
Date Made Active in Reports: 06/03/2016
Next Scheduled EDR Contact: 11/07/2016
Number of Days to Update: 35
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Source: EPA Region 7
Telephone: 913-551-7003
Date Data Arrived at EDR: 11/25/2014
Last EDR Contact: 07/27/2016
Date Made Active in Reports: 01/29/2015
Next Scheduled EDR Contact: 11/07/2016
Number of Days to Update: 65
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites

A listing of sites with engineering controls in place.

Date of Government Version: 05/06/2016
Source: Department of Health
Date Data Arrived at EDR: 05/25/2016
Telephone: 404-586-4249
Last EDR Contact: 08/26/2016
Date Made Active in Reports: 08/02/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 69
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 05/06/2016
Source: Department of Health
Date Data Arrived at EDR: 05/25/2016
Telephone: 808-586-4249
Last EDR Contact: 08/26/2016
Date Made Active in Reports: 08/02/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 69
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Source: EPA, Region 1
Telephone: 617-918-1102
Date Data Arrived at EDR: 09/29/2015
Last EDR Contact: 07/01/2016
Date Made Active in Reports: 02/19/2016
Next Scheduled EDR Contact: 10/10/2016
Number of Days to Update: 142
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Source: EPA, Region 7
Telephone: 913-551-7365
Date Data Arrived at EDR: 04/22/2008
Last EDR Contact: 04/20/2009
Date Made Active in Reports: 05/19/2008
Next Scheduled EDR Contact: 07/20/2009
Number of Days to Update: 27
Data Release Frequency: Varies

VCP: Voluntary Response Program Sites

Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 05/06/2016
Source: Department of Health
Date Data Arrived at EDR: 05/25/2016
Telephone: 808-586-4249
Last EDR Contact: 08/26/2016
Date Made Active in Reports: 06/03/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 69
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites

With certain legal exclusions and additions, the term 'brownfield site' means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 05/06/2016
Source: Department of Health
Date Data Arrived at EDR: 05/25/2016
Telephone: 808-586-4249
Last EDR Contact: 08/26/2016
Date Made Active in Reports: 06/03/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 69
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfields sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 06/21/2016
Source: Environmental Protection Agency
Date Data Arrived at EDR: 06/22/2016
Telephone: 202-566-2777
Last EDR Contact: 06/22/2016
Date Made Active in Reports: 06/03/2016
Next Scheduled EDR Contact: 10/03/2016
Number of Days to Update: 72
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Landfills / Solid Waste Disposal Sites

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/05/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9:

Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/20/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: No Update Planned

Local Lists of Hazardous waste / Contaminated Sites

US HST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 05/04/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 40

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/31/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Listing

A listing of clandestine drug lab site locations.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Date Made Active in Reports: 10/22/2010
Number of Days to Update: 42

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 09/12/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 05/04/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 40

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/31/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-8023
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

Records of Emergency Release Reports

HIMRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HIMRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/24/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 09/02/2015
Number of Days to Update: 68

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

SPILLS: Release Notifications

Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 01/14/2016
Date Data Arrived at EDR: 02/24/2016
Date Made Active in Reports: 04/06/2016
Number of Days to Update: 42

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA Non-Gen / MLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/30/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: (415) 495-3695
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

This data set consists of locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 12/19/2016
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-276-8747
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administered lands of the United States. Lands included are administered by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-276-8747
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1986, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-3599
Last EDR Contact: 08/15/2016
Next Scheduled EDR Contact: 11/29/2016
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 05/08/2016
Date Data Arrived at EDR: 05/18/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 107

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 08/17/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law, only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/08/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act, TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/24/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Chemical Release Inventory System, TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/03/2016
Number of Days to Update: 133

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Telephone: 703-416-0223
Date Data Arrived at EDR: 12/12/2013
Last EDR Contact: 09/09/2016
Date Made Active in Reports: 02/24/2014
Next Scheduled EDR Contact: 12/19/2016
Number of Days to Update: 74
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(0): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases. Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 05/01/2016
Telephone: 202-564-8600
Date Data Arrived at EDR: 05/28/2016
Last EDR Contact: 07/25/2016
Date Made Active in Reports: 09/02/2016
Next Scheduled EDR Contact: 11/07/2016
Number of Days to Update: 99
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administrative Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Telephone: 202-564-4104
Date Data Arrived at EDR: 07/03/1995
Last EDR Contact: 06/02/2008
Date Made Active in Reports: 09/07/1995
Next Scheduled EDR Contact: 09/01/2008
Number of Days to Update: 35
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties
Source: EPA
Telephone: 202-564-6023
Date Data Arrived at EDR: 10/17/2014
Last EDR Contact: 08/12/2016
Date Made Active in Reports: 10/20/2014
Next Scheduled EDR Contact: 11/21/2016
Number of Days to Update: 3
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS identifies generators, transporters, commercial stores and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2016
Telephone: 202-566-0500
Date Data Arrived at EDR: 04/28/2016
Last EDR Contact: 07/15/2016
Date Made Active in Reports: 09/02/2016
Next Scheduled EDR Contact: 10/24/2016
Number of Days to Update: 127
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Telephone: 202-564-5088
Date Data Arrived at EDR: 02/06/2015
Last EDR Contact: 07/07/2016
Date Made Active in Reports: 03/09/2015
Next Scheduled EDR Contact: 10/24/2016
Number of Days to Update: 31
Data Release Frequency: Quarterly

FTTS: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Telephone: 202-566-1667
Date Data Arrived at EDR: 04/16/2009
Last EDR Contact: 08/17/2016
Date Made Active in Reports: 05/11/2009
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 25
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Telephone: 202-566-1667
Date Data Arrived at EDR: 04/16/2009
Last EDR Contact: 08/17/2016
Date Made Active in Reports: 05/11/2009
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 25
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/07/2016
Telephone: 301-415-7189
Date Data Arrived at EDR: 03/18/2016
Last EDR Contact: 09/05/2016
Date Made Active in Reports: 04/13/2016
Next Scheduled EDR Contact: 11/21/2016
Number of Days to Update: 28
Data Release Frequency: Quarterly

COALASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Telephone: 202-566-8719
Date Data Arrived at EDR: 08/07/2009
Last EDR Contact: 09/09/2016
Date Made Active in Reports: 10/22/2009
Next Scheduled EDR Contact: 12/19/2016
Number of Days to Update: 76
Data Release Frequency: Varies

COALASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Telephone: N/A
Date Data Arrived at EDR: 09/10/2014
Last EDR Contact: 09/06/2016
Date Made Active in Reports: 10/20/2014
Next Scheduled EDR Contact: 12/19/2016
Number of Days to Update: 40
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.
Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S.

Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2015
Date Data Arrived at EDR: 07/09/2015
Date Made Active in Reports: 09/16/2015
Number of Days to Update: 69
Source: Environmental Protection Agency
Telephone: 202-345-9775
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transportation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 06/07/2012
Date Made Active in Reports: 09/19/2012
Number of Days to Update: 42
Source: Department of Transportation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 04/06/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 149
Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 09/30/2015
Number of Days to Update: 218
Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 08/26/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34
Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/11/2016
Date Data Arrived at EDR: 03/15/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 80
Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146
Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 09/09/2016
Next Scheduled EDR Contact: 12/05/2016
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/07/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 148
Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/08/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-306-0451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AFS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

US AFS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/09/2016
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 44

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/01/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2006
Date Made Active in Reports: 04/16/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-646-7709
Last EDR Contact: 09/02/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-646-7709
Last EDR Contact: 09/02/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FINDS: Facility Index System/Facility Registry System

Facility Index System: FINDS contains both facility information and pointers to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil/judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PAIDS (PCB Activity Data System).

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 09/07/2016
Next Scheduled EDR Contact: 12/19/2016
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 91

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 08/24/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015
Date Data Arrived at EDR: 01/29/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 67

Source: Department of Defense
Telephone: 571-373-0407
Last EDR Contact: 06/20/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Varies

AIRS: List of Permitted Facilities

A listing of permitted facilities in the state.

Date of Government Version: 04/14/2016
Date Data Arrived at EDR: 04/19/2016
Date Made Active in Reports: 05/17/2016
Number of Days to Update: 28

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 07/13/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing

A listing of permitted drycleaner facilities in the state.

Date of Government Version: 01/20/2016
Date Data Arrived at EDR: 04/19/2016
Date Made Active in Reports: 05/17/2016
Number of Days to Update: 28

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 09/16/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/21/2016
Date Data Arrived at EDR: 06/24/2016
Date Made Active in Reports: 06/02/2016
Number of Days to Update: 39

Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 09/12/2016
Next Scheduled EDR Contact: 12/26/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UIC: Underground Injection Wells Listing

A listing of underground injection well locations.

Date of Government Version: 02/07/2013
Date Data Arrived at EDR: 02/12/2013
Last EDR Contact: 08/24/2016
Next Scheduled EDR Contact: 12/12/2016
Number of Days to Update: 56
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 05/24/2016
Date Data Arrived at EDR: 05/25/2016
Last EDR Contact: 08/23/2016
Next Scheduled EDR Contact: 12/05/2016
Number of Days to Update: 49
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/20/2015
Date Data Arrived at EDR: 09/23/2015
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/03/2016
Number of Days to Update: 103
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oil waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Number of Days to Update: N/A
Data Release Frequency: No Update Planned

EDR Hist/Auto: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Number of Days to Update: N/A
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Number of Days to Update: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWHS: Recovered Government Archive State Hazardous Waste Facilities List
The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Number of Days to Update: 191
Data Release Frequency: Varies

RGA LFI: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Number of Days to Update: 200
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Number of Days to Update: 186
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Oil/Gas Pipelines

Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/INGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/INGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:

Source: American Hospital Association, Inc.

Telephone: 312-280-5981

The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing

Source: Centers for Medicare & Medicaid Services

Telephone: 410-786-3000

A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes

Source: National Institutes of Health

Telephone: 301-594-6248

Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory

Source: Office of Planning

Telephone: 808-587-2895

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Current USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK® - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

FIELD 912
NOT REPORTED
KIHEI, HI 96753

TARGET PROPERTY COORDINATES

Latitude (North): 20.819106 - 20° 49' 8.78"
Longitude (West): 156.469795 - 156° 28' 11.26"
Universal Transverse Mercator: Zone 4
UTM X (Meters): 763345.2
UTM Y (Meters): 2304059.2
Elevation: 62 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map: 5941599 MAALAEA, HI
Version/Date: 2013
Northeast Map: 5941605 PAIA, HI
Version/Date: 2013
Southeast Map: 5941643 PUU O KALI, HI
Version/Date: 2013
Northwest Map: 5941607 WAILUKU, HI
Version/Date: 2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

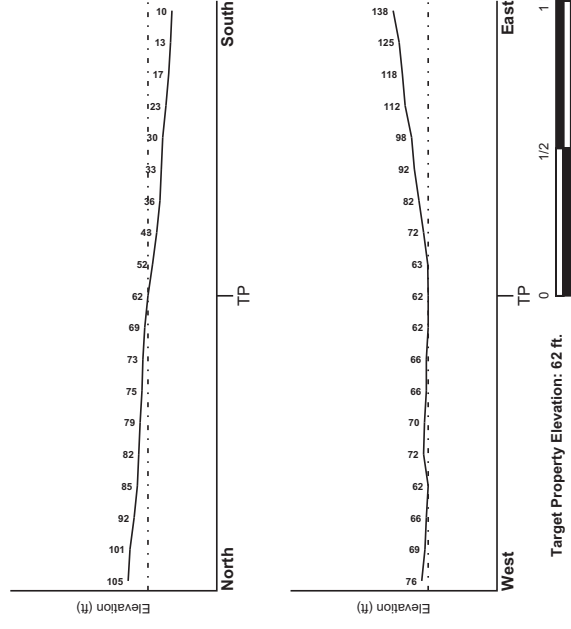
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

| | |
|--------------------------------------|----------------------|
| Flood Plain Panel at Target Property | FEMA Source Type |
| 1500030557G | FEMA FIRM Flood data |
| Additional Panels in search area: | FEMA Source Type |
| 1500030394F | FEMA FIRM Flood data |
| 1500030255B | FEMA Q3 Flood data |
| 1500030580F | FEMA FIRM Flood data |

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property
NOT AVAILABLE
NWI Electronic
Data Coverage
YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1,000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

| | | |
|--------------|----------|-------------------|
| MAP ID | LOCATION | GENERAL DIRECTION |
| Not Reported | FROM TP | GROUNDWATER FLOW |

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silt-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

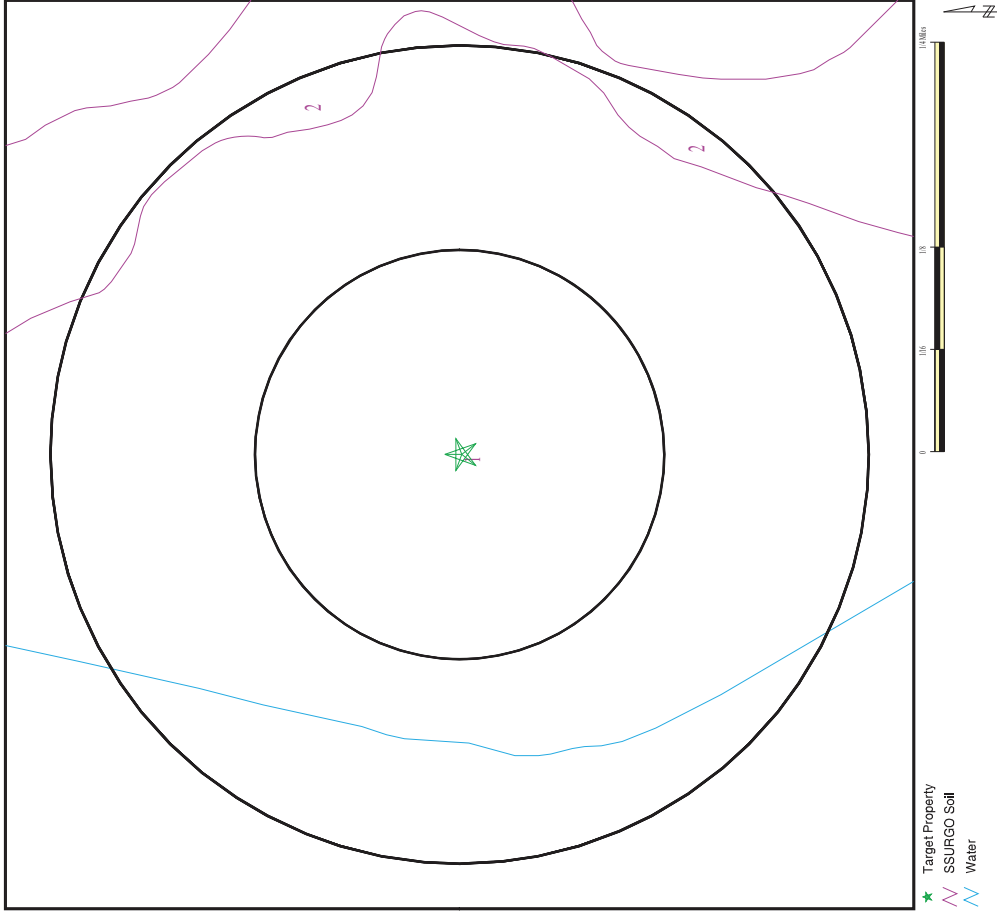
ROCK STRATIGRAPHIC UNIT

| | | | |
|---------|-----|---|---|
| Era: | - | Category: | - |
| System: | - | | |
| Series: | - | | |
| Code: | N/A | (decoded above as Era, System & Series) | |

GEOLOGIC AGE IDENTIFICATION

Geologic Age and Rock Stratigraphic Unit Source: P. G. Schuben, R.E. Arndt and W. J. Bawiec, Geology of the Continental U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 4729933.2s



GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Pulehu
 Soil Surface Texture: silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Layer | Boundary | | Soil Texture Class | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
|-------|-----------|-----------|--------------------|--|---|--|----------------------|
| | Upper | Lower | | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 20 inches | silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 2

Soil Component Name: Pulehu
 Soil Surface Texture: cobbly silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained

SITE NAME: Field 912
 ADDRESS: Not Reported
 LAT/LONG: 20.819106 / 156.468785
 CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Shara Nakashima
 INQUIRY #: 4729933.2s
 DATE: September 19, 2016 1:05 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|---|---|---|----------------------|
| Layer | Boundary | | Classification | | | | |
| | Upper | Lower | Soil Texture Class | AASHTO Group | | | |
| 1 | 0 inches | 20 inches | cobbly silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200) Clayey Soils | FINE-GRAINED SOILS: Silts and Clays (liquid limit less than 50%), silt. | Saturated hydraulic conductivity micro msec | Soil Reaction (pH) |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS: Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| | | | | | | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE SEARCH DISTANCE (miles)
 Federal USGS 1,000
 Federal FRDS PWS Nearest PWS within 0.001 miles
 State Database 1,000

FEDERAL USGS WELL INFORMATION

MAP ID _____ WELL ID _____ LOCATION _____
 1 USGS40000269033 1/8 - 1/4 Mile East FROM TP

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID _____ WELL ID _____ LOCATION _____
 FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

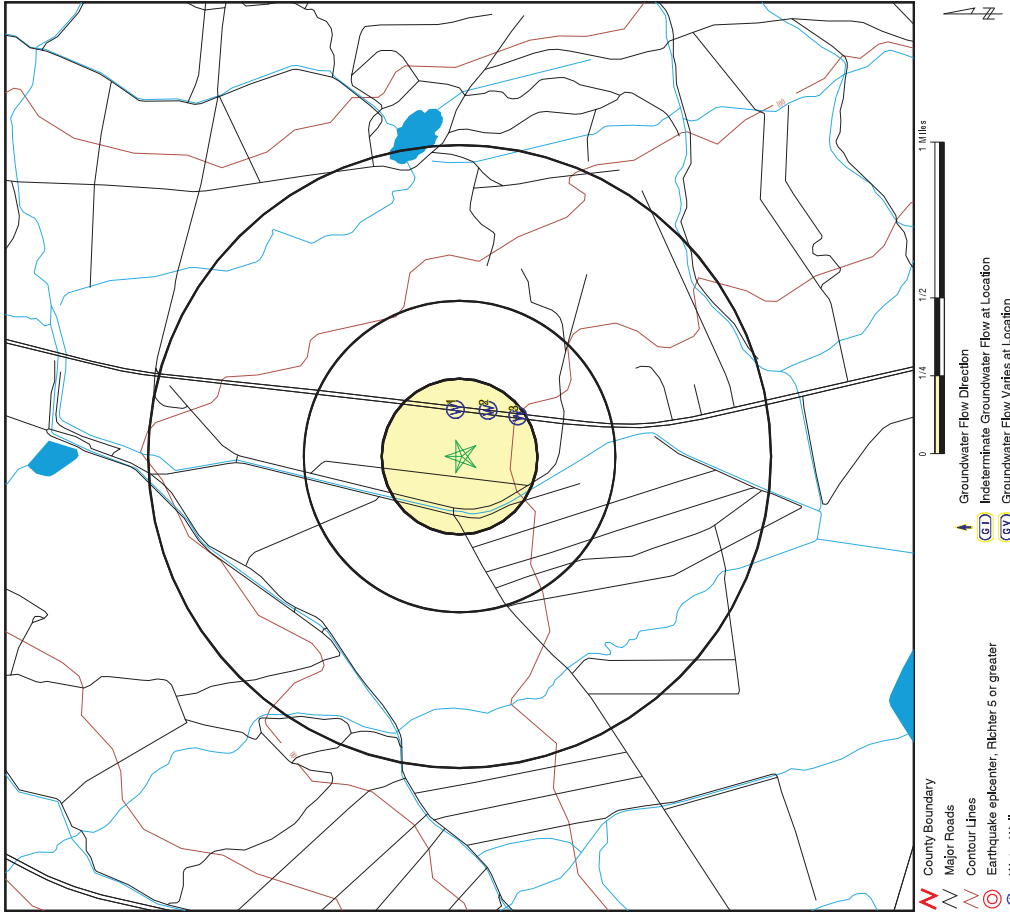
MAP ID _____ WELL ID _____ LOCATION _____
 No PWS System Found FROM TP

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID _____ WELL ID _____ LOCATION _____
 2 HI9000000003261 1/8 - 1/4 Mile ESE
 3 HI9000000003262 1/8 - 1/4 Mile SE

PHYSICAL SETTING SOURCE MAP - 4729933.2S



GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database
FED USGS
USGS40000269033

EDR ID Number

1 East
1/8 - 1/4 Mile
Higher

Org. Identifier: USGS-HI
Formal name: USGS Hawaii Water Science Center
Mnemonic Identifier: USGS-204921156281301
Mnemonic name: 6-4928-01 W1
Mnemonic type: Well
Mnemonic desc: Not Reported
HUC code: 20020000
Drainagearea Units: Not Reported
Drainagearea value: Not Reported
Contrib drainagearea: Not Reported
Contrib drainagearea units: Not Reported
Longitude: -156.4674577
Horiz Acc measure: 1
Horiz Collection method: Interpolated from map
Horiz coord refs: NAD83
Vert measure units: feet
Vert measure val: 70.00
Vert coord refs: Not Reported
Vert collection method: Interpolated from topographic map
Vert acc measure val: 10
Countrycode: US
Aquifername: HILOCAL
Formation type: Not Reported
Aquifer type: Not Reported
Construction date: 19420101
Welldepth units: ft
Welldepth: 70
Wellholedepth: Not Reported

Drainagearea value: Not Reported
Contrib drainagearea: Not Reported
Latitude: 20.8192973
Source map scale: 24000 seconds
Horiz Acc measure units: Not Reported
Vert measure val: 70.00
Vert coord refs: Not Reported
Countrycode: US
Welldepth: 70
Wellholedepth: Not Reported

Ground-water levels, Number of Measurements: 0

2 ESE
1/8 - 1/4 Mile
Higher

Wid: 6-4928-001
Well name: Puunene Airp TH
Yr drilled: 1942
Driller: Curtis Wong (Naval Facilities Engineering Command Hawaii, Asset Management, NAVFAC Hawaii)
Quad map: 6
Long83dd: -156.4675
Lat83dd: 20.817778
Gps: -1
Owner user: DOT, Airports Division
Land owner: Not Reported
Pump insta: Not Reported
Old number: 1
Casing dia: 8
Well depth: 70
Solid case: Not Reported
Use: ABN - Sealed
Use year: Not Reported
Init head: 3.6
Init head3: Not Reported
Init Cl: 0
Test date: Not Reported

Island: Maui
Old name: Not Reported
Utm: 0
Well type: Not Reported
Ground el: 70
Perf case: Not Reported
Init head2: Not Reported
Test gpm: Not Reported

HI WELLS
H9900000003261

SITE NAME: Field 912
ADDRESS: Not Reported
Kinet HI 96753
LAT/LONG: 20.819106 / 156.468795

CLIENT: Enviro Svcs. and Trng. Center
CONTACT: Sharia Nakashima
INQUIRY #: 4729933.2S
DATE: September 19, 2016 1:05 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 300
 Drift mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Drift yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported
 Pump mgd: 432
 Drift mgd: Not Reported
 Pump depth: Not Reported
 Aquil code: 60301
 Latest hd: Not Reported
 Plr: Not Reported
 Surveyor: Not Reported
 T: Not Reported

Pump mgd: 2.88
 Draft mgd: Not Reported
 Pump depth: Not Reported
 Aquil code: 60301
 Latest hd: Not Reported
 Plr: Not Reported
 Surveyor: Not Reported
 T: Not Reported

Test chlor: Not Reported
 Test unit: Not Reported
 Head feet: Not Reported
 Min chlor: Not Reported
 Bot hole: 0
 Bot perf: Not Reported
 Pump elev: Not Reported
 Trnk: (2) 3-8-008:001
 Wcr: 01-JAN-42
 Site id: HI900000003261

Pump elev: Not Reported
 Trnk: (2) 3-8-008:001
 Wcr: 01-JAN-42
 Site id: HI900000003262

3 SE 1/8 - 1/4 Mile Lower

HI WELLS HI900000003262

HI WELLS

Wid: 6-4928-002
 Well name: Puunene Airp Shaft
 Yr drilled: 1942
 Driller: Curtis Wong (Naval Facilities Engineering Command Hawaii, Asset Management, NAVFAC Hawaii)
 Quad map: 6
 LongE3dd: -156.467778
 Lat63dd: 20.816389
 Gps: -1
 Owner user: Hawaiian Commercial & Sugar Co. (HC&S)
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 34-SH
 Casing dia: 72
 Well depth: 53
 Solid case: Not Reported
 Use: ABN - Sealed
 Use year: Not Reported
 Init head: 3.7
 Init head3: Not Reported
 Init d: 0
 Test date: Not Reported
 Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 2000
 Drift mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Drift yr: Not Reported
 Bot solid: Not Reported
 Spec capac: Not Reported

Island: Maui
 Old name: Not Reported
 Ulm: 0
 Well type: SHF
 Ground el: 50
 Perf case: Not Reported
 Init head2: Not Reported
 Test gpm: Not Reported
 Test chlor: Not Reported
 Test unit: Not Reported
 Head feet: Not Reported
 Min chlor: Not Reported
 Bot hole: -3
 Bot perf: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for MAUI County: 3

Note: Zone 1 indoor average level > 4 pCi/L

: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L

: Zone 3 indoor average level < 2 pCi/L

Federal Area Radon Information for Zip Code: 96753

Number of sites tested: 10

| Area | Average Activity | % <= 4 pCi/L | % 4-20 pCi/L | % >20 pCi/L |
|-------------------------|------------------|--------------|--------------|--------------|
| Living Area - 1st Floor | 0.010 pCi/L | 100% | 0% | 0% |
| Living Area - 2nd Floor | Not Reported | Not Reported | Not Reported | Not Reported |
| Basement | Not Reported | Not Reported | Not Reported | Not Reported |

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)

Source: United States Geological Survey

EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory

Source: Office of Planning

Telephone: 808-587-2895

HYDROGEOLOGIC INFORMATION

AQUIFLOWR Information System

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit

Source: P.G. Scribner, R.E. Arndt and W.J. Bawiec. Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Bekken Map. USGS Digital Data Series DDS - 11 (1984).

STATSGO: State Soil Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)

The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)

Telephone: 800-672-5559

SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service. mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)

This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Well Index Database

Source: Commission on Water Resource Management

Telephone: 808-587-0214

CWRM maintains a Well Index Database to track specific information pertaining to the construction and installation of production wells in Hawaii

OTHER STATE DATABASE INFORMATION

RADON

Area Radon Information

Source: USGS

Telephone: 703-356-4020

The National Radon Database has been developed by the U.S. Environmental Protection Agency

(USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey.

The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones

Source: EPA

Telephone: 703-356-4020

Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities:

Private and public use landing facilities

Source: Federal Aviation Administration, 800-457-6656

Epionters:

World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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PROFESSIONAL QUALIFICATIONS

Name: **Sharla M. Nakashima**
Title: Environmental Scientist
Education: BS, Chemistry, University of Hawaii at Manoa, 2000
Training: OSHA 40 Hour HAZWOPER
DOT Hazardous Materials Handling
Experience: EnviroServices & Training Center, LLC, Environmental Chemist, 2000 to Present.
University of Hawaii, Chemistry Department, Graduate Research Assistant, 2000.

Ms. Nakashima's primary responsibilities are conducting Phase I and II environmental site assessments. She is also the lead person to conduct data QA/QC/validation/reduction. Ms. Nakashima possesses experience in operating global positioning system (GPS) instrumentation and conducting hazardous materials inventories/classifications/segregations/compatibility determinations.

PAST PROJECT EXPERIENCE

Shari'a M. Nakashima

Phase I Environmental Site Assessments on the Islands of Oahu, Maui, Kauai, Hawaii, Lanai; Environmental Professional. Ms. Nakashima has conducted numerous Phase I environmental site assessments throughout the State of Hawaii in accordance with generally accepted Phase I industry protocol as described in the ASTM E-1527 standard and to satisfy "all appropriate inquiry" as defined in 42 United States Code (U.S.C.) §9601(35)(B). Work sites included commercial, industrial, agricultural, condemned, and residential land ranging in size from small properties (less than 2.0 acres) to larger properties (greater than 300.0 acres).

Phase II Environmental Site Assessments/Site Screening Assessments on the Islands of Oahu, Maui, Kauai, Hawaii, Lanai; Project Manager. Ms. Nakashima has performed numerous Phase II environmental site assessments and site screening assessments throughout the State of Hawaii. Projects included surface soil investigation utilizing both multi-incremental and discrete sampling protocols and subsurface soil/groundwater investigations using hand tools, direct-push rig, and hollow-stem augering techniques. Contaminants investigated included petroleum/petroleum-related compounds, heavy metals, pesticides/herbicides, PCBs, and dioxins/furans.

Phase II Environmental Site Assessments/Site Screening Activities; GPS Team Leader. Ms. Nakashima utilized Trimble Navigation Global Positioning System (GPS) instrumentation and Geographical Information Systems (GIS) applications for numerous projects to identify/locate pre-determined sample locations, document sample locations or site features, and/or identify property limits. GIS data obtained were incorporated in both the planning and reporting phases of applicable projects.

Underground Storage Tank (UST) Closure and Release Response; Environmental Scientist. Ms. Nakashima has closed numerous UST systems throughout the State of Hawaii. Closure and release response activities were performed in accordance with Hawaii Administrative Rules 11-281. Duties included coordination and management of various subcontractors, documentation of closure (both removal and close in place), release assessment sample collection, site remediation, waste profiling/packaging/disposal, communication with State regulators, and report preparation.

Voluntary Response Program (VRP) Site Assessment and Remediation; Environmental Scientist/Project Manager. Ms. Nakashima has served as both environmental scientist and project manager on several VRP projects on the Island of Oahu. Ms. Nakashima worked on all phases of the VRP, including project scoping, planning document preparation, field sampling, data assessment, contaminated media removal/remediation, confirmation sampling, and report preparation. Contaminants addressed included petroleum/petroleum-related compounds, heavy metals, pesticides/herbicides, PCBs, and dioxins/furans.

Industrial Wastewater Discharge Permitting (IWDP), Environmental Scientist. Ms. Nakashima acquired an IWDP which authorized the facility to discharge industrial wastewater into the City and County of Honolulu's publicly owned treatment works (POTW) under Chapter 14 of the Revised Ordinances of Honolulu.

Underground Injection Control (UIC) Permitting, Environmental Scientist. Ms. Nakashima acquired a UIC permit for two dry wells located at a car rental facility in Kona, Hawaii. Work included investigation and application procedures required by the Hawaii Department of Health-State Drinking Water Branch.

Hazardous Materials Inventory, Environmental Chemist. Ms. Nakashima conducted a hazardous materials survey at over sixty (60) public intermediate and high schools on the islands of Oahu, Kauai, Maui, Molokai, Lanai and Hawaii. Work included identification and categorizing of over 30,000 hazardous materials, conducting photographic documentation, and determining NFPA labeling requirements for classroom storage areas potentially containing hazardous materials.

Household Hazardous Waste (HHW) Collection, Environmental Scientist. Ms. Nakashima assisted with the collection of HHW in Honolulu, Lahaina, Waialuku, Hilo, and Kona. Tasks included identification, packaging, labeling, transportation and disposition of HHW in accordance with OSHA, EPA, and DOT protocol.

Hazardous Waste Characterization and/or Disposal, Environmental Scientist. Ms. Nakashima assisted in the disposal of various chemicals and hazardous wastes at an abandoned laboratory in Waimanalo, Oahu. Additional sites included several public intermediate and high schools. Tasks included identification, packaging, labeling, transportation and disposition of hazardous waste in accordance with OSHA, EPA, DOT, and local regulations.

Asbestos Air-Monitoring, City and County – Department of Agriculture, Environmental Scientist. Ms. Nakashima assisted and/or conducted air monitoring using low volume sampling pumps during asbestos abatement activities.

Laboratory Studies, Research Assistant. Ms. Nakashima conducted studies of protein conformational dynamics through photothermal methods and purified horse heart myoglobin within thin layered polymer slides and organic solvents. Lab experience also included utilization of Gas Chromatography (GC)-Mass Spectrometry (MS), High Performance Liquid Chromatography (HPLC), Nuclear Magnetic Resonance (NMR), Infrared (IR) spectrometry, and Ultraviolet/Visible (UV-VIS) Spectrometer.

APPENDIX I-2

**PHASE I ENVIRONMENTAL SITE ASSESSMENT,
2018**

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**PHASE I
ENVIRONMENTAL SITE ASSESSMENT**
DHHL Maui Property - Puhehumui
Puunene, Maui, Hawaii
TMK (2) 3-8-008 : Parcel 036 (portion)

Prepared For:
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

in association with:
State of Hawaii
Department of Hawaiian Home Lands
91-5420 Kapolei Parkway
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ETC Project No. 18-1005
April 2018

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1.0 EXECUTIVE SUMMARY

This report presents the results of a Phase I Environmental Site Assessment (ESA) performed by EnviroServices & Training Center, LLC (ETC) in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E1527-13. This Phase I ESA was completed for PBR Hawaii & Associates, Inc. (PBR) (Client) in association with the State of Hawaii Department of Hawaiian Home Lands (DHHL) (User) for a property located along Mokulele Highway in Puunene, Maui, herein referred to as the Subject Property. The Subject Property is identified by Tax Map Key (TMK) identification number (2) 3-8-008: Parcel 036 (portion).

The Subject Property consists of approximately 40-acres of partially improved land located in Puunene, Hawaii, within the central portion of the island of Maui (Appendix I, Figure 1). As part of the Phase I ESA, ETC performed a visual observation on March 28, 2018, for the use and/or storage of hazardous materials and/or hazardous waste. The Subject Property is bound to the south and west by former sugarcane haul roads, to the east by Mokulele Highway, and to the north by the Maui Humane Society property.

The northern most portion of the Subject Property includes a fenced telecommunication station; occupied by Sandwich Isles Communications, Inc. (SICI). The SICI property includes a radio tower, a single-story office building, and two portable office trailers. The interior areas of the station's office building and trailers were observed to house computer systems and associated components (i.e. cables, hardware, etc.). ETC also observed a bathroom floor drain within the office structure. According to SICI personnel, the bathroom drain reportedly discharges to an onsite septic system located on the southeast portion of the site. ETC also observed two active generators on the exterior areas of the station. The generators appeared to be in good condition with no visual indication of petroleum leaks or spills. ETC observed two 55-gallon metal drums beneath a tree on the south portion of the station. The drums were observed to be in poor condition (i.e. rusted with visible holes), were unlabeled, and contained an unknown liquid substance. SICI personnel indicated having no knowledge of the origins or contents of the drums; however, later reported that one of the drums may be filled with water. SICI has recently made arrangements to have the drums removed from the site and properly disposed. While no obvious visual or olfactory indications of a release from the drums were observed (i.e. surface staining or petroleum odor); ETC was unable to determine whether a past release of hazardous materials had occurred. As such, ETC cannot dismiss the potential contaminant impacts associated with the corroded drums. This finding is considered a REC.

Immediately south of the SICI property, ETC observed multiple stockpiles of rock/boulders, concrete rubble, asphalt, and a limited amount miscellaneous metal. While no petroleum products or hazardous substances were observed from the visible surface areas of the piles; the interior areas of the piles were not visible. The quantity of waste and size of the piles made it infeasible to adequately characterize the potential environmental impacts. As such, the unknown contents of these piles are considered a "data gap." Based on ETC's general observation of the stockpiles and surrounding areas coupled with information provided by Alexander & Baldwin, Inc. (A&B) personnel, this data gap is not considered significant.

ETC also observed a single-story concrete structure on the north portion of the Subject Property. The interior areas of the structure appeared to be vacant and unoccupied. No other

structures were observed on the Subject Property. The remaining areas of the Subject Property appeared to be overgrown with vegetation and were unoccupied. No other evidence of improper generation, storage, or disposal of hazardous or regulated wastes was observed on the Subject Property. No visual evidence of the presence of underground storage tanks (USTs) or above-ground storage tanks (ASTs) was observed (i.e. vent or fill pipes, dispensers, etc.). In addition, no suspect PCB-containing electrical or hydraulic equipment was observed on the Subject Property. No other significant findings to indicate suspect recognized environmental conditions (RECs), historical RECs, controlled RECs, or *de minimis* conditions were identified during ETC's site reconnaissance.

The Subject Property was not listed by ETC's contract database search. Additionally, the database search did not identify any other sites within the specified radii of the Subject Property. Although not considered as part of the standard record sources, *Maui Airport Military Reservation (H09HH0225)* was identified as a Formerly Used Defense Site (FUDS) site and located approximately 0.45-miles southeast of the Subject Property. Based on the close proximity to the Subject Property, ETC requested and reviewed facility file records from the DOH Hazard Evaluation and Emergency Response Office (HEER).

ETC's file review indicated that *Maui Airport Military Reservation* was originally developed by the Territory of Hawaii in or around 1937 as a civil airfield (known as the Puunene Airport). Eventually Navy-use of the Puunene Airport began in or around 1940. By 1942, the Puunene Airport had expanded and immediately adjacent areas (including the Subject Property) were commissioned as the Naval Air Station of Maui. In 1943, the area was renamed NAS-Puunene when the Naval Air Station Kahului was opened.

ETC's review of historic maps, aerial photographs, and Client-provided information confirmed that the Subject Property was formerly part of the naval air station prior to its redevelopment for sugarcane cultivation in or around the 1970's. Information pertaining to specific military usage of the Subject Property is unknown; however, historic aerial imagery of the site indicate that the Subject Property may have been used for offices, housing, and/or equipment storage. Based on ETC's file review, no environmental issues pertaining to the *Maui Airport Military Reservation* on the Subject Property were identified.

File review also indicated that a transformer release site and former landfill associated with the former *Maui Airport Military Reservation* are located approximately 0.9-miles southeast of the Subject Property. The transformer release site was reportedly cleaned up, backfilled, and restored. Clean up activities included the removal and disposal of approximately 633-cubic yards of PCB-contaminated soil and concrete debris. As a result, the DOH HEER Office issued the facility a letter indicating that no further action (i.e. No department of Defense Action Indicated) was required for the site. File review indicated that the *Maui Airport Landfill* reportedly consisted of a 20-acre dump site that was believed to contain the remains of aircraft and other equipment that were deemed surplus for military purposes. Environmental investigations were conducted on the former *Maui Airport Landfill* site which included soil and groundwater sampling and analyses. Investigative results indicated that elevated concentrations of arsenic, cadmium, lead, and PCBs were found in the soil. A feasibility study determined that surface capping with institutional controls and natural attenuation with institutional controls were determined to be the two highest ranking remedial alternatives. Based on this information coupled with the distance to the Subject Property; ETC believes this facility does not pose a

reasonable risk of impacting the Subject Property.

Interview findings indicate that pre-harvest burning of sugarcane was conducted on the Subject Property as part of the sugarcane cultivation operations. The primary concern regarding sugarcane burning is airborne particulate matter; however, the former sugarcane burning is not considered a REC for the Subject Property.

The Subject Property has been used for commercial sugarcane cultivation since at least 1932. Activities commonly associated with commercial sugar cultivation include the use of pesticides. As described in Section 9 of the State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response (DOH HEER) *Interim Final Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan* (HEER TGM), with the exception of arsenic, residual pesticides in former sugarcane fields are rarely detected above levels of potential concern. Data gathered by the DOH over the past ten years indicate that dioxins in former sugarcane fields do not pose a significant health risk (DOH, 2009). Review of the DOH HEER Office's *Summary of Pesticide and Dioxin Contamination Associated with Former Sugarcane Operations* indicated that elevated concentrations were not reported in the surface soils of sugarcane fields associated with the nearby Puunene Sugar Mill (DOH, 2011). No pesticide mixing sites were operated on the Subject Property. Although other contaminants associated with commercial sugarcane cultivation were not evaluated, based on these findings, the former agricultural usage of the Subject Property is considered a *de minimis* condition.

In summary, ETC performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-13 on the Subject Property. This assessment revealed there is no evidence of RECs in connection with the Subject Property, except the following:

- Contaminant impacts associated with a potential release from the two corroded 55-gallon drums containing an unknown substance.

2.0 INTRODUCTION

EnviroServices & Training Center, LLC (ETC) was contracted by PBR Hawaii & Associates, Inc. (PBR) (Client) in association with the State of Hawaii Department of Hawaiian Home Lands (DHHL) (User), to complete a Phase I Environmental Site Assessment (ESA) of the property located along Mokulele Highway in Pulehuanui, Maui, Hawaii; identified as Tax Map Key (TMK) identification number (2) 3-8-008: Parcel 036 (portion) and herein referred to as the Subject Property.

This Phase I ESA was performed in accordance with the American ASTM International (ASTM) Standard E1527-13 entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (referred to herein as the ASTM Practice). The ASTM Practice is intended for use by parties who wish to assess the environmental condition of commercial real estate with respect to contaminants within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and petroleum products. The ASTM Practice is designed to satisfy 'all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice' as defined in 42 United States Code (U.S.C.) §9601(35)(B).

2.1 Background

Under CERCLA, persons may be held liable to clean up hazardous substances at properties that they either currently own or operate, or owned or operated at the time of disposal. Strict liability in the context of CERCLA means that a potentially responsible party may be liable for environmental contamination based solely on property ownership and without regard to fault or negligence.

In 1986, the Superfund Amendments and Reauthorization Act (SARA) amended CERCLA by creating an "innocent landowner" defense to CERCLA liability for those persons who could successfully demonstrate, among other requirements, that they "did not know and had no reason to know" prior to purchasing the property that any hazardous substance that is the subject of a release or threatened release was disposed of on, in, or at the property. Such persons, to demonstrate that they had "no reason to know" must have undertaken, prior to, or on the date of acquisition of the property, "all appropriate inquiries" into the previous ownership and uses of the property consistent with good commercial or customary standards and practices.

The Small Business Liability Relief and Brownfields Revitalization Act (referred to as "the Brownfields Amendments") was enacted in January 2002 to amend CERCLA. These amendments provide funds to assess and clean up Brownfields sites, clarify CERCLA liability provisions for certain landowners, and provide funding to enhance state and tribal cleanup programs.

Subtitle B of Title II of the Brownfields Amendments revised CERCLA, and clarifies the requirements necessary to establish the innocent landowner defense. The Brownfield Amendments also added protections from CERCLA liability for "bona fide prospective purchasers" and "contiguous property owners" who meet certain statutory requirements. Each of the CERCLA liability provisions for innocent landowners, bona fide prospective purchasers, and contiguous property owners (referred to collectively as "landowner liability protections," or LLPs) requires that persons claiming the liability protections conduct all appropriate inquiries

into prior ownership and use of a property prior to or on the date a person acquires a property.

A key provision of the Brownfield Amendments finalized regulations setting federal standards for the conduct of all appropriate inquiries. The federal standards were promulgated in the *Standards and Practices for All Appropriate Inquiries(AAI)*, *Final Rule, 40 CFR Part 312*, referred to as the AAI Final Rule.

Section 312.11 of the AAI Final Rule indicates that the ASTM International Standard E1527-05/13, entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, may be used to comply with the requirements set forth in Sections 312.23 through 312.31 of the AAI Final Rule. Therefore, this Phase I ESA was performed in conformance with the ASTM International Standard E1527-13.

2.2 Purpose

The purpose and goal of this Phase I ESA is to conduct an inquiry to identify recognized environmental conditions in connection with the Subject Property, to the extent feasible pursuant to the process described in the ASTM Practice. The term recognized environmental condition (REC) is defined as:

“the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not recognized environmental conditions.”

As defined in the ASTM Practice, for the purposes of this Phase I ESA, the term “migrate” or “migration” refers to the movement of hazardous substances or petroleum products in any form, including, for example, solid and liquid at the surface or subsurface, and vapor in the subsurface (ASTM, 2013).

2.3 Scope of Services

The scope of work included the following tasks.

- Develop a site description for the Subject Property including background, physical characteristics, and historical site conditions.
- Evaluate user provided information including but not limited to environmental liens, activity and use limitations, specialized knowledge, valuation reduction of environmental issues, and other information pertaining to the property.
- Evaluate information in programs such as NPL, CERCLIS, FINDS, ERNS, RCRA notifiers, and other governmental information systems within specific radii of the property to identify sites that would have the potential to impact the property;
- Conduct a visual site reconnaissance from publicly accessible areas detailing the current property and adjacent property conditions.

- Provide a visual evaluation of the adjacent properties to identify high-risk neighbors, and the potential for a chemical to migrate onto the property;
- Conduct interviews with owner(s), site manager(s), occupant(s), local government official(s), and/or other individuals with past and prior use history of the property, if available.
- Conduct a Tier 1 Vapor Encroachment Screening for the subject property in conformance with the ASTM Practice E2600-15.
- Complete a written report detailing the Phase I ESA findings and conclusions.
- Document supporting information including maps, site photographs, regulatory records, and interview(s).

2.4 Significant Assumptions

This Phase I ESA is limited by the availability of information at the time of the assessment. Interviews were conducted and interviewee’s responses were assumed as answered in good faith, to the extent of his/her actual knowledge.

Since no hydrogeological data was available for the Subject Property, groundwater was assumed to flow in the direction of the surface topography of the Subject Property and surrounding areas.

2.5 Conditions and Limitations

ETC completed this Phase I ESA for the Subject Property in accordance with the scope and limitations of ASTM Practice E1527-13. ETC’s findings and conclusions contained herein are professional opinions based solely upon visual observations, interviews, and interpretation of the historical information and documents available to ETC at the time this Phase I ESA was conducted. Opinions stated in this report do not apply to changes that occur after services were performed.

ETC performed the specified services for this project with the degree of care, skill and diligence ordinarily exercised by professional consultants performing the same or similar services. No other warranty, guarantee, or representation, expressed or implied, is included or intended; unless otherwise specifically agreed to in writing by both ETC and ETC’s Client.

2.6 User Reliance

This report is intended for the sole use of ETC’s Client and User, exclusively for the Subject Property indicated. ETC’s Client may use and release this report, including making and retaining copies, provided such use is limited to the particular site and project for which this report is provided. However, the services performed may not be appropriate to satisfy the needs of other users. Release of this report to third-parties is at the sole risk of the said user(s), and ETC is not liable for any claims or damages resulting from or connected with such release or any third party’s use or reuse of this report.

3.0 SITE DESCRIPTION

3.1 Location and Description

The Subject Property consists of approximately 40-acres of partially improved land in Puuene, Hawaii, on the island of Maui. The Subject Property is identified as TMK identification number (2) 3-8-008: Parcel 036 (portion). Site maps of the Subject Property are included as Appendix I.

3.2 Physical Setting

Groundcover at the Subject Property generally consists of vegetation and bare soil (i.e. former sugarcane fields). Additionally, on the north portion of the Subject Property, there are multiple concrete platforms within a fenced telecommunication station (i.e. Sandwich Isles Communication, Inc. property). The Subject Property and surrounding areas appear to exhibit a slight downward gradient to the southwest. An aerial site map is included as Appendix I, Figure 2. Photographic documentation of ETC's site reconnaissance is included in Appendix II.

3.2.1 Site Topography

Topographic map coverage of the Subject Property and surrounding areas is provided by the United States Geological Survey, Island of Maui, Hawaii, 7.5-minute Series, Maalaea Quadrangle, 2013. The elevation of the Subject Property is approximately 80- to 100-feet above mean sea level (msl).

3.2.2 Regional Geology

The island of Maui is the second largest of the Hawaiian Islands. Maui consists of two shield volcanoes with a connecting isthmus. The volcanic rocks of the West Maui Mountains (West Maui Volcano) are divided into three series. The oldest is the Wailuku Volcanic Series, followed by the Honolua and Lahaina Volcanic Series. The Wailuku Series built the major shield volcano comprised of basaltic lava flows and associated pyroclastic deposits. The Lahaina Series then covered the western slopes of the West Maui Volcano.

The Haleakala Volcano last erupted around 1790 and is presently dormant. The shield of the volcano is composed of a' a and pahoehoe lava flows of theolite, theoleiitic olivine basalt, and oceanite known as the Honomanu Volcanic Series. The Kula Volcanic Series overlies the Honomanu Series and is comprised of hawaite, alkalic olivine basalt, and ankaramite. Lava flows from the Haleakala volcano formed the Maui Isthmus and are made up of permeable basalt and erosional deposits (Macdonald, et al., 1983).

3.2.3 Site Geology

The soil at the Subject Property is mapped as Ewa silty clay loam, 0- to 3- percent slopes (EaA). EaA consists of well-drained soils in basins on alluvial fans on the island of Maui and Oahu. This soil is developed in alluvium, derived from basic igneous rock. In a representative profile, EaA's surface layer is 18-inches thick and comprised of dark reddish-brown silty clay loam. The subsoil is approximately 42-inches thick and is comprised of dark reddish-brown and dark-red silty clay loam. The substratum is comprised of coral limestone, sand, and/or gravelly alluvium. EaA also exhibits a subangular blocky structure. EaA is neutral in both the surface layer and subsoil. The natural vegetation consists of fingergrass, kiawe, koa haole, klu, and uhaloa. This soil is primarily used for sugarcane and homesites (USDA 1972).

3.2.4 Regional Hydrogeology

The primary drinking water in the Hawaiian Islands is drawn from basal groundwater. Basal groundwater is formed by rainwater percolating down through the residual soils and permeable volcanic rock. The portion of the island situated below sea level is saturated with ocean salt water, except within rift zones of the volcanoes where fresh water forms a basal lens called the "Ghyben-Herzberg" lens. A zone of transition between the fresh groundwater and the ocean salt water occurs due to the constant movement of the interface as a result of tidal fluctuations, seasonal fluctuations in recharge and discharge and aquifer development (Macdonald et al., 1983).

Groundwater aquifers in Hawaii occur under two principal conditions at high altitudes above sea level: perched and dike-impounded. Downward percolation of rainwater may be impeded by low permeability materials such as dense volcanic sediments, alluvial clay, and volcanic ash, which can cause the formation of a perched aquifer. A dike-impounded aquifer results from steeply dipping volcanic dikes serving as a barrier, sequestering water into compartments and reservoirs of impermeable lavas. Recharge of freshwater aquifers occurs in areas of high rainfall, which are the interior mountainous areas. The groundwater flows from the recharge areas to the areas of discharge along the shoreline. Frictional resistance to groundwater flow causes it to pile up within the island until it attains sufficient hydraulic head to overcome friction. Thus, basal groundwater tends to slope toward the shoreline (Nichols et al., 1996).

3.2.5 Site Hydrogeology

The Subject Property is underlain by the Kahului Aquifer System which is part of the Central Aquifer Sector on the island of Maui. The aquifer is classified by Mink and Lau, 1990, with the system identification number 60301116 (12211). This system includes an unconfined, basal aquifer in sedimentary lithology (i.e. nonvolcanic). The groundwater in this aquifer is described as being a currently used, ecologically important, non-drinking water source. This water is also described as having low salinity (250- to 1000-mg/l Cl⁻). is irreplaceable, and considered to have a high vulnerability to contamination (Mink and Lau, 1990).

The site is further underlain by a second aquifer of the same system. This aquifer includes an unconfined, basal aquifer in flank formations and is classified by Mink and Lau, 1990, with the system identification number 60301111 (12212). The groundwater in this aquifer is described as a currently used, ecologically important, non-drinking water source with low salinity (250- to 1000-mg/l Cl⁻). The groundwater is also described as irreplaceable with a moderate vulnerability

to contamination (Mink and Lau, 1990).

3.2.6 Nearest Surface Water Bodies

The nearest surface water bodies to the Subject Property are the Waikapu Stream, which is located approximately 0.27-miles west of the Subject Property and the former HC&S Reservoir-92, which is located approximately 0.4-miles north of the Subject Property.

3.3 Current Use of the Subject Property

The northernmost portion of the Subject Property is occupied by Sandwich Isles Communications, Inc. (SICI), who operates a telecommunication station at the site. The SICI property consists of a radio tower, a single-story office structure, and two portable office trailers.

The remaining portions of the Subject Property are currently not used; however, were most recently used for commercial cultivation of sugar by Hawaiian Commercial & Sugar Co. (HC&S), a former subsidiary of Alexander & Baldwin, Inc. (A&B). Note that the Subject Property corresponds to former HC&S Field No. 912. The A&B-occupied portion of the Subject Property includes an empty concrete structure (remnant feature from the historic Puunene Naval Air Station) and several concrete/rock piles.

3.4 Current Uses of the Adjoining Properties

ETC visually inspected the neighboring properties and their operations from the Subject Property and publicly accessible areas. The Subject Property is bordered to the north by the Maui Humane Society property, to the east by Mokuale Highway, to the west by Mehamaha Loop road, and to the south by a former sugarcane haul road. All other areas in the vicinity of the Subject Property are former sugarcane and other agricultural (e.g. seed corn) fields.

4.0 USER PROVIDED INFORMATION

This section is intended to provide information obtained from the user of this Phase I ESA that will help identify RECs associated with the Subject Property. The information provided does not require the user to have the technical expertise of an environmental professional and are generally not provided by the environmental professional performing the Phase I ESA.

4.1 Required Information

In order to qualify for one of the LLPs offered by the Brownfields Amendments, the user must provide certain information about the site (if available) to the environmental professional. Failure to provide this information could result in a determination that “all appropriate inquiry” is not complete. Mr. Allen G. Yanos, Property Development Agent, State of Hawaii, Department of Hawaiian Home Lands - Land Management Division (“user”), provided ETC with the information in the following subsections.

4.1.1 Environmental Liens

The User did not have any information pertaining to any environmental liens or governmental notifications relating to past or recurrent violations of environmental laws with respect to the Subject Property.

4.1.2 Activity and Use Limitations

The User did not have any information pertaining to activity and land use limitations filed or recorded in a registry under federal, tribal, state or local law.

4.1.3 Specialized Knowledge

The User did not have any specialized knowledge or experience related to the Subject Property or nearby properties.

4.1.4 Valuation Reduction for Environmental Issues

The User indicated that the purpose of the Phase I ESA pertains to a change in land-use; therefore, valuation reduction for environmental issues pertaining to the Subject Property is not applicable.

4.1.5 Commonly Known or Reasonably Ascertainable Information

The User indicated that the Subject Property was historically part of the Puunene Naval Air Station prior to use as sugarcane fields. A portion the Subject Property was designated for development in 2007 and has since then been left fallow. The Subject Property is no longer planned for development due to failed lease negotiations.

The user had no additional commonly known and reasonable ascertainable information about the Subject Property that would help the environmental professional to identify conditions indicative of releases or threatened releases. In addition, known spills and/or chemical releases, if any, were noted.

4.1.6 Degree of Obviousness of Potential Contamination

The User had no knowledge of any obvious indicators that point to the presence or likely presence of contamination at the Subject Property based on their knowledge and/or experience related to the Subject Property.

4.2 Other Information Pertaining to the Subject Property

4.2.1 Reason for Performing Phase I ESA

This Phase I ESA was conducted as part of the User's due diligence efforts prior to prospective future commercial/light industrial uses of the Subject Property (Chapter 343 EIS).

4.2.2 Title Records

Title records/documents were not provided by the User. However, ETC conducted a limited land title search, which is documented in Section 5.4.3.

4.2.3 Owner, Property Manager, and Former Occupant Information

Subject Property Owner:
State of Hawaii, DHHL
Land Management Division
Shelly Carreira
Land Agent
DHHL, Land Management Division

5.0 RECORDS REVIEW

5.1 Standard Environmental Record Sources

To obtain information concerning recognized environmental conditions (REC) at or near the Subject Property, ETC contracted Environmental Data Resources, Inc. (EDR) to conduct an environmental database search. EDR is a company that specializes in the review of public regulatory environmental databases. The regulatory agency report provided (Appendix IV) is based on an evaluation of the data collected and compiled by EDR.

ETC contracted a radius search report, which focused on the Subject Property and adjacent properties that may impact the Subject Property. Adjacent properties listed in governmental environmental records are identified within a specific search radius (Table 1). The search radius varies depending on the particular record queried. The search is designed to meet the requirements of the current industry approach, as described in ASTM Practice E1527-13. The information provided is assumed to be correct and complete, unless noted otherwise.

Table 1: ASTM Practice Environmental Record Sources and Recommended Search Distances

| Environmental Database Sources | ASTM Practice Search Distances (miles) |
|--|---|
| Federal NPL Site List | 1.0 |
| Federal Delisted NPL Sites | 0.5 |
| Federal CERCLIS List | 0.5 |
| Federal CERCLIS NFRAP Site List | 0.5 |
| Federal RCRA CORRACTS Facilities List | 1.0 |
| Federal RCRA non-CORRACTS TSD Facilities List | 0.5 |
| Federal RCRA Generators List | Subject Property and adjoining properties |
| Federal Institutional Control/Engineering Control Registries | Subject Property only |
| Federal ERNS List | Subject Property only |
| State-Equivalent NPL | 1.0 |
| State-Equivalent CERCLIS | 0.5 |
| State Landfill and/or Solid Waste Disposal Site Lists | 0.5 |
| State Leaking UST List | 0.5 |
| State Registered UST List | Subject Property and adjoining properties |
| State Institutional Control Registry | Subject Property only |
| State Voluntary Cleanup/Response (VCP/VRP) Sites | 0.5 |
| State Brownfield Sites | 0.5 |

5.1.1 Federal NPL and Delisted NPL

The National Priorities List (NPL) is the Environmental Protection Agency's (EPA) database of uncontrolled or abandoned hazardous waste properties, which are considered to pose an immediate threat to human health and the environment. These properties are identified for priority remedial response actions under the Superfund Program. The Subject Property was not identified as a NPL site or a delisted NPL site. The database did not identify any delisted NPL sites within a 0.5-mile radius of the Subject Property. In addition, the database did not identify any NPL sites within a 1-mile radius of the Subject Property.

5.1.2 Federal CERCLIS and CERCLIS NFRAP

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database contains information on various aspects of potentially uncontrolled or abandoned hazardous waste properties from initial screening and assessment phases to listing on the NPL. The Subject Property was not identified as an active CERCLIS site or a CERCLIS No Further Remedial Action Planned (NFRAP) site. The database did not identify any active CERCLIS facilities within a 0.5-mile radius of the Subject Property. In addition, the database did not identify any CERCLIS NFRAP facilities within a 0.5-mile radius of the Subject Property.

5.1.3 Federal RCRA CORRACTS

The RCRA Corrective Action Sites (CORRACTS) database contains Resource Conservation Recovery Information System (RCRIS) sites with reported corrective action. The Subject Property was not identified as a CORRACTS facility. In addition, the database search did not identify any CORRACTS sites within a mile radius of the Subject Property.

5.1.4 Federal RCRA (non-CORRACTS) TSD Facilities

The EPA's RCRA program identifies and tracks hazardous waste from the point of generation to the point of final disposal. The RCRA Treatment, Storage or Disposal (TSD) facility database compiles those reporting facilities that treat, store, or dispose of hazardous waste. The Subject Property was not identified as a RCRA TSD facility. In addition, the database search did not identify any RCRA TSD facilities within a 0.5-mile radius of the Subject Property.

5.1.5 Federal RCRA Generator

The RCRA Generator database is a compilation by EPA's RCRIS of regulated facilities that generate hazardous waste. The Subject Property was not identified as a RCRA generator. In addition, the database search did not identify any RCRA generator facilities located on potential adjoining properties with respect to the Subject Property.

5.1.6 Federal Institutional Control/Engineering Control Registries

Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on a site.

The EPA Institutional Control and Engineering Control registry maintains a list of sites with institutional or engineering controls in place. The Subject Property was identified as not having any institutional or engineering controls in place.

5.1.7 Federal ERNS

The Emergency Response Notification System (ERNS) tracks the initial notifications of reported oil and hazardous material spills. The database contains information regarding the discharger, release date, material, amount released, incident location, and release action taken. The Subject Property was not identified as an ERNS facility.

5.1.8 State Equivalent NPL and CERCLIS

The CERCLIS List is a compilation of known or suspected uncontrolled or abandoned hazardous waste sites. These sites either have been investigated or are currently under investigation by the EPA for the release, or threatened release, of hazardous substances. Once a site is placed in CERCLIS, it may be subjected to several levels of review and evaluation and ultimately placed on the National Priorities List. The State of Hawaii does not have a formal "State Superfund" program; therefore, the State Hazardous Waste Sites (SHWS) are the State of Hawaii's equivalent to the federal EPA's CERCLIS database. Because this information is acquired from the Hawaii Department of Health (DOH) Hazard Evaluation and Emergency Response (HEER) Office, these sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup that use state funds (state equivalent superfund) are identified with sites where cleanup is paid for by the potentially responsible parties. The Subject Property was not identified as a SHWS. Additionally, the database search did not identify any SHWS sites within a 1-mile radius of the Subject Property.

5.1.9 State Landfill and/or Solid Waste Disposal

The State of Hawaii maintains records that include an inventory of solid waste disposal facilities and/or landfills. These include active or inactive facilities, or open dumps that failed to meet RCRA Subtitle D, Section 4004 criteria for solid waste landfills or disposal sites. The Subject Property was not identified as a Solid Waste Facility/Landfill (SWF/LF) facility. The database search did not identify any SWF/LF facilities within a 0.5-mile radius of the Subject Property.

5.1.10 State Leaking Underground Storage Tanks

The DOH Underground Storage Tank (UST) Program maintains a list of all reported leaks and releases from USTs. The Subject Property was not identified as a leaking underground storage tank (LUST) facility. Additionally, the database search did not identify any LUST facilities within a 0.5-mile radius of the Subject Property.

5.1.11 State Registered Underground Storage Tanks

The DOH Underground Storage Tank (UST) Program registration system tracks known and registered UST systems. The Subject Property was not identified as a UST facility. Additionally, the database search did not identify any UST facilities located on a potential adjacent property with respect to the Subject Property.

5.1.12 State Institutional Control Registry

Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on a site. The State Institutional Control list includes Voluntary Response Program and Brownfields sites with institutional controls in place. The Subject Property was not identified as having institutional controls in place.

5.1.13 State Voluntary Cleanup/Response Sites

The Hawaii Voluntary Response Program (VRP) was created on July 7, 1997 by amendments made to Hawaii's Environmental Response Law (ERL). The purpose of the VRP is to streamline the cleanup process in a way that encourages prospective developers, lenders, and purchasers to voluntarily cleanup properties. The VRP facilitates the cleanup process and, in certain situations, provides relief from the strict liability provisions of the Federal CERCLA and Hawaii ERL. The Subject Property was not identified as a VRP site, and the database search did not identify any VRP sites within a 0.5-mile radius of the Subject Property.

5.1.14 State Brownfields

A Brownfields site is land which the expansion, redevelopment, or reuse of may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. The Subject Property was not identified as a Brownfields site. The database search did not identify any Brownfields sites within a 0.5-mile radius of the Subject Property.

5.1.15 Unmappable/Orphan Sites

Unmappable sites are sites not plotted due to poor or inadequate address information. Due to the inaccurate or incomplete information provided by the respective agency, these sites cannot be plotted with confidence. The database search identified one (1) unmappable site in the Orphan Summary of the EDR Report.

5.2 Additional Environmental Record Sources

The EDR database includes a number of other regulatory databases that are not specified by the ASTM Practice. The Subject Property was not identified in any of the additional databases; however *Maui Airport Military Reservation (H09H0225)* was identified as a Formerly Used Defense Site (FUDS) site and located within 0.5-miles of the Subject Property. No additional sites surrounding the Subject Property were identified in any of the following databases.

ODI – Open Dump Inventory
LIENS 2 – CERCLA Line Information
HMIRS – Hazardous Materials Information Reporting System
HI SPILLS – Release Notifications
HI SPILLS 90 – SPILLS90 data from FirstSearch

DOD – Department of Defense Sites
FUDS – Formerly Used Defense Sites
CONSENT – Superfund (CERCLA) Consent Decrees
COAL ASH DOE – Steam Electric Plant Operation Data
COAL ASH EPA – Coal Combustion Residues Surface Impoundments List
DOT OPS – Incident and Accident Data
ROD – Records of Decision
RMP – Risk Management Plans
TRIS – Toxic Chemical Release Inventory System
TSCA – Toxic Substances Control Act
FTTS – FIFRA/TSCA Tracking System
MLTS – Material Licensing Tracking System
HIST FTTS – FIFRA/TSCA Tracking System Administrative Case List
SSTS – Section 7 Tracking Systems
ICIS – Integrated Compliance Information System
PADS – PCB Activity Database System
RADINFO – Radiation Information Database
RAATS – RCRA Administrative Action Tracking System
UIC – Underground Injection Wells List
DRYCLEANERS – Permitted Drycleaner Facility List
DOCKET HWC – Hazardous Waste Compliance Docket List
AIRS – List of Permitted Facilities
FINANCIAL ASSURANCE – Financial Assurance Information List
SCRD DRYCLEANERS – State Coalition for Remediation of Drycleaners
US AIRS – Aerometric Information Retrieval System Facility Subsystem
US MINES – Mines Master Index File
FINDS – Facility Index System/Facility Registry System
UXO – Unexplored Ordnance Sites
US FIN ASSUR – Financial Assurance Information
EPA WATCH LIST – EPA Watch List
2020 COR ACTION – 2020 Corrective Action Program List
PCB TRANSFORMER – PCB Transformer Registration Database

RCRA NonGen / NLR – RCRA – NonGenerators / No Longer Regulated
 PRP – Potentially Responsible Parties
 FUSRAP – Formally Utilized Sites Remedial Action Program
 UMTRA – Uranium Mill Tailing Sites
 LEAD SMELTERS – Lead Smelter Sites
 ABANDONED MINES – Abandoned Mines
 FUELS PROGRAM – EPA Fuels Program List
 ECHO – Enforcement & Compliance History Information

5.3 Tier 1 Vapor Encroachment Screen

ETC conducted a Tier 1 Vapor Encroachment Screen (VES) for the Subject Property. The Tier 1 VES was conducted in conformance with the scope and limitations of ASTM Practice E2600-15.

The purpose and goal of the Tier 1 VES is to conduct an inquiry to identify whether a vapor encroachment condition exists on the Subject Property. The term vapor encroachment condition (VEC) is defined as the “presence or likely presence of chemical(s) of concern (COC) vapors in the subsurface of the target property caused by the release of vapors from contaminated soil or groundwater or both, either on or near the target property as identified by a Tier 1 or Tier 2 screen.”

To obtain information concerning VECs at or near the Subject Property, ETC contracted EDR to conduct a Vapor Encroachment Screen. The report is a radius search report which focuses on both the Subject Property and adjacent properties that may impact the Subject Property. The search radius varies depending on the particular record being researched. The search is designed to meet the recommended search radius described in ASTM Practice E2600-15.

Table 2: ASTM Practice E2600-15

| Environmental Database Sources | ASTM Practice Search Distances (miles) COC and Petroleum Hydrocarbon Chemicals of Concern |
|--|---|
| Federal NPL Site List | 1/3 |
| Federal CERCLIS List | 1/3 |
| Federal RCRA CORRACTS Facilities List | 1/3 |
| Federal RCRA non-CORRACTS TSD Facilities List | 1/3 |
| Federal RCRA Generators List | Subject Property only |
| Federal Institutional Control/Engineering Control Registries | Subject Property only |
| Federal ERNS List | Subject Property only |
| State-Equivalent NPL | 1/3 |
| State-Equivalent CERCLIS | 1/3 |
| State Landfill and/or Solid Waste Disposal Site Lists | 1/3 |
| State Leaking UST List | 1/3 |
| State Registered UST List | Subject Property only |
| State Institutional Control/Engineering Control Registries | Subject Property only |
| State Voluntary Cleanup/Response (VCP/VRP) Sites | 1/3 |
| State Brownfield Sites | 1/3 |

The Subject Property was not identified by the contracted database. In addition, the database search did not identify any other sites within the specified radii of the Subject Property.

5.4 Historical Use Information on the Subject and Adjoining Properties

Historical uses of the Subject Property and adjoining properties were investigated through the review of documentation available from public land records and State of Hawaii archived information. In addition, available aerial photographs, plat maps, Sanborn maps, building permits, and city directories were reviewed.

5.4.1 Aerial Photograph Review

Aerial photographs from the EDR Aerial Photo Decade Package were reviewed. A total of five aerial photographs were found that included the Subject Property. The photographs were dated 1950, 1954, 1975, 1992, and 2000.

In the 1950 aerial photograph, the Subject Property appears partially developed with six structures. Note that the Subject Property appears to be part of the former NAS Puunene which appears to extend onto the north and south adjacent properties. The remaining areas surrounding the Subject Property appear to be utilized for agricultural purposes. Mokuule Highway and Mehamaha Loop are depicted in the 1950 aerial photograph.

The Subject Property and surrounding areas are not clearly visible in the 1954 aerial

photograph due to poor photo resolution. Although not clearly visible, the Subject Property and surrounding areas appear similar to the 1950 aerial photograph.

In the 1975 aerial photograph, the Subject Property appears to be primarily utilized as agricultural land, with the exception of the northernmost portion which remains undeveloped. All but one of the previously depicted structures are no longer present in the 1975 aerial photograph. With the exception of the north adjacent property, which appears developed with a single structure, all surrounding areas appear to be utilized for agricultural-purposes.

In the 1992 and 2000 aerial photographs, the Subject Property appears similar to the 1975 aerial photograph; however, the previously vacant area on the north portion of the Subject Property appears partially paved and developed with multiple structures and/or features. With the exception of the north adjacent property which appears further developed; surrounding areas appear similar to the 1975 aerial photograph with no significant changes.

5.4.2 Fire Insurance Maps

ETC contracted EDR to conduct a search for Sanborn fire insurance maps of the Subject Property. The search results indicated that the Subject Property is an unmapped property; therefore, Sanborn Maps were not available.

5.4.3 Historical Map Review

ETC reviewed available historic maps at the A&B map office. These included various field/plantation maps, contour maps, and facility site maps. Numerous maps (greater than 50) were found that included the Subject Property. These maps were dated from 1910 to 2012.

Parcel 036 (Field 912) was noted to be agricultural fields (labeled as Field M) in the maps dated from 1910 to 1939. In the 1943 through 1963 maps, Field 912 is fully developed and labeled as part of the east adjacent NAS-Puunene. Specifically, several structures included but not limited to a theatre, barracks, tennis court, hangar, offices, warehouse, inflammable storage, maintenance shops, etc. are depicted. The surrounding areas to the west and south of Field 912 appear to be used for agricultural purposes. Additionally, four (4) suspect aviation fuel USTs are depicted on the south adjacent property (Parcel 35). Areas to the north, east, and south appear to be part of the NAS-Puunene. In the 1968 map, all but two of the previously observed structures are no longer present; and Field 912 appears to be used for agricultural purposes. In addition, the southeast area appears to be labeled as Puunene Airport. Field 912 remained unchanged in the 1969 through 2012 maps with no significant changes.

5.4.4 Property Tax Files and Land Title Records

ETC conducted a limited chain of title search for the Subject Property at the Maui County Property Tax office. ETC is not a professional title search company and does not warrant the completeness or accuracy of the information provided, but considers the data useful in screening the Subject Property for environmentally suspect owners or lessees.

Property records were dated from 1948 to 2008. Review of the property records indicated the Subject Property is currently owned by the State of Hawaii, Department of Hawaiian Home Lands, who has owned the Subject Property since at least 1948. The chain of title records indicated that there are no current lessees for the Subject Property. The previous lessee for the

Subject Property included Alexander & Baldwin, Inc (formerly known as A&B Properties, Inc. and A&B Hawaii, Inc.), who had leased the Subject Property for commercial sugarcane cultivation from around 1967 to 2004. Note that the Subject Property (Parcel 036) formerly came from the larger parcel 008 in 2001.

5.4.5 Building Permit Records

A review of available building permits issued by the County of Maui indicated that there are no permits pertaining to the Subject Property.

6.0 SITE RECONNAISSANCE

To complete a visual survey and identify the use and/or storage of hazardous materials, ETC performed a site reconnaissance on March 28, 2018.

6.1 Methodology and Limiting Conditions

ETC personnel performed the site reconnaissance by systematically inspecting all accessible areas within the Subject Property. With the exception of a portable trailer within the SICl property, no areas of the Subject Property were restricted from ETC's visual observation. The portable trailer was closed and locked during ETC's site reconnaissance and could not be fully inspected. Although not fully inspected, SICl personnel confirmed that the interior areas of the trailer were restricted to office-use. Furthermore, no hazardous chemicals were reported to be stored inside. No other areas of the Subject Property were restricted from ETC's visual observation. Maps of the Subject Property are included in Appendix I. Photographic documentation of ETC's site reconnaissance is included in Appendix II.

6.2 General Site Setting

The Subject Property consists of 40-acres of partially improved land in Puunene, Maui. The Subject Property is bound to the west by Mehamaha Loop road, to the east by Mokulele Highway, and to the north by the Maui Humane Society property. The northern most portion of the Subject Property includes a fenced telecommunication station, occupied by SICl. The SICl property includes a radio tower, a single-story office building, and two portable office trailers. The remaining areas of the Subject Property consist of former HC&S sugarcane fields situated on a portion of the former NAS Puunene. One out-of-use remnant concrete structure was noted on the Subject Property.

6.3 Observations

Visual inspection of the Subject Property indicated that the groundcover on the northernmost portion of the Subject Property primarily consisted of bare soil, gravel, and multiple concrete platforms associated with the SICl station. Additionally, landscaped vegetation was observed along the fenced perimeter of the station. The remaining areas of the Subject Property generally consisted of vegetation and bare soil (i.e. former HC&S sugarcane fields).

The SICl property was observed to be primarily utilized for storage and office space. The interior areas of the station were observed to house computer systems and associated components (i.e. cables, hardware, etc.). ETC also observed a bathroom floor drain within the single-story office structure. According to SICl personnel, the bathroom drain reportedly discharges to an onsite septic system located on the southeast portion of the site. ETC observed two active generators on the exterior areas of the station. The generators appeared to be in good condition with no visual indication of petroleum leaks or spills. ETC observed two 55-gallon metal drums beneath a tree on the south portion of the station. The drums were observed to be in poor condition (i.e. rusted with visible holes), were unlabeled, and contained and unknown liquid substance. While no obvious visual or olfactory indications of a release from the drums were observed (i.e. surface staining or petroleum odor), ETC was unable to determine whether a past release of hazardous product had occurred. The remaining areas of the station were observed to be utilized for vehicle parking and covered outdoor storage (i.e. spools of electrical cables and

wires).

Immediately south of the fenced communication station, ETC observed multiple stockpiles of rock/boulders, concrete rubble, asphalt, and miscellaneous metal. No active releases or petroleum-like staining was observed within or around the observed stockpiles. ETC also observed a single-story concrete structure on the north portion of the Subject Property. The interior areas of the structure appeared to be vacant and unoccupied. No other structures were observed on the Subject Property. The remaining areas of the Subject Property appeared to be overgrown with vegetation and unoccupied.

6.4 USTs / ASTs

A visual inspection for the presence of USTs or ASTs was conducted. No visual evidence (e.g., vent or fill pipes, dispensers, etc.) of the presence of USTs or ASTs was observed.

6.5 Hydraulic and Dielectric Fluid Containing Equipment

A visual inspection was conducted for hydraulic and electrical equipment, or electrical components that use fluid that may contain PCBs. No in-ground hydraulic lifts and/or machinery was observed. No suspect PCB-containing equipment was observed in the vicinity of the Subject Property.

7.0 INTERVIEWS

The objective of performing interviews is to obtain information from past and present owners, operators, and occupants of the Subject Property to identify potential REC in connection with the Subject Property.

Mr. Leroy Kalama Fallau, Switching Engineer, Sandwich Isles Communications, Inc., Subject Property Occupant

Mr. Fallau provided ETC with the following information regarding the SIC1-occupied portion of the Subject Property:

- Sandwich Isles Communications Inc. has been in operation on the Subject Property for approximately 15 years.
- Aside from one bathroom floor drain, there are no other known floor drains on the Subject Property. The bathroom floor drain discharges to an onsite septic system.
- There are no known USTs or ASTs on the Subject Property.
- There have been no known cases of fugitive dumping on the Subject Property.
- There has been no known burying or burning of any waste or rubbish on the Subject Property.
- There are currently no damaged or discarded automotive or industrial batteries, pesticides, paints, or other chemicals in individual containers of greater than 5-gallons or 50-gallons in the aggregate, stored or used on the property.
- There are two active transformers on the Subject Property.
- All SIC1 vehicles are serviced off-site. There is no vehicle maintenance conducted on the Subject Property.
- There are no known current or former gas stations on the Subject Property.
- There are no known chemical pipelines on the Subject Property.
- There are no known current or past issues with runoff onto the Subject Property from the adjoining properties.
- The north adjacent property is currently occupied by the Maui Humane Society. The remaining surrounding properties have been historically utilized for commercial cultivation of sugarcane.
- There are no known former pits, ponds, or lagoons located on the Subject Property in connection with waste treatment or disposal.
- There are no known environmental liens or governmental notifications relating to past or recurrent violations of environmental laws with respect to the Subject Property.

Mr. Sean O'Keefe, Director, Environmental Affairs, Alexander & Baldwin Inc., Hawaiian Commercial and Sugar Company, Subject Property Occupant

Mr. O'Keefe provided ETC with the following information regarding the A&B-occupied portion of the Subject Property:

- Mr. O'Keefe's knowledge of the Subject Property dates back at least 24 years.
- The Subject Property was under cultivation for sugarcane by A&B (formerly HC&S) from at least 1910. Note that some areas were in pasture for part of the time between 1910 and 1942. By 1939, portions of Field 912 were converted to use as the Puunene Airport (Maui Airport), and by about 1942, the airport had been converted to military use. By 1945, NAS Puunene had been expanded to include the east and west surrounding areas. The Subject Property was restored to sugarcane cultivation around 1969 and has remained under cultivation through the final harvest in 2016.
- The former usage of the Subject Property as part of the former NAS Puunene may have included industrial uses.
- There is no domestic water supply for the Subject Property; however, abandoned domestic water infrastructure associated with NAS Puunene may still be present.
- There are no known floor drains or sumps on the Subject Property.
- There are no known transformers on the Subject Property.
- Fertilizers and pesticides/herbicides commonly used on sugar plantations were used on the Subject Property. Arsenic may have been present in the older herbicides historically used on the Subject Property.
- No waste or rubbish is known to have been buried on the Subject Property; however, there are areas where concrete, asphalt, steel and similar materials, apparently generated by the demolition of structures at the former NAS Puunene, have been disposed of in piles.
- No waste or rubbish is known to have been burned on the Subject Property; however, agricultural burning of the sugarcane fields (i.e. pre-harvesting burning) has been conducted on the Subject Property for many years.
- No oils or lubricants were used on the Subject Property by HC&S except to the extent used in farm equipment which operated on the Subject Property.
- There are no known current or former gas stations on the Subject Property.
- There are no known chemical pipelines on the Subject Property.
- Runoff onto the Subject Property from the adjoining road and/or sugarcane fields is likely.
- There are no known current or former pits, ponds, or lagoons located on the Subject Property in connection with waste treatment or disposal.
- The Subject Property and adjoining properties are not used as a printing facility, gasoline station, motor repair facility, dry cleaner, photo developer, laboratory,

junkyard, landfill, waste TSDF, or recycling facility. However, the Subject Property was formerly part of NAS Puunene, which may have included some of the above uses.

- There are known areas of past contamination and waste disposal associated with the former NAS Puunene. Specifically, a former landfill and PCB transformer cleanup site area was located on the state-owned land to southeast of the Subject Property. The transformer site was cleaned up to the satisfaction of the DOH. The status of the landfill is not known. A leaking UST was located on state-owned land to the east of former HC&S Field 912 and was cleaned up to the satisfaction of the DOH.
- There are no known environmental liens or governmental notifications relating to past or recurrent violations of environmental laws with respect to the Subject Property.

8.0 FINDINGS AND OPINIONS

8.1 Site Description

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.2 User Provided Information

8.2.1 Required Information

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.3 Records Review

8.3.1 Standard Environmental Record Sources

Federal NPL and Delisted NPL

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal CERCLIS and CERCLIS NFRAP

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal RCRA CORRACTS

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal RCRA (non-CORRACTS) TSD Facilities

No significant findings to indicate suspect RECs, historical RECs, or *de minimis* conditions were identified.

Federal RCRA Generator

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal Institutional Control/Engineering Control Registries

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Federal ERNS

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Equivalent NPL and CERCLIS

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Landfill and/or Solid Waste Disposal

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Leaking Underground Storage Tanks

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Registered Underground Storage Tanks

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Institutional Control Registry

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Voluntary Cleanup/Response Sites

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

State Brownfields

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

Unmappable/Orphan Sites

No significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.3.2 Additional Environmental Record Sources

The *Maui Airport Military Reservation (H09HH0225)* FUDS site was identified by the contracted database to be formerly located approximately 0.45-miles southeast of the Subject Property. Based on the close proximity to the Subject Property, ETC requested and reviewed facility file records from the DOH HEER Office.

ETC's file review indicated that *Maui Airport Military Reservation* was originally developed by the Territory of Hawaii in or around 1937 as a civil airfield (known as the Puuene Airport). Eventually Navy-use of the Puuene Airport began in or around 1940. By 1942, the Puuene Airport had expanded and immediately adjacent areas (including the Subject Property) were commissioned as the Naval Air Station of Maui. In 1943, the area was renamed NAS

Puuene when the Naval Air Station Kahului was opened.

Use of the Subject Property as part of NAS Puuene was terminated in July 1972 following a letter agreement between the Department of the Army Pacific Ocean Division, Corps of Engineers and A&B. Information pertaining to specific military usage of the Subject Property is unknown; however, historic aerial imagery of the site indicates that the Subject Property may have been used for offices, housing, and/or equipment storage. Based on ETC's file review, no environmental issues pertaining to the *Maui Airport Military Reservation* on the Subject Property were identified.

File review also indicated that a transformer release site and former landfill associated with the former *Maui Airport Military Reservation* is located approximately 0.9-miles southeast of the Subject Property. The transformer release site was reportedly cleaned up, backfilled, and restored. Clean up activities included the removal and disposal of approximately 633-cubic yards of PCB-contaminated soil and concrete debris. As a result, the DOH HEER Office issued the facility a letter indicating that no further action (i.e. No department of Defense Action Indicated) was required for the site. File review indicated that the *Maui Airport Landfill* reportedly consisted of a 20-acre dump site that was believed to contain the remains of aircraft and other equipment that were deemed surplus for military purposes. Environmental investigations were conducted on the former *Maui Airport Landfill* site which included soil and groundwater sampling and analyses. Investigative results indicated that elevated concentrations of arsenic, cadmium, lead, and PCBs were found in the soil. A feasibility study determined that surface capping with institutional controls and natural attenuation with institutional controls were determined to be two highest ranking remedial alternatives. Based on this information coupled with the distance to the Subject Property; ETC believes this facility does not pose a reasonable risk of impacting the Subject Property.

No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.3.3 Tier 1 Vapor Encroachment Screen (VES)

The database did not identify any sites on the Subject Property or within the specified radius of the Subject Property. All previously obtained data reviewed and discussed as part of this Phase I ESA (Section 1.0 to 8.0) were evaluated as part of this Tier 1 VES. Review of Phase I ESA findings (e.g., Sanborn maps, aerial photographs, etc.) does not indicate any potential VECs in connection with the Subject Property. ETC performed a Tier 1 VES in conformance with the scope and limitations of ASTM Practice E2600-15 on the Subject Property. No evidence of VECs in connection with the Subject Property was identified.

8.3.4 Historical Use Information on the Subject and Adjoining Properties

Based on ETC's review of historical aerial photographs, the Subject Property was occupied by NAS Puuene in and/or around the 1950's. The Subject Property was converted into agricultural land for sugarcane cultivation by at least 1975. No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.4 Site Reconnaissance

During ETC's visual observations of the Subject Property, two 55-gallon metal drums were discovered within the SICI property on the northernmost portion of the Subject Property. The drums were observed to be in poor condition (i.e. rusted with visible holes), were unlabeled, and contained an unknown liquid substance. SICI personnel indicated having no knowledge of the origins or contents of the drums; however, later reported that one of the drums may be filled with water. SICI has recently made arrangements to have the drums removed from the site and properly disposed. While no obvious visual or olfactory indications of a release from the drums were observed (i.e. surface staining or petroleum odor); ETC was unable to determine whether a past release of a hazardous substance or petroleum product from the drums had occurred. Based on these findings coupled with the condition of the drums, ETC cannot dismiss the potential contaminant impacts associated with the corroded drums. As such, this finding is considered an REC.

No other significant findings to indicate suspect RECs, historical RECs, controlled RECs, or *de minimis* conditions were identified.

8.5 Interviews

Interview findings indicate that pre-harvest burning of sugarcane was conducted on the Subject Property as part of the sugarcane cultivation operations. The primary concern regarding sugarcane burning is the airborne particulate matter; however, the former sugarcane burning is not considered a REC for the Subject Property.

The Subject Property was used for commercial sugarcane cultivation since at least 1970, but possibly earlier. Activities commonly associated with commercial sugarcane cultivation include the use and application of pesticides. As discussed in Section 9 of the DOH HEER Office's November 2009 *Interim Final Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan* (HEER TGM), with the exception of arsenic, residual pesticides in former sugarcane fields are rarely detected above levels of potential concern. Data gathered by the DOH over the past ten years indicate that dioxins in former sugarcane fields do not pose a significant health risk (DOH, 2009). Review of the DOH HEER Office's *Summary of Pesticide and Dioxin Contamination Associated with Former Sugarcane Operations* indicated that elevated concentrations were not reported in the surface soils of sugarcane field(s) associated with the nearby Puunene Sugar Mill (DOH, 2011). There has been no evidence indicating that pesticide mixing was conducted on the Subject Property. In fact, multiple lines of evidence indicate that the Subject Property, when in agricultural use, was solely utilized as fields or possible pasture. Although other contaminants associated with commercial sugarcane cultivation were not evaluated, based on these findings, the former agricultural usage of the Subject Property is considered a *de minimis* condition.

9.0 DATA GAPS

Data gaps are defined as the lack of or inability to obtain information required by the ASTM Practice despite good faith efforts by the environmental professional to gather such information. ETC identified the following data gaps:

- Although all *reasonably ascertainable* maps, site photographs, and standard historical sources (e.g., aerial photos, Sanborn Maps, chain of title, etc.) were reviewed, such documents and information were not available at five-year intervals. This data gap represents a "data failure." However, based on ETC's collective review of the documents and information which were available, this "data failure" does not represent a significant data gap (as described in Sections 8.3.2.3 and 12.7 of the ASTM Practice).
- ETC was unable to inspect a closed and locked portable trailer within the SICI property. The inability to access this area of the Subject Property is considered a data gap for this report. However, based on information provided by SICI personnel and site reconnaissance findings of the remaining interior areas of the Subject Property, this data gap is not considered significant.
- Stockpiles of concrete, rock, asphalt, and scrap metal were observed on the north portion of the Subject Property. In accordance with Hawaii Administrative Rules Title 11, Department of Health, Chapter 58.1 (HAR §11-58.1) property owners are responsible for "removing accumulated solid waste to an approved solid waste disposal facility." While no petroleum products or hazardous substances were observed from surface areas of these piles; the interior areas of the piles were not visible. The quantity and size of these piles made it infeasible to adequately and fully characterize their potential environmental impact. As such, the unknown contents of these piles are considered a data gap. Based on interview findings, the piles may have been created prior to 1969 and are suspected to contain demolition material from the former NAS Puunene. While the context of these piles is unknown, site reconnaissance findings and information provided by A&B do not indicate the presence of significant quantities of hazardous substances or petroleum projects. Based on these findings, this data gap is not considered significant.

10.0 CONCLUSIONS

We have performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-13 of the Subject Property located along Mokulele Highway, Punahoa, Maui, Hawaii, identified as Tax Map Key (TMK) identification number (2) 3-8-008: Parcel 036 (portion). Any exceptions to, or deletions from, the ASTM Practice E1527-13 are described in Section 12.0 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the Subject Property except:

- Contaminant impacts associated with a potential release from the two corroded 55-gallon drums containing an unknown substance.

11.0 ENVIRONMENTAL PROFESSIONAL CERTIFICATION

We declare that, to the best of our professional knowledge and belief, we meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Prepared by:



Eva Kakone
Environmental Scientist
EnviroServices & Training Center, LLC



Shaarla Nakashima
Environmental Professional
EnviroServices & Training Center, LLC

April 2018

12.0 DEVIATIONS AND ADDITIONAL SERVICES

No client-imposed constraints were identified. As such, there were no deletions from the ASTM Practice E1527-13 upon completion of this Phase I ESA. No additional services were requested or completed.

13.0 REFERENCES

- ASTM International. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. Designation E1527-13.
- Hawaii State Department of Health (DOH), Hazard Evaluation and Emergency Response (HEER) Office. November 2009. *Technical Guidance Manual for Implementation of the Hawaii State Contingency Plan, Interim Final*.
- Environmental Data Resources, Inc., February 16, 2018. *The EDR Aerial Photo Decade Package*. Report Inquiry No. 5190664.9.
- Environmental Data Resources, Inc., February 16, 2018. *The EDR City Directory Image Report*. Report Inquiry No. 5190664.5.
- Environmental Data Resources, Inc. February 15, 2018. *The EDR Historical Topo Map Report*. Order No. 5190664.4.
- Environmental Data Resources, Inc., February 15, 2018. *The EDR Radius Map™ with GeoCheck®*. Report Inquiry No. 5190664.2s.
- Environmental Data Resources, Inc. March 12, 2018. *The EDR Vapor Encroachment Screen*. Order No. 5190664.2s.
- Environmental Data Resources, Inc., February 15, 2018. *Sanborn® Map Report*. Order No. 5190664.3.
- Macdonald, G.A., A.T. Abbot, and F.L. Peterson. 1983. *Volcanoes in the Sea*. University of Hawaii Press.
- Mink, John F. and Stephen L. Lau, March 1990. Aquifer Identification and Classification for Maui: Groundwater Protection Strategy for Hawaii.
- State of Hawaii Department of Health, Solid and Hazardous Waste Branch records.
- State of Hawaii Taxation Map Bureau, Tax Map Key (2) 3-8-008: Parcel 036 (portion).
- U.S. Department of Agriculture Soil Conservation Service. 1972. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.
- U.S. Department of Interior Geological Survey. 1992. Puu O Kali Quadrangle, Island of Maui, 7.5 Minute Series (Topographic Maps).

APPENDIX I
FIGURES

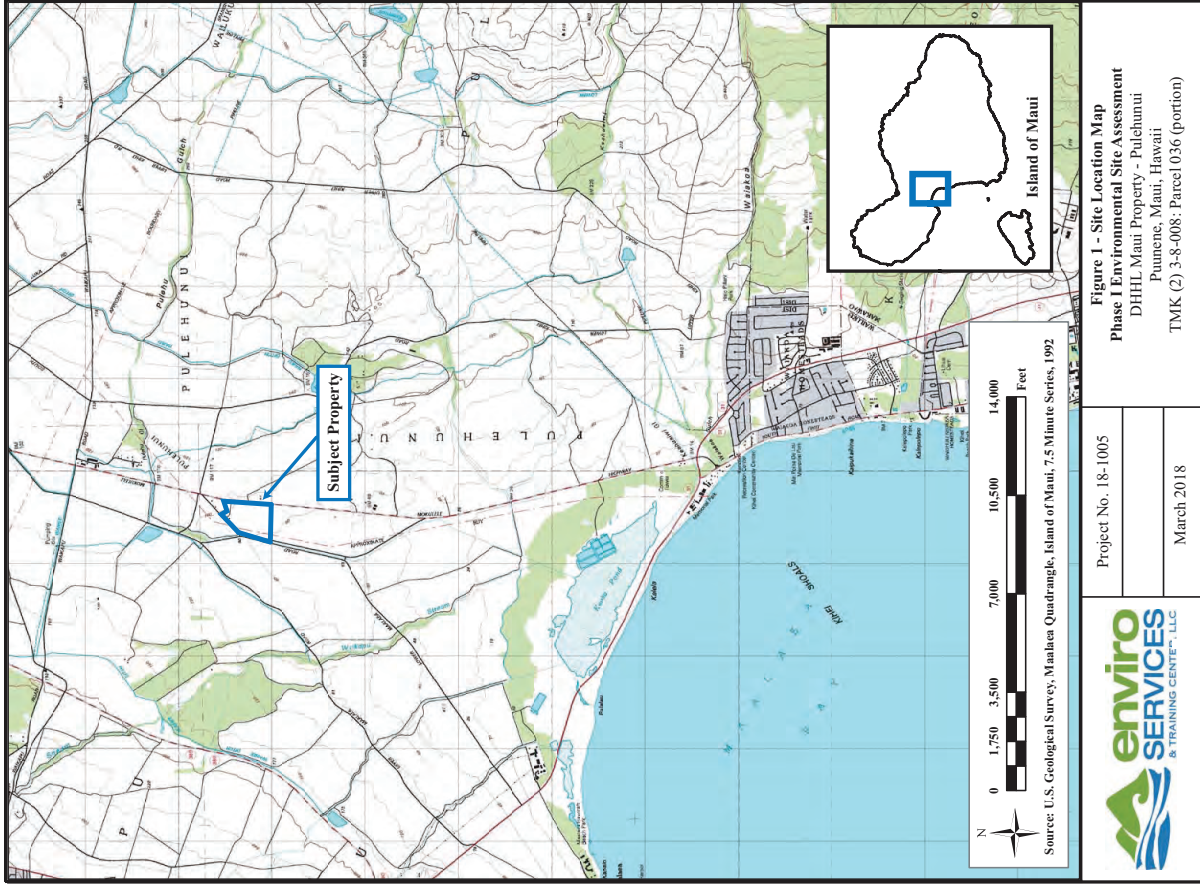




Figure 2 - Aerial Site Map
Phase I Environmental Site Assessment
 DHHL Maui Property - Pulehunui
 Puunene, Maui, Hawaii
 TMK (2) 3-8-008; Parcel 036 (portion)

Project No. 18-1005

April 2018

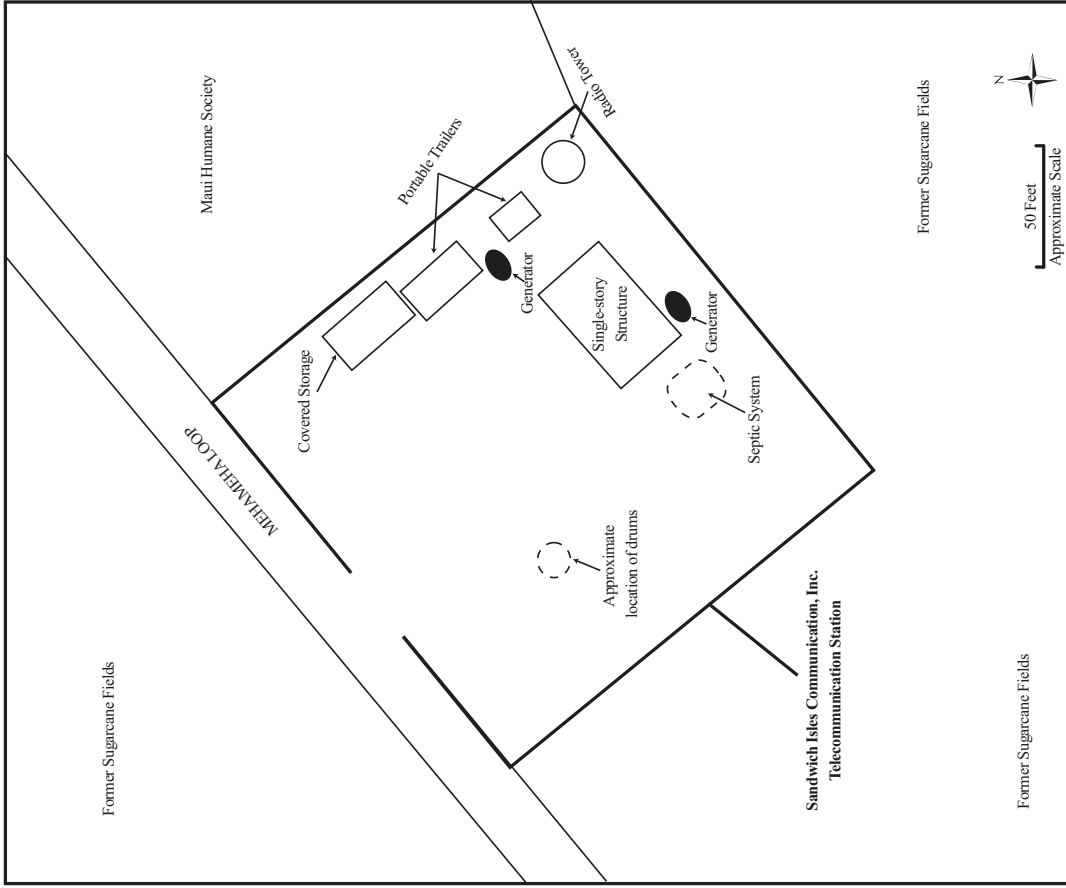


Figure 3 - Site Plan
Phase I Environmental Site Assessment
 DHHL Maui Property - Pulehunui
 Puunene, Maui, Hawaii
 TMK (2) 3-8-008; Parcel 036 (portion)

Project No. 18-1005

April 2018



APPENDIX II
PHOTOGRAPHIC DOCUMENTATION



Photograph 1: East boundary of Subject Property, along Mokulele Highway.



Photograph 2: South boundary of the Subject Property, along an overgrown former sugarcane haul road.

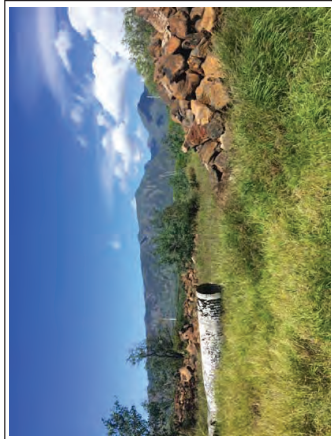


Photograph 3: West boundary of the Subject Property, along a former sugarcane haul road.



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April 2018

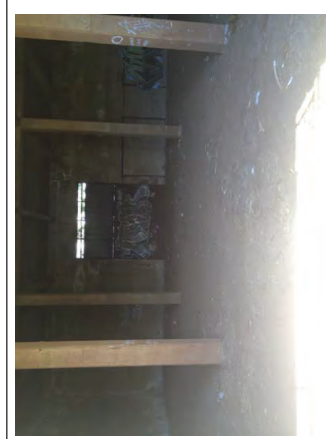
Photographic Documentation
Phase I Environmental Site Assessment
DHHL Maui Property - Pihunui
Puunene, Maui, Hawaii
TMK (2) 3-8-008: Parcel 036 (portion)



Photograph 1: View of stockpiles located on the north portion of the Subject Property.



Photograph 2: Exterior view of concrete structure located on the north portion of the Subject Property.



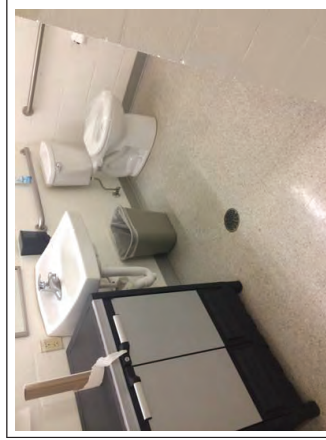
Photograph 3: Interior view of concrete structure located on the north portion of the Subject Property.



Photograph 7: View of fenced telecommunication station located on the north portion of the Subject Property.



Photograph 8: Interior view of single-story structure located within the telecommunication station.



Photograph 9: Interior view of bathroom floor drain located within the telecommunication station.



Photographic Documentation
 Phase I Environmental Site Assessment
 DHHL Maui Property - Pihunui
 Punene, Maui, Hawaii
 TMK (2) 3-8-008: Parcel 036 (portion)

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Photographic Documentation
 Phase I Environmental Site Assessment
 DHHL Maui Property - Pihunui
 Punene, Maui, Hawaii
 TMK (2) 3-8-008: Parcel 036 (portion)



Photograph 7: View of septic system located on the southeast portion of the telecommunication station.



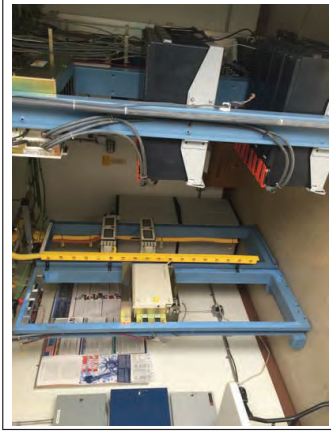
Photograph 8: View of generator located on the east portion of the telecommunication station.



Photograph 9: View of generator located on the north portion of the telecommunication station.



Photograph 7: View of portable trailers located on the north portion of the telecommunication station.



Photograph 8: Interior view of a portable trailer located on the north portion of the telecommunication station.



Photograph 9: View of rusted drums located beneath tree on the south portion of the telecommunication station.



Photographic Documentation
 Phase I Environmental Site Assessment
 DHHHL Maui Property - Pihulunui
 Paumotu, Maui, Hawaii
 TMK (2) 3-8-008: Parcel 036 (portion)

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Photographic Documentation
 Phase I Environmental Site Assessment
 DHHHL Maui Property - Pihulunui
 Paumotu, Maui, Hawaii
 TMK (2) 3-8-008: Parcel 036 (portion)

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 April 2018

APPENDIX III
RESEARCH DOCUMENTATION

PBR Pulehunui
Not Reported
Kihei, HI 96753

Inquiry Number: 5190664.9
February 16, 2018

The EDR Aerial Photo Decade Package



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

| | |
|---|---|
| 02/16/18 | |
| EDR Aerial Photo Decade Package | |
| Site Name: | Client Name: |
| PBR Pulehunui Not Reported Kihai, HI 96753 EDR Inquiry # 5190664.9 | Enviro Svcs. and Trng. Center 505 Ward Avenue Honolulu, HI 96814 Contact: Eva Kakone |



Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

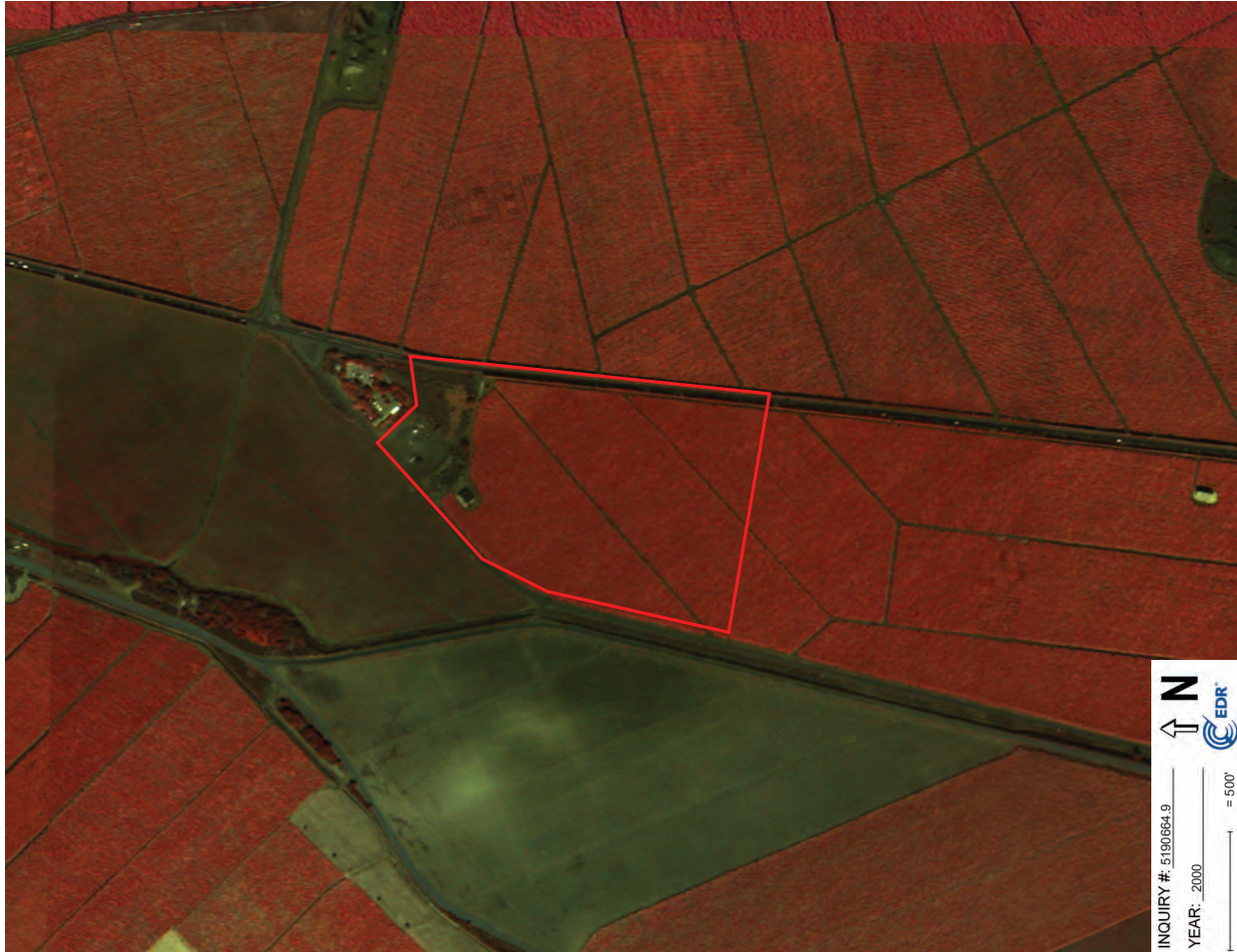
| <u>Year</u> | <u>Scale</u> | <u>Details</u> | <u>Source</u> |
|-------------|--------------|----------------------------------|---------------|
| 2000 | 1"=500' | Acquisition Date: April 12, 2000 | USGS/DOQQ |
| 1992 | 1"=500' | Flight Date: September 23, 1992 | USGS |
| 1975 | 1"=500' | Flight Date: July 22, 1975 | USGS |
| 1954 | 1"=750' | Flight Date: April 04, 1954 | USGS |
| 1950 | 1"=500' | Flight Date: September 28, 1950 | USGS |

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

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INQUIRY # 5190664.9

YEAR: 2000
 = 500'





PBR Pulehunui
Not Reported
Kihei, HI 96753

Inquiry Number: 5190664.4
February 15, 2018

EDR Historical Topo Map Report

02/15/18

Site Name:

PBR Pulehunui
Not Reported
Kihei, HI 96753
EDR Inquiry # 5190664.4

Client Name:

Enviro Svcs. and Trng. Center
505 Ward Avenue
Honolulu, HI 96814
Contact: Eva Kakone



EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Enviro Svcs. and Trng. Center were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDR's Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# PBR Pulehunui
Project: 18-1005

Coordinates:

Latitude: 20.828336 20° 49' 42" North
Longitude: -156.467874 -156° 28' 4" West
UTM Zone: Zone 4 North
UTM X Meters: 763525.10
UTM Y Meters: 2305220.76
Elevation: 91.96' above sea level

Maps Provided:

2013
1992, 1996, 1997
1983
1961
1954, 1955
1922

EDR Historical Topo Map Report
with QuadMatch™



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2013 Source Sheets



Paia
7.5-minute, 24000



Maalaea
7.5-minute, 24000



Puu O Kali
7.5-minute, 24000



Wailuku
7.5-minute, 24000

1992, 1996, 1997 Source Sheets



Puu O Kali
7.5-minute, 24000
Aerial Photo Revised 1992



Maalaea
7.5-minute, 24000
Aerial Photo Revised 1996



Paia
7.5-minute, 24000
Aerial Photo Revised 1997



Wailuku
7.5-minute, 24000
Aerial Photo Revised 1997

1983 Source Sheets



Puu O Kali
7.5-minute, 24000
Aerial Photo Revised 1976



Paia
7.5-minute, 24000
Aerial Photo Revised 1977



Maalaea
7.5-minute, 24000
Aerial Photo Revised 1977



Wailuku
7.5-minute, 24000
Aerial Photo Revised 1977

1961 Source Sheets



MAUI
15-minute, 62500

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1954, 1955 Source Sheets



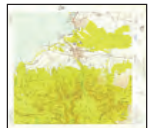
Paia
7.5-minute, 24000
Aerial Photo Revised 1950



Puu O Kali
7.5-minute, 24000
Aerial Photo Revised 1950



Maalaea
7.5-minute, 24000
Aerial Photo Revised 1950



Wailuku
7.5-minute, 24000
Aerial Photo Revised 1950

1922 Source Sheets

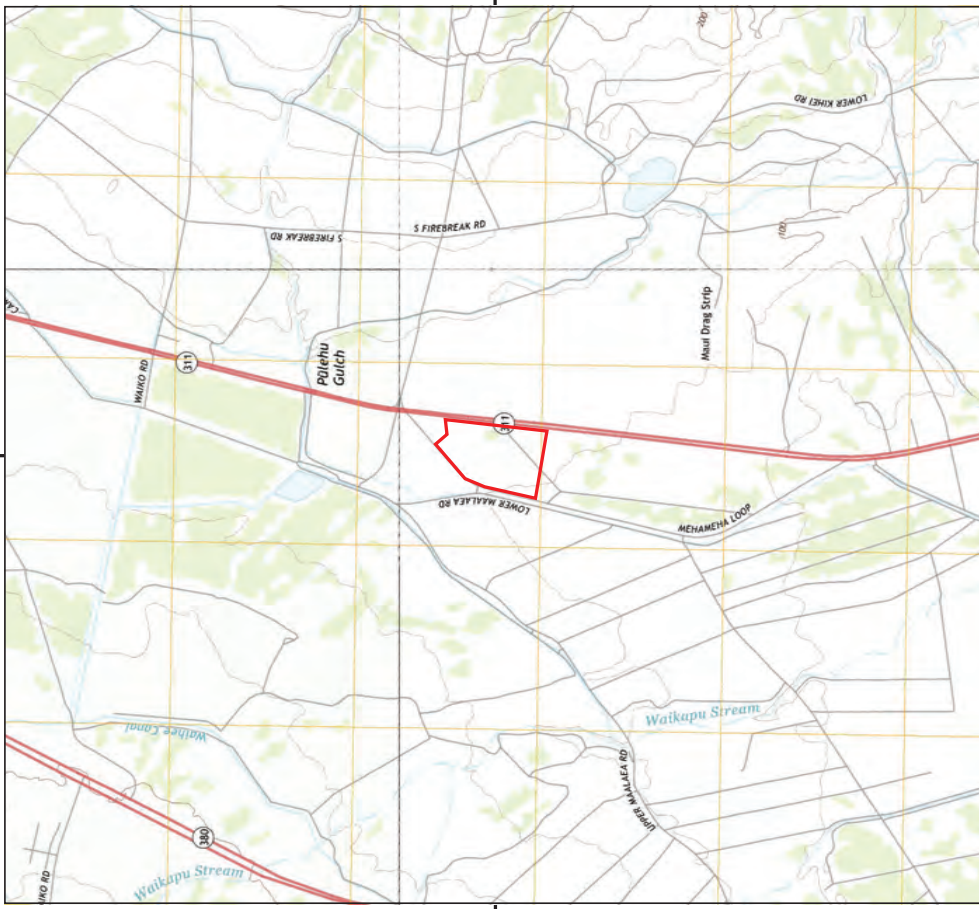


KIHEI
7.5-minute, 31680

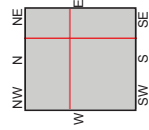


Historical Topo Map

2013



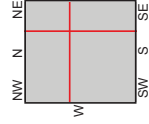
This report includes information from the following map sheet(s).



SITE NAME: PBR Pulehuhui
 ADDRESS: Not Reported
 CLIENT: Enviro Svcs. and Trng. Center

TP, Maalea, 2013, 7.5-minute
 NE, Paia, 2013, 7.5-minute
 SE, Puu O Kaili, 2013, 7.5-minute
 E NW, Wailuku, 2013, 7.5-minute

This report includes information from the following map sheet(s).



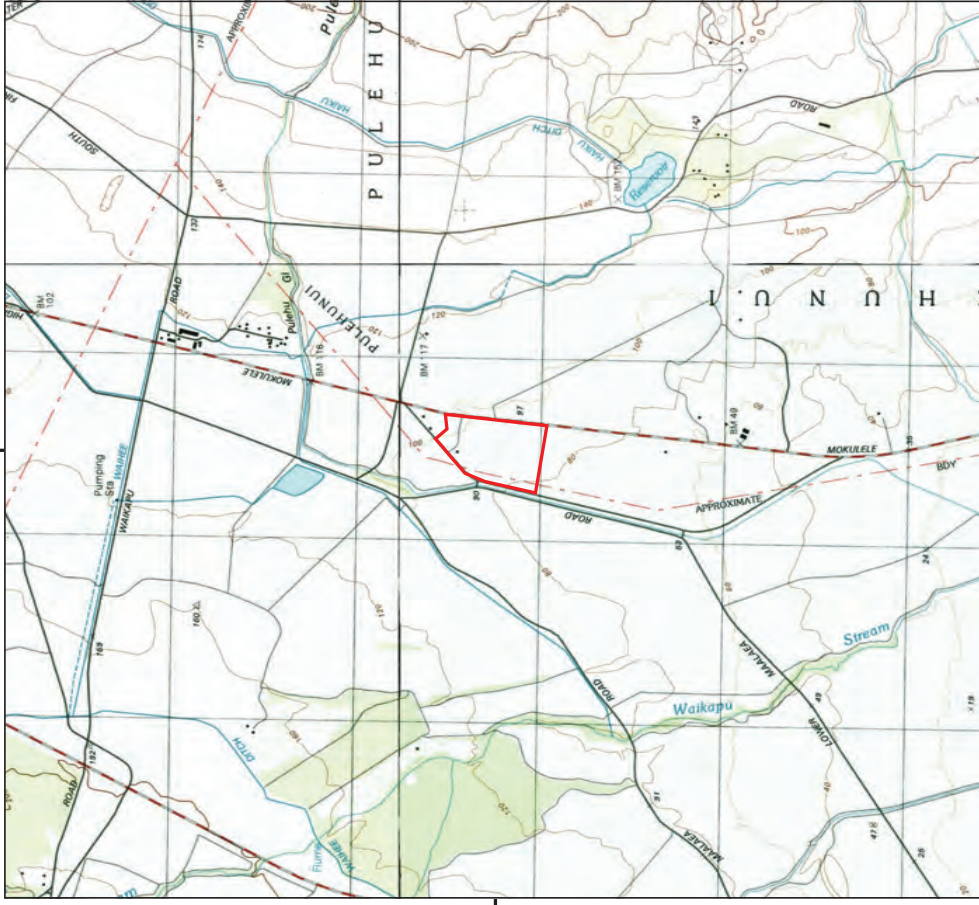
TP, Maalea, 1996, 7.5-minute
 NE, Paia, 1997, 7.5-minute
 SE, Puu O Kaili, 1992, 7.5-minute
 E NW, Wailuku, 1997, 7.5-minute

SITE NAME: PBR Pulehuhui
 ADDRESS: Not Reported
 CLIENT: Enviro Svcs. and Trng. Center

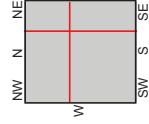


Historical Topo Map

1992, 1996, 1997

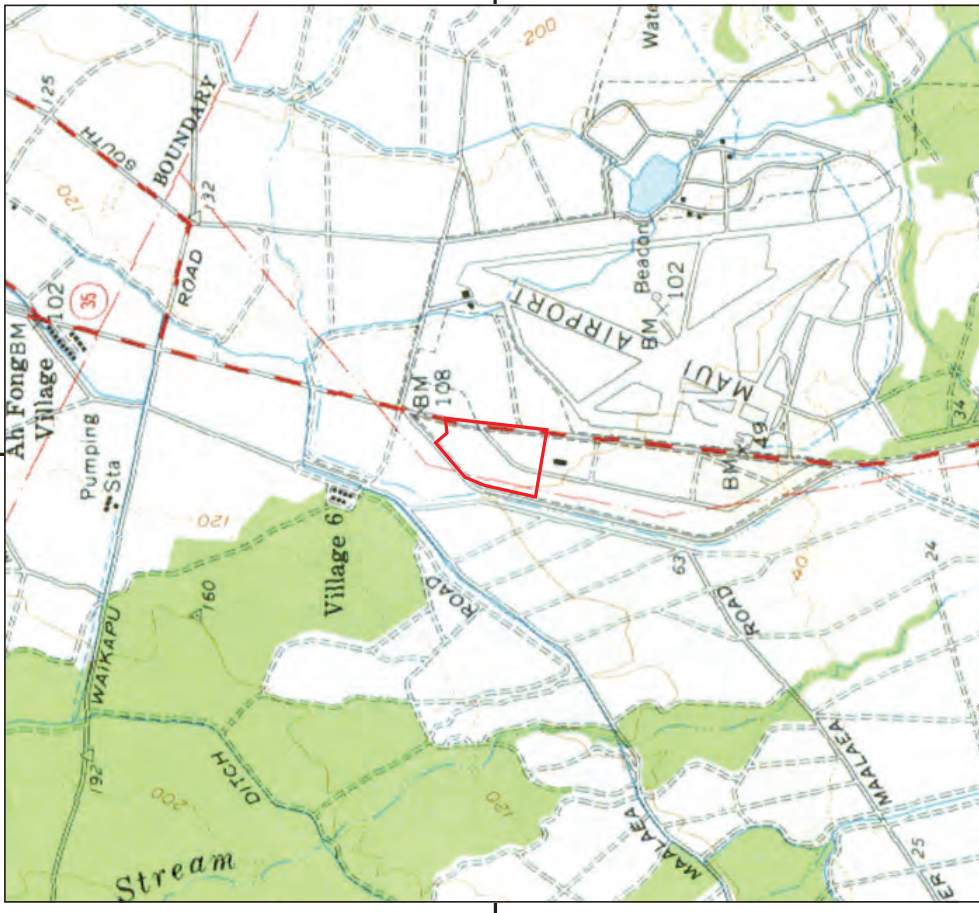


This report includes information from the following map sheet(s).

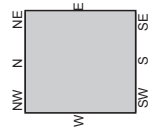


TP, Maalea, 1996, 7.5-minute
 NE, Paia, 1997, 7.5-minute
 SE, Puu O Kaili, 1992, 7.5-minute
 E NW, Wailuku, 1997, 7.5-minute

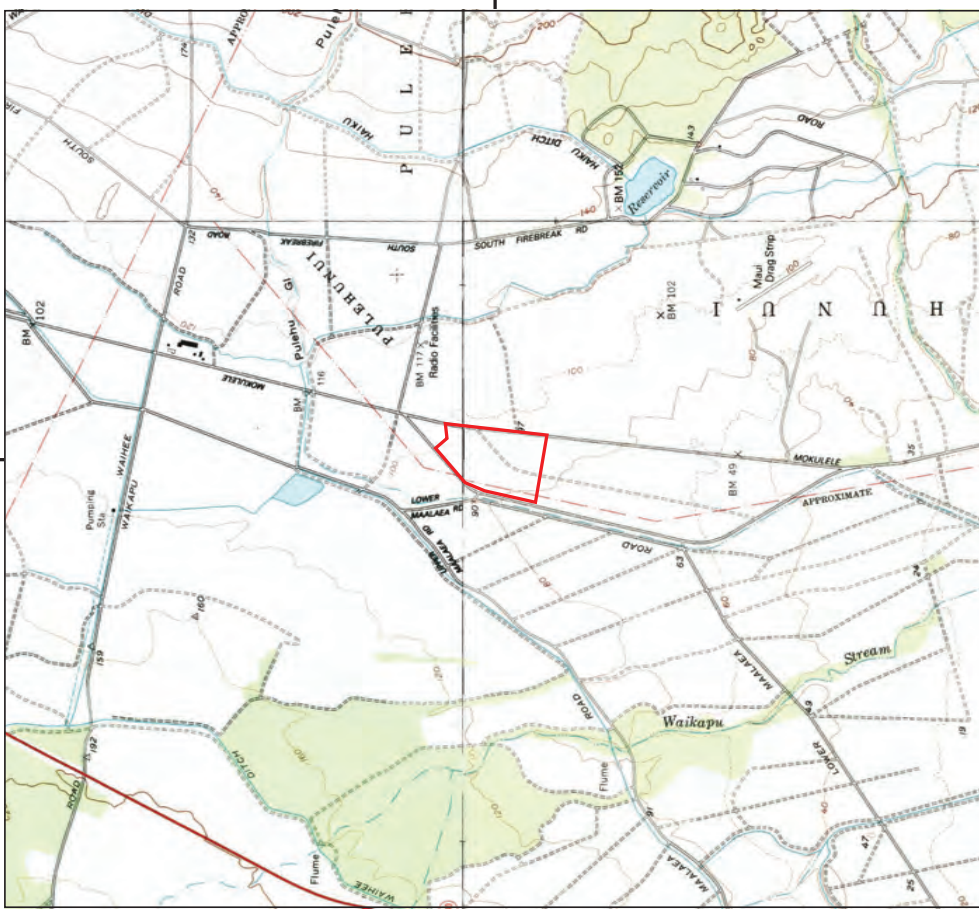
SITE NAME: PBR Pulehuhui
 ADDRESS: Not Reported
 CLIENT: Enviro Svcs. and Trng. Center



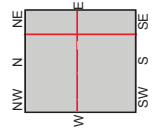
This report includes information from the following map sheet(s).



SITE NAME: PBR Pulehuhui
 ADDRESS: Not Reported
 CLIENT: Enviro Svcs. and Trng. Center



This report includes information from the following map sheet(s).



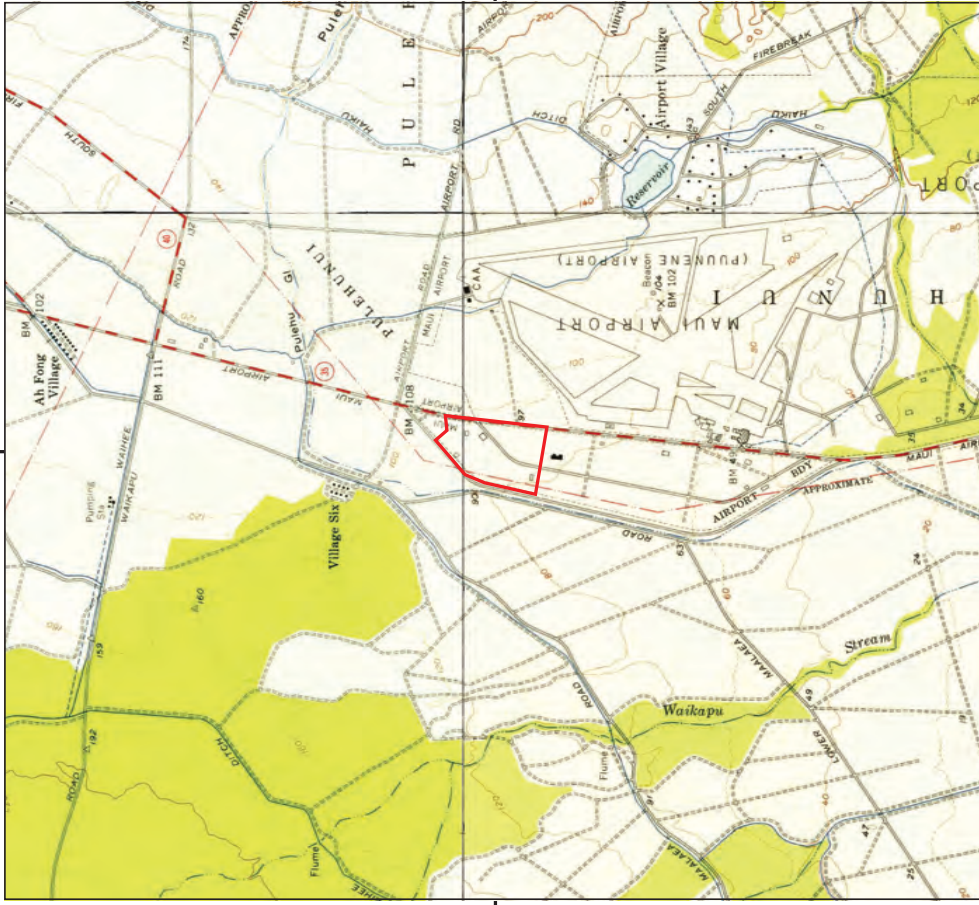
SITE NAME: PBR Pulehuhui
 ADDRESS: Not Reported
 CLIENT: Enviro Svcs. and Trng. Center

TP, Maalaea, 1983, 7.5-minute
 NE, Paia, 1983, 7.5-minute
 SE, Puu O Kaili, 1983, 7.5-minute
 NW, Wailuku, 1983, 7.5-minute

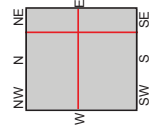


Historical Topo Map

1954, 1955



This report includes information from the following map sheet(s).



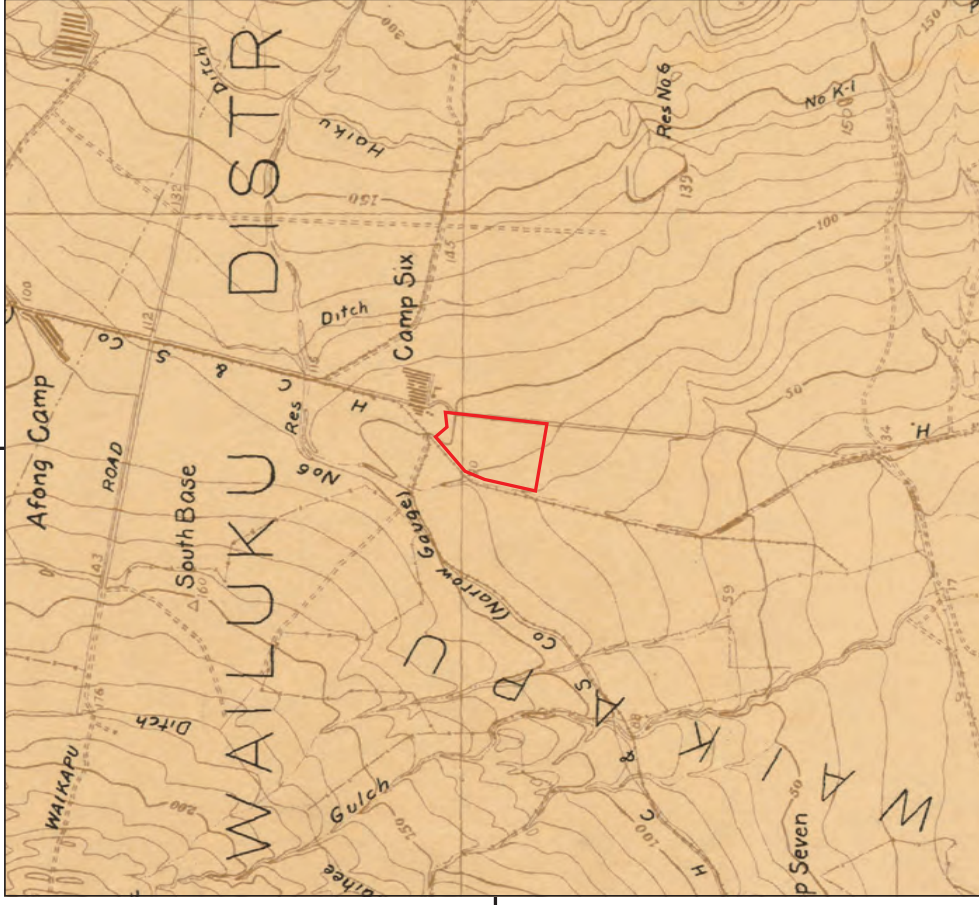
SITE NAME: TP, Maalaea, 1954, 7.5-minute
NE, Paia, 1954, 7.5-minute
SE, Puu O Kaili, 1954, 7.5-minute
E NW, Wailuku, 1955, 7.5-minute

CLIENT: Enviro Svcs. and Trng. Center

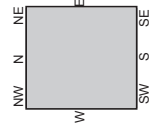


Historical Topo Map

1922



This report includes information from the following map sheet(s).



SITE NAME: TP, KIHEI, 1922, 7.5-minute

ADDRESS: Not Reported
KIHEI, HI 96753

CLIENT: Enviro Svcs. and Trng. Center

PBR Pulehunui
Not Reported
Kihei, HI 96753

Inquiry Number: 5190664.3
February 15, 2018

| | | |
|--------------------------------------|-------------------------------|----------|
| Certified Sanborn® Map Report | | 02/15/18 |
| Site Name: | Client Name: | |
| PBR Pulehunui | Enviro Svcs. and Trng. Center | |
| Not Reported | 505 Ward Avenue | |
| Kihei, HI 96753 | Honolulu, HI 96814 | |
| EDR Inquiry # 5190664.3 | Contact: Eva Kakone | |



The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Enviro Svcs. and Trng. Center were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 303B-4D81-A306
PO # PBR Pulehunui
Project 18-1005

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.



Sanborn® Library search results
Certification #: 303B-4D81-A306

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- Library of Congress
- University Publications of America
- EDR Private Collection

The Sanborn Library LLC Since 1988™

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Shelton, CT 06484
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www.edrnet.com



APPENDIX IV
REGULATORY RECORDS DOCUMENTATION (*EDR Radius Map Report*)

PBR Pulehunui
Not Reported
Kihei, HI 96753

Inquiry Number: 5190664.2s
February 15, 2018

The EDR Radius Map™ Report with GeoCheck®



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Sunnyvale, CA 94086
Toll Free: 800.352.0050
www.edrnet.com

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| Detail Map | 3 |
| Map Findings Summary | 4 |
| Map Findings | 8 |
| Orphan Summary | 9 |
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| <u>GEOCHECK ADDENDUM</u> | |
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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

NOT REPORTED
KIHAEI, HI 96753

COORDINATES

Latitude (North): 20.8283360 - 20° 49' 42.00"
Longitude (West): 156.4678740 - 156° 28' 4.34"
Universal Transverse Mercator: Zone 4
UTM X (Meters): 763529.2
UTM Y (Meters): 2305084.8
Elevation: 89 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

| | |
|----------------------|------------------------|
| Target Property Map: | 5941599 MAALAEA, HI |
| Version Date: | 2013 |
| Northeast Map: | 5941605 PAIA, HI |
| Version Date: | 2013 |
| Southeast Map: | 5941643 PUU O KALI, HI |
| Version Date: | 2013 |
| Northwest Map: | 5941607 WAILUKU, HI |
| Version Date: | 2013 |

MAPPED SITES SUMMARY

EXECUTIVE SUMMARY

Target Property Address:
NOT REPORTED
KIHEI, HI 96753

Click on Map ID to see full detail.

| MAP ID | SITE NAME | ADDRESS | DATABASE ACRONYMS | RELATIVE ELEVATION | DIST (ft. & mi.) | DIRECTION |
|--------|----------------------|---------|-------------------|--------------------|------------------|-----------|
| 1 | MAUI AIRPORT MILITAR | | FUDS | Higher | 2420, 0.458, ESE | |

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

- NPL..... National Priority List
- Proposed NPL..... Proposed National Priority List Sites
- NPL LIENS..... Federal Superfund Liens

Federal Delisted NPL site list

- Delisted NPL..... National Priority List Deletions

Federal CERCLIS list

- FEDERAL FACILITY..... Federal Facility Site Information listing
- SEMS..... Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

- SEMS-ARCHIVE..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

- CORRACTS..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

- RCRA-TSDF..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

- RCRA-LQG..... RCRA - Large Quantity Generators
- RCRA-SQG..... RCRA - Small Quantity Generators
- RCRA-CESQG..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

- LUCIS..... Land Use Control Information System
- US ENG CONTROLS..... Engineering Controls Sites List

EXECUTIVE SUMMARY

US INST CONTROL..... Sites with Institutional Controls

Federal ERMS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS..... Sites List

State and tribal landfill and/or solid waste disposal site lists

SW/LE..... Permitted Landfills in the State of Hawaii

State and tribal leaking storage tank lists

LUST..... Leaking Underground Storage Tank Database

INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing

UST..... Underground Storage Tank Database

INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

ENG CONTROL..... Engineering Control Sites

INST CONTROL..... Sites with Institutional Controls

State and tribal voluntary cleanup sites

VCP..... Voluntary Response Program Sites

INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Brownfields Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands

ODI..... Open Dump Inventory

DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

IHS OPEN DUMPS..... Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... Delisted National Clandestine Laboratory Register

EXECUTIVE SUMMARY

CDL..... Clandestine Drug Lab Listing

US CDL..... National Clandestine Laboratory Register

Local Land Records

LIENS 2..... CERCLA Lien Information

Records of Emergency Release Reports

HMIRS..... Hazardous Materials Information Reporting System

SPILLS..... Release Notifications

SPILLS 90..... SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR..... RCRA - Non Generators / No Longer Regulated

DOD..... Department of Defense Sites

SCRD DRYCLEANERS..... State Coalition for Remediation of Drycleaners Listing

US FIN ASSUP..... Financial Assistance Information

EPA WATCH LIST..... EPA WATCH LIST

2020 COR ACTION..... 2020 Corrective Action Program List

TSCA..... Toxic Substances Control Act

TRIS..... Toxic Chemical Release Inventory System

SSTS..... Section 7 Tracking Systems

ROD..... Records Of Decision

RMP..... Risk Management Plans

RAAITS..... RCRA Administrative Action Tracking System

PRP..... Potentially Responsible Parties

PADS..... PCB Activity Database System

ICIS..... Integrated Compliance Information System

FTTS..... FIFRA TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

MLTS..... Material Licensing Tracking System

COAL ASH DOE..... Steam-Electric Plant Operation Data

COAL ASH EPA..... Coal Combustion Residues Surface Impoundments List

PCB TRANSFORMER..... PCB Transformer Registration Database

RADINFO..... Radiation Information Database

HIST FTTS..... FIFRA/TSCA Tracking System Administrative Case Listing

DOT OPS..... Incident and Accident Data

CONSENT..... Superfund (CERCLA) Consent Decrees

INDIAN RESERV..... Indian Reservations

FUSRAP..... Formerly Utilized Sites Remedial Action Program

UMTRA..... Uranium Mill Tailings Sites

LEAD SMELTERS..... Lead Smelter Sites

US AIRS..... Aesthetic Information Retrieval System Facility Subsystem

US MINES..... Mines Master Index File

ABANDONED MINES..... Abandoned Mines

FINDS..... Facility Index System/Facility Registry System

DOCKET HWC..... Hazardous Waste Compliance Docket Listing

UXO..... Unexploded Ordnance Sites

ECHO..... Enforcement & Compliance History Information

FUELS PROGRAM..... EPA Fuels Program Registered Listing

AIFS..... List of Permitted Facilities

DRYCLEANERS..... Permitted Drycleaner Facility Listing

Financial Assurance..... Financial Assurance Information Listing

EXECUTIVE SUMMARY

UIC..... Underground Injection Wells Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR *Exclusive Records*

EDR MGP..... EDR Proprietary Manufactured Gas Plants
EDR Hist Auto..... EDR Exclusive Historical Auto Stations
EDR Hist Cleaner..... EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HW/S..... Recovered Government Archive State Hazardous Waste Facilities List
RGA LF..... Recovered Government Archive Solid Waste Facilities List
RGA LUST..... Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property. Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in **bold italics** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 01/31/2015 has revealed that there is 1 FUDS site within approximately 1 mile of the target property.

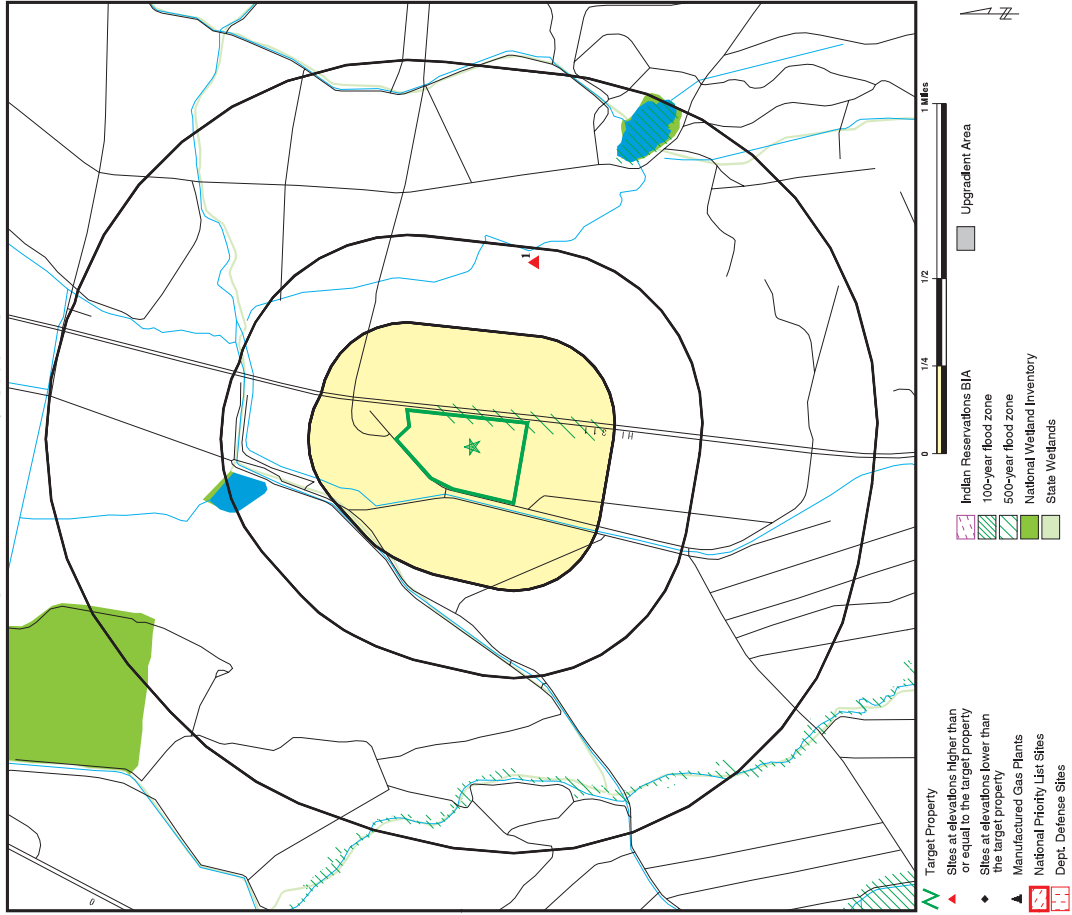
| <u>Equal/Higher Elevation</u> | <u>Address</u> | <u>Direction /Distance</u> | <u>Map ID</u> | <u>Page</u> |
|-------------------------------|----------------|----------------------------|---------------|-------------|
| MAUI AIRPORT MILITAR | | ESE 1/4 - 1/2 (0.458 mi.) | 1 | 8 |

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 1 records.

Site Name _____ Database(s) _____
WAIKAPU DUMP-MAUI COUNTY DUMP SHWS

OVERVIEW MAP - 5190664.2S



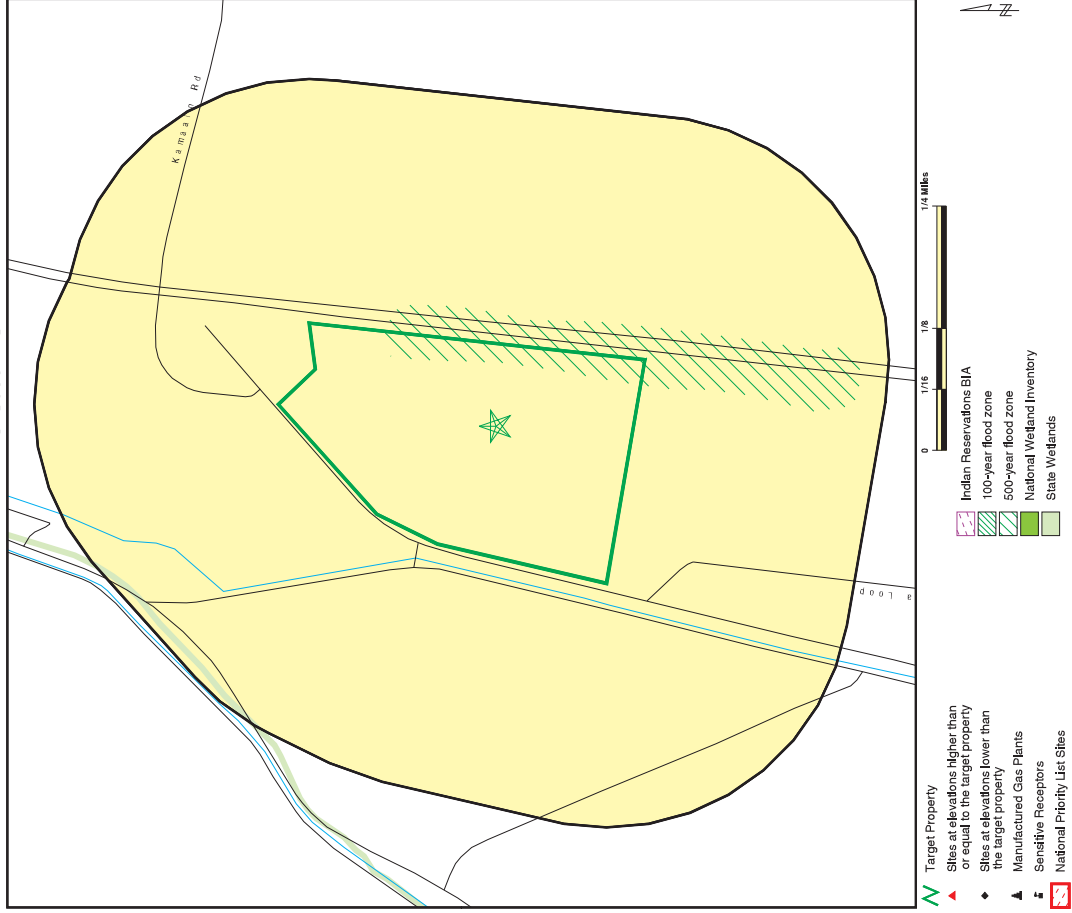
This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: PBR Pulehunui
 ADDRESS: Not Reported
 Kireh HI 96753
 LAT/LONG: 20.828536 / 156.467874

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Eva Kakone
 INQUIRY #: 5190664.2S
 DATE: February 15, 2018 3:55 pm

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DETAIL MAP - 5190664.2S



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: PBR Pulehunui
 ADDRESS: Not Reported
 Kireh HI 96753
 LAT/LONG: 20.828536 / 156.467874

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Eva Kakone
 INQUIRY #: 5190664.2S
 DATE: February 15, 2018 3:55 pm

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MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| STANDARD ENVIRONMENTAL RECORDS | | | | | | | | |
| <i>Federal NPL site list</i> | | | | | | | | |
| NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| Proposed NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| NPL LIENS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Federal Delisted NPL site list</i> | | | | | | | | |
| Delisted NPL | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| <i>Federal CERCLIS list</i> | | | | | | | | |
| FEDERAL FACILITY | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| SEMS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal CERCLIS NFRAP site list</i> | | | | | | | | |
| SEMS-ARCHIVE | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal RCRA CORRACTS facilities list</i> | | | | | | | | |
| CORRACTS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| <i>Federal RCRA non-CORRACTS TSD facilities list</i> | | | | | | | | |
| RCRA-TSDF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal RCRA generators list</i> | | | | | | | | |
| RCRA-LQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-SQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-CESQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| <i>Federal institutional controls / engineering controls registries</i> | | | | | | | | |
| LUCIS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US ENG CONTROLS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US INST CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Federal ERNS list</i> | | | | | | | | |
| ERNS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>State- and tribal - equivalent CERCLIS</i> | | | | | | | | |
| SHWS | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| <i>State and tribal landfill and/or solid waste disposal site lists</i> | | | | | | | | |
| SWFLF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal leaking storage tank lists</i> | | | | | | | | |
| LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INDIAN LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal registered storage tank lists</i> | | | | | | | | |
| FEMA UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|--|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
| UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| INDIAN UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| <i>State and tribal institutional control / engineering control registries</i> | | | | | | | | |
| ENG CONTROLS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INST CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal voluntary cleanup sites</i> | | | | | | | | |
| VCP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INDIAN VCP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>State and tribal Brownfields sites</i> | | | | | | | | |
| BROWNFIELDS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ADDITIONAL ENVIRONMENTAL RECORDS | | | | | | | | |
| <i>Local / Brownfield lists</i> | | | | | | | | |
| US BROWNFIELDS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Local Lists of Landfill / Solid Waste Disposal Sites</i> | | | | | | | | |
| INDIAN ODI | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ODI | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| DEBRIS REGION 9 | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| IHS OPEN DUMPS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| <i>Local Lists of Hazardous waste / Contaminated Sites</i> | | | | | | | | |
| US HIST CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Local Land Records</i> | | | | | | | | |
| LIENS 2 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Records of Emergency Release Reports</i> | | | | | | | | |
| HMIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS 90 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| <i>Other Ascertainable Records</i> | | | | | | | | |
| RCRA NonGen / NLR | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| FUDS | 1,000 | | 0 | 0 | 1 | 0 | NR | 1 |
| DOD | 1,000 | | 0 | 0 | 0 | 0 | NR | 0 |
| SCRD DRYCLEANERS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US FIN ASSUR | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| EPA WATCH LIST | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| 2020 COR ACTION | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| TSCA | 0.001 | | 0 | 0 | NR | NR | NR | 0 |

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|

NOTES:
 TP = Target Property
 NR = Not Requested at this Search Distance
 Sites may be listed in more than one database

MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|
|----------|-------------------------|-----------------|-------|-----------|-----------|---------|-----|---------------|

| | | | | | | | | |
|---------------------|-------|--|----|----|----|----|----|---|
| TRIS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| SSTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| ROD | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| RVID | 0.001 | | NR | NR | NR | NR | NR | 0 |
| RAATS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| PRP | 0.001 | | NR | NR | NR | NR | NR | 0 |
| PADS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| IGIS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FTTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| MLTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| COALASHDOE | 0.001 | | NR | NR | NR | NR | NR | 0 |
| COALASHEPA | 0.500 | | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB TRANSFORMER | 0.001 | | NR | NR | NR | NR | NR | 0 |
| RADINFO | 0.001 | | NR | NR | NR | NR | NR | 0 |
| HIST FTTS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| DOT OPS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| CONSENT | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| INDIAN RESERV | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FUSRAP | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| UMTRA | 0.500 | | 0 | 0 | 0 | 0 | 0 | 0 |
| LEAD SMELTERS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| US AIRS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| US AIRS | 0.250 | | 0 | 0 | 0 | 0 | 0 | 0 |
| ABANDONED MINES | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FINDS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| DOCKET HWC | 0.001 | | NR | NR | NR | NR | NR | 0 |
| UXO | 1.000 | | 0 | 0 | 0 | 0 | 0 | 0 |
| ECHO | 0.001 | | NR | NR | NR | NR | NR | 0 |
| FUELS PROGRAM | 0.250 | | 0 | 0 | 0 | 0 | 0 | 0 |
| AIRS | 0.001 | | NR | NR | NR | NR | NR | 0 |
| DRYCLEANERS | 0.250 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Financial Assurance | 0.001 | | NR | NR | NR | NR | NR | 0 |
| UIC | 0.001 | | NR | NR | NR | NR | NR | 0 |

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

| | | | | | | | | |
|------------------|-------|--|----|----|----|----|----|---|
| EDR MGP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| EDR Hist Auto | 0.125 | | NR | NR | NR | NR | NR | 0 |
| EDR Hist Cleaner | 0.125 | | NR | NR | NR | NR | NR | 0 |

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

| | | | | | | | | |
|----------|-------|--|---|----|----|----|----|---|
| RGA HWS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RGA LF | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RGA LUST | 0.001 | | 0 | NR | NR | NR | NR | 0 |

- Totals -- 0 0 0 0 1 0 0 0 1

| City | EDR ID | Site Name | Site Address | Zip | Database(s) |
|---------|------------|-------------------------------|--------------|-------|-------------|
| KAHULUI | 1006819647 | WAIKAPU DUMP-MAUI COUNTY DUMP | WAIKAPU RD | 96732 | SHWS |

Map ID
Direction
Distance
Elevation

MAP FINDINGS

EDR ID Number
EPA ID Number

Database(s)

MAUI AIRPORT MILITARY RES

1
ESE
1/4-1/2
0.458 mi.
2420 ft.
Relative:
Higher
Actual:
120 ft.

FUDS 1007212729
N/A

FUDS:
EPA Region: 09
Congressional District: 02
FUDS Number: H09H10225
State: HI
Facility Name: MAUI AIRPORT MILITARY RES
Fiscal Year: 2013
City: PUUNENE
Federal Facility ID: H18799F3960
Telephone: 808-835-4004
INST ID: 54616
County: MAUI
RAB: Not reported
CORPUS_DIST:
NPL Status: Honolulu District (POH)
CTC: Not Listed
Current Owner: 5173.60000000000004
Future Prog: State Government
Description: Not reported

The former Maui Airport Military Reservation consists of 1,875 acres and is located midway to Kihel on Mokuleie Highway. The airport was known as Puunene Naval Air Station and was built from 1935-1939. The airport was used by the Navy from 1940 to 1946 and was later returned for civilian uses. After the military left the site, the area was used for agriculture, ranging from sugar cultivation to animal husbandry. The current owner is the State of Hawaii.

Current Program:
History:

The site was used as a naval air station that also supported Army operations. Radio-controlled drones were used to aid in the development of accuracy among anti-aircraft gunners. The site consisted of nine underground fuel storage tanks, a transformer building with a PCB transformer, and a former landfill that may need to be removed or remediated. Current use of the site includes a heliport, crop dusting airplane runway, and a drag strip. The County of Maui is proposing the area to be a county fairground.

Latitude Degree: 20
Latitude Minute: 50
Latitude Second: 33
Longitude Degree: N
Longitude Minute: -156
Longitude Second: 28
Longitude Direction: 35 E

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Last EDR Contact: 02/06/2018
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 14
Source: EPA
Telephone: N/A
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)

Telephone: 202-564-7333

EPA Region 1

Telephone 617-918-1143

EPA Region 3

Telephone 215-814-5418

EPA Region 4

Telephone 404-562-8033

EPA Region 5

Telephone 312-886-6686

EPA Region 10

Telephone 206-553-8665

EPA Region 6

Telephone: 214-655-6659

EPA Region 7

Telephone: 913-551-7247

EPA Region 8

Telephone: 303-312-6774

EPA Region 9

Telephone: 415-947-4246

Proposed NPL - Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Last EDR Contact: 02/06/2018
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 14
Source: EPA
Telephone: N/A
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56
Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 14
Source: EPA
Telephone: N/A
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing
A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Offices is involved in cleanup activities.

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 92
Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/05/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly known as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 21
Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, remained to SEMS-ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be potential NPL site.

Source: EPA
Telephone: 800-424-9346
Date Data Arrived at EDR: 12/11/2017
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 04/30/2018
Number of Days to Update: 21
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Source: EPA
Telephone: 800-424-9346
Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Number of Days to Update: 45
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Number of Days to Update: 45
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Number of Days to Update: 45
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Number of Days to Update: 45
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Number of Days to Update: 45
Data Release Frequency: Quarterly

Federal Institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Source: Department of the Navy
Telephone: 843-820-7326
Date of Government Version: 05/22/2017
Date Data Arrived at EDR: 06/13/2017
Last EDR Contact: 02/09/2018
Next Scheduled EDR Contact: 05/28/2018
Number of Days to Update: 94
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Source: Environmental Protection Agency
Telephone: 703-603-0695
Date of Government Version: 11/13/2017
Date Data Arrived at EDR: 11/27/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Number of Days to Update: 74
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Source: Environmental Protection Agency
Telephone: 703-603-0695
Date of Government Version: 11/13/2017
Date Data Arrived at EDR: 11/27/2017
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Number of Days to Update: 74
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal ERNS list

ERNS: Emergency Response Notification System
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/16/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

State and tribal - equivalent CERCLIS

SHWS: Sites List
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWP/LF: Permitted Landfills in the State of Hawaii
Solid Waste Facilities/Landfill Sites. SWP/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/17/2012
Date Data Arrived at EDR: 04/03/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 37

Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 12/28/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank Database
Leaking Underground Storage Tank Database. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/2017
Date Data Arrived at EDR: 06/30/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 16

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 01/26/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/25/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 31

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

State and tribal registered storage tank lists

FEWA UST: Underground Storage Tank Listing
A listing of all FEWA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 06/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136
Source: FEWA
Telephone: 202-646-5797
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Varies

UST: Underground Storage Tank Database

Registered Underground Storage Tanks (UST) are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 09/01/2017
Date Data Arrived at EDR: 09/30/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 16
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 01/26/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71
Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98
Source: EPA Region 4
Telephones: 404-562-9424
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71
Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 12/09/2017
Number of Days to Update: 134
Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 05/02/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78
Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/25/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites

A listing of sites with engineering controls in place.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182
Source: Department of Health
Telephone: 404-586-4249
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

VCP: Voluntary Response Program Sites

Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 182
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 12/20/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 09/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites

With certain legal exclusions and additions, the term 'brownfield site' means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 01/19/2018
Date Data Arrived at EDR: 01/19/2018
Date Made Active in Reports: 02/09/2018
Number of Days to Update: 21
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-306-8245
Last EDR Contact: 01/30/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 06/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-8346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land

A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 09/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176
Source: Department of Health & Human Services, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 02/02/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 01/19/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 02/09/2018
Number of Days to Update: 16
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Listing

A listing of clandestine drug lab site locations.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Date Made Active in Reports: 10/22/2010
Number of Days to Update: 42
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/21/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

US CDL: clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 01/09/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 02/09/2018
Number of Days to Update: 16
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 21
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/21/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22
Source: U.S. Department of Transportation
Telephone: 202-368-4555
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

SPILLS: Release Notifications

Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 162
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and releaser records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39
Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RCRA Non-Gen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/26/2017
Date Made Active in Reports: 02/09/2018
Number of Days to Update: 45
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97
Source: U.S. Army Corps of Engineers
Telephone: 202-526-4285
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005

Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62
Source: USGS
Telephone: 888-276-8747
Last EDR Contact: 10/13/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administered lands of the United States. Lands included are administered by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephones: 888-276-8747
Last EDR Contact: 10/11/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1986, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63
Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/17/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/17/2017
Date Data Arrived at EDR: 11/01/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 06/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 01/31/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/08/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 188

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 01/10/2018
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/23/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 21

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for or on accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternate training measures; Prevention program that includes safety precautions and maintenance, monitoring, and employee and procedures for informing the public and response agencies (e.g. the fire department) should an accident occur.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administrative Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 06/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the EPA of such activities.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 06/01/2017
Date Data Arrived at EDR: 06/09/2017
Last EDR Contact: 01/12/2018
Next Scheduled EDR Contact: 04/23/2018
Number of Days to Update: 126
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/12/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Last EDR Contact: 02/10/2017
Next Scheduled EDR Contact: 04/23/2018
Number of Days to Update: 79
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Quarterly

FTTS: FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS (NSP): FIFRA/TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/02/2016
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/21/2018
Number of Days to Update: 43
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 06/07/2009
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Last EDR Contact: 12/08/2017
Next Scheduled EDR Contact: 03/19/2018
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 12/08/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Last EDR Contact: 01/26/2018
Next Scheduled EDR Contact: 05/07/2018
Number of Days to Update: 15
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 01/26/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/02/2017
Date Data Arrived at EDR: 10/05/2017
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/16/2018
Number of Days to Update: 8
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS (NSP): FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transportation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/14/2018
Number of Days to Update: 42
Source: Department of Transportation, Office of Pipeline Safety
Telephone: 202-366-4695
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CONSENT: Superfund (CERCLA) Consent/Decreets

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 11/10/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 63
Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218
Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/20/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546
Source: USGS
Telephone: 202-206-3710
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52
Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23
Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 10/10/2017
Date Data Arrived at EDR: 11/05/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 42
Source: Environmental Protection Agency
Telephone: 703-603-9787
Last EDR Contact: 02/06/2018
Next Scheduled EDR Contact: 05/21/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931 and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36
Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100
Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100
Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 10/29/2017
Date Data Arrived at EDR: 11/29/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 45
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 11/28/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/19/2008
Number of Days to Update: 49
Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 12/01/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/09/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97
Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 12/01/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 09/25/2017
 Telephone: Department of Interior
 Date Data Arrived at EDR: 09/26/2017
 Last EDR Contact: 12/19/2017
 Date Made Active in Reports: 10/20/2017
 Next Scheduled EDR Contact: 03/26/2018
 Number of Days to Update: 24
 Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System: FINDS contains both facility information and "pointers" to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIFS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/23/2017
 Telephone: EPA
 Date Data Arrived at EDR: 09/06/2017
 Last EDR Contact: 01/19/2018
 Date Made Active in Reports: 09/15/2017
 Next Scheduled EDR Contact: 03/19/2018
 Number of Days to Update: 9
 Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.
 Date of Government Version: 06/27/2017
 Telephone: Environmental Protection Agency
 Date Data Arrived at EDR: 11/21/2017
 Last EDR Contact: 01/19/2018
 Date Made Active in Reports: 01/12/2018
 Next Scheduled EDR Contact: 03/12/2018
 Number of Days to Update: 52
 Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations
 Date of Government Version: 09/30/2016
 Telephone: Department of Defense
 Date Data Arrived at EDR: 10/31/2017
 Last EDR Contact: 01/02/2018
 Date Made Active in Reports: 01/12/2018
 Next Scheduled EDR Contact: 04/30/2018
 Number of Days to Update: 73
 Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.
 Date of Government Version: 09/02/2017
 Telephone: Environmental Protection Agency
 Date Data Arrived at EDR: 09/06/2017
 Last EDR Contact: 01/19/2018
 Date Made Active in Reports: 10/20/2017
 Next Scheduled EDR Contact: 03/19/2018
 Number of Days to Update: 44
 Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 11/20/2017
 Date Data Arrived at EDR: 11/20/2017
 Last EDR Contact: 07/19/2018
 Date Made Active in Reports: 01/17/2018
 Number of Days to Update: 53
 Data Release Frequency: Quarterly

Source: EPA
 Telephone: 800-385-6164
 Last EDR Contact: 07/19/2018
 Date Made Active in Reports: 03/05/2018
 Next Scheduled EDR Contact: 03/05/2018
 Data Release Frequency: Quarterly

AIRS: List of Permitted Facilities

A listing of permitted facilities in the state.
 Date of Government Version: 01/02/2018
 Telephone: Department of Health
 Date Data Arrived at EDR: 01/04/2018
 Last EDR Contact: 01/02/2018
 Date Made Active in Reports: 01/17/2018
 Number of Days to Update: 13
 Data Release Frequency: Varies

Source: Department of Health
 Telephone: 808-586-4200
 Last EDR Contact: 01/02/2018
 Date Made Active in Reports: 04/16/2018
 Next Scheduled EDR Contact: 04/16/2018
 Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing

A listing of permitted drycleaner facilities in the state.

Date of Government Version: 01/02/2018
 Telephone: Department of Health
 Date Data Arrived at EDR: 01/04/2018
 Last EDR Contact: 01/02/2018
 Date Made Active in Reports: 01/17/2018
 Number of Days to Update: 13
 Data Release Frequency: Varies

Source: Department of Health
 Telephone: 808-586-4200
 Last EDR Contact: 01/02/2018
 Date Made Active in Reports: 04/16/2018
 Next Scheduled EDR Contact: 04/16/2018
 Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 12/18/2017
 Telephone: Department of Health
 Date Data Arrived at EDR: 12/26/2017
 Last EDR Contact: 12/19/2017
 Date Made Active in Reports: 01/16/2018
 Next Scheduled EDR Contact: 03/26/2018
 Number of Days to Update: 21
 Data Release Frequency: Varies

Source: Department of Health
 Telephone: 808-586-4226
 Last EDR Contact: 12/19/2017
 Date Made Active in Reports: 03/26/2018
 Next Scheduled EDR Contact: 03/26/2018
 Data Release Frequency: Varies

UIC: Underground Injection Wells Listing

A listing of underground injection well locations.

Date of Government Version: 02/07/2013
 Telephone: Department of Health
 Date Data Arrived at EDR: 02/12/2013
 Last EDR Contact: 11/21/2017
 Date Made Active in Reports: 04/09/2013
 Number of Days to Update: 56
 Data Release Frequency: Varies

Source: Department of Health
 Telephone: 808-586-4258
 Last EDR Contact: 11/21/2017
 Date Made Active in Reports: 03/12/2018
 Next Scheduled EDR Contact: 03/12/2018
 Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oil waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
 Telephone: N/A
 Date Data Arrived at EDR: N/A
 Last EDR Contact: N/A
 Date Made Active in Reports: N/A
 Number of Days to Update: N/A
 Data Release Frequency: No Update Planned

Source: EDR, Inc.
 Telephone: N/A
 Last EDR Contact: N/A
 Date Made Active in Reports: N/A
 Next Scheduled EDR Contact: N/A
 Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRRH. EDR's HRRH effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRRH. EDR's HRRH effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/08/2014
Number of Days to Update: 191
Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/17/2014
Number of Days to Update: 200
Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 07/03/2014
Number of Days to Update: 186
Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines

Source: PennWell Corporation
Petroleum Bundles (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data

Source: PennWell Corporation
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:

Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.
Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.
Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.
Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools

Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.
Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2827
Date of Government Version: 2003, 2015

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK® - PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

PBR PULEHUNUI
NOT REPORTED
KIHEI, HI 96753

TARGET PROPERTY COORDINATES

Latitude (North): 20.828336 - 20.49 42.01"
Longitude (West): 156.467874 - 156.28 4.35"
Universal Transverse Mercator:
Zone 4
UTM X (Meters): 763529.2
UTM Y (Meters): 2305084.8
Elevation:
89 ft. above sea level

USGS TOPOGRAPHIC MAP

| | |
|----------------------|------------------------|
| Target Property Map: | 5941589 MAALAEA, HI |
| Version Date: | 2013 |
| Northeast Map: | 5941605 PAIA, HI |
| Version Date: | 2013 |
| Southeast Map: | 5941643 PUU O KALI, HI |
| Version Date: | 2013 |
| Northwest Map: | 5941607 WAILUKU, HI |
| Version Date: | 2013 |

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

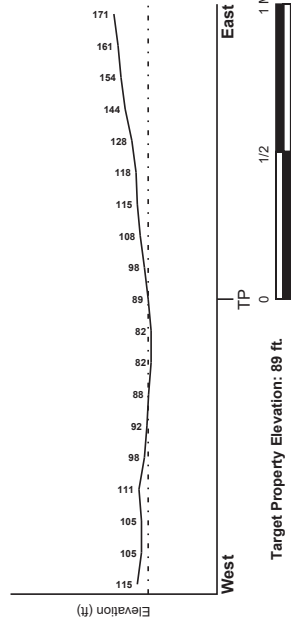
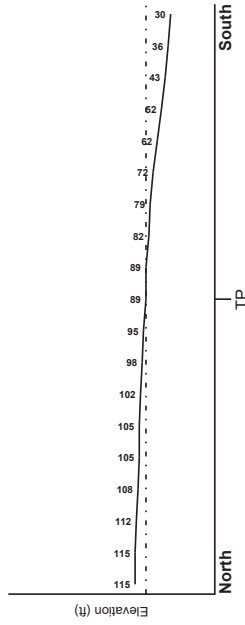
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property

FEMA Source Type

1500030557G

FEMA FIRM Flood data

Additional Panels in search area:

FEMA Source Type

1500030394F

FEMA FIRM Flood data

1500030413E

FEMA FIRM Flood data

1500030255B

FEMA Q3 Flood data

1500030580F

FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Electronic

Data Coverage

YES - refer to the Overview Map and Detail Map

NWI Quad at Target Property

NOT AVAILABLE

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1,000 Miles.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID: Not Reported

LOCATION: FROM TP

GENERAL DIRECTION: GROUNDWATER FLOW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

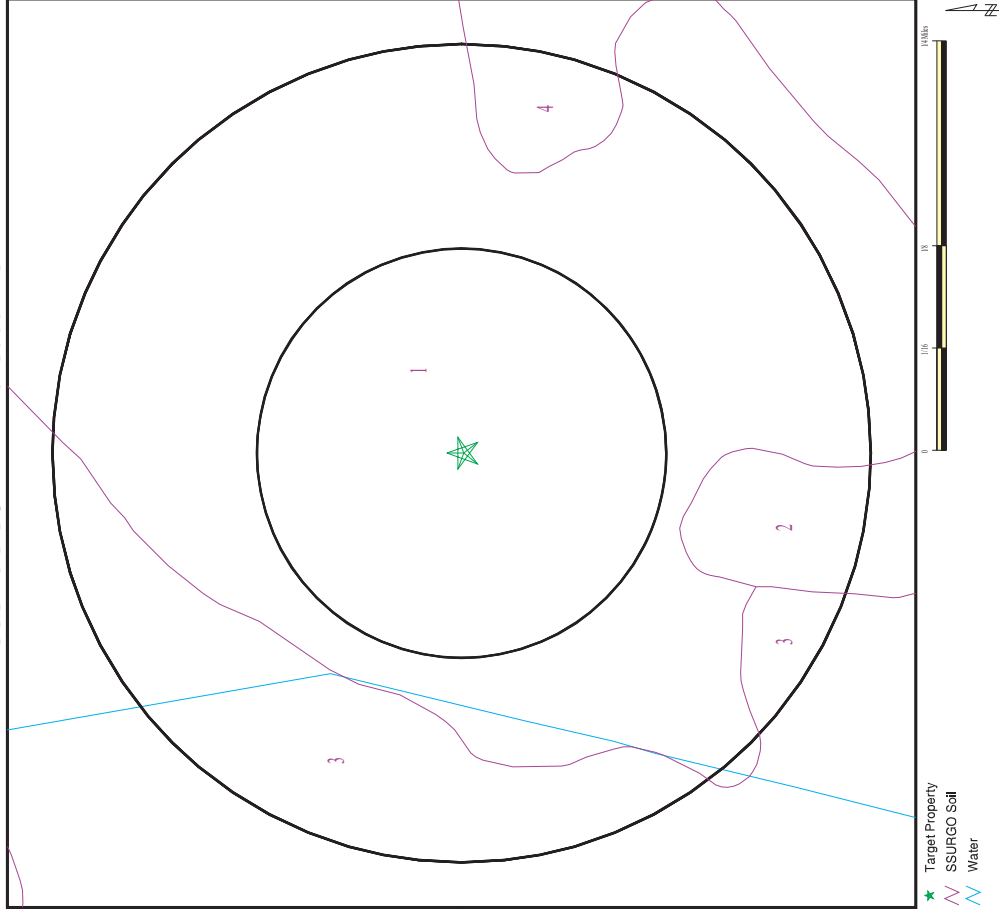
Era: -
 System: -
 Series: -
 Code: N/A (decoded above as Era, System & Series)

GEOLOGIC AGE IDENTIFICATION

Category: -

Geologic Age and Rock Stratigraphic Unit Source: P.G., Schuben, R.E., Arndt and W.J., Bawiec, Geology of the Conterminous U.S., at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Belkman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5190664.2S



SITE NAME: PBR Pulehunui
 ADDRESS: Not Reported
 LAT/LONG: 20.828336 / 156.467874

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Eva Kakone
 INQUIRY #: 5190664.2S
 DATE: February 15, 2018 3:55 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Etwa
 Soil Surface Texture: silty clay loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
|-------|-----------|-----------|--|-----------------|--|----------------------|
| | Upper | Lower | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 18 inches | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | ML-K (proposed) | Max: 14 Min: 4.23 | Max: 7.8 Min: 6.6 |
| 2 | 18 inches | 59 inches | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | ML-K (proposed) | Max: 14 Min: 4.23 | Max: 7.8 Min: 6.6 |

Soil Map ID: 2

Soil Component Name: Pulehu
 Soil Surface Texture: cobbly silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

| Layer | Boundary | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
|-------|-----------|-----------|--|---|--|----------------------|
| | Upper | Lower | Soil Texture Class | Unified Soil | | |
| 1 | 0 inches | 20 inches | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS. Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils. | COARSE-GRAINED SOILS. Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 3

Soil Component Name: Pulehu
 Soil Surface Texture: silt loam
 Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
 Soil Drainage Class: Well drained
 Hydric Status: Not hydric
 Corrosion Potential - Uncoated Steel: Moderate
 Depth to Bedrock Min: > 0 inches
 Depth to Waterable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|--|---|--|----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 20 inches | silt loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt. | Max: 14 Min: 4.23 | Max: 7.3 Min: 6.6 |
| 2 | 20 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Silty Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 141.14 Min: 14.11 | Max: 7.8 Min: 6.6 |

Soil Map ID: 4

Soil Component Name: Ewa

Soil Surface Texture: cobbly silty clay loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Waterable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|------------------------|----------|-----------|------------------------|--|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 1 | 0 inches | 18 inches | cobbly silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.8 Min: 6.6 |

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

| Soil Layer Information | | | | | | | |
|------------------------|-----------|-----------|--------------------|--|--|--|----------------------|
| Layer | Boundary | | Soil Texture Class | AASHTO Group | Classification | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| | Upper | Lower | | | | | |
| 2 | 18 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200). Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand. | Max: 14 Min: 4.23 | Max: 7.8 Min: 6.6 |

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE SEARCH DISTANCE (miles)
 Federal USGS 1,000
 Federal FRDS PWS Nearest PWS within 0.001 miles
 State Database 1,000

FEDERAL USGS WELL INFORMATION

MAP ID 1
 WELL ID USGS40000269033
 LOCATION FROM TP 1/2 - 1 Mile South

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

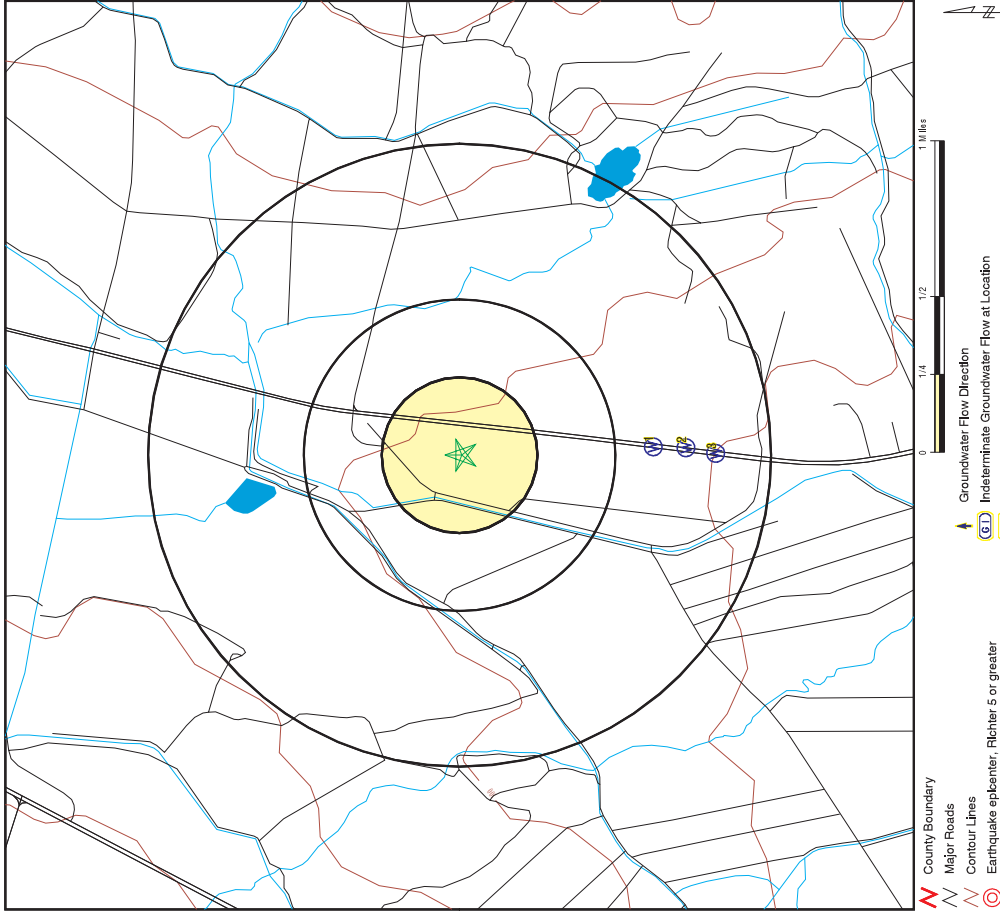
MAP ID No PWS System Found
 WELL ID
 LOCATION FROM TP

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID 2
 WELL ID HI9000000003261
 LOCATION FROM TP 1/2 - 1 Mile South

PHYSICAL SETTING SOURCE MAP - 5190664.2s



GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID: 3
 WELL ID: HI90000000003262

LOCATION FROM TP: 1/2 - 1 Mile South

SITE NAME: PBR Pulehunui
 ADDRESS: Not Reported
 Kirel HI 96753
 LAT/LONG: 20.828336 / 156.467874

CLIENT: Enviro Svcs. and Trng. Center
 CONTACT: Eva Kakone
 INQUIRY #: 5190664.2s
 DATE: February 15, 2018 3:55 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation Database EDR ID Number
 1 South 1/2 - 1 Mile Lower USGS HI900000003261

USGS-HI USGS Hawaii Water Science Center
 Formal name: USGS/204921156281301
 Monoc name: 6-4928-01 W1
 Monoc type: Well
 Monoc desc: Not Reported
 Hrc code: 20020000
 Drainagearea Units: Not Reported
 Contrib drainagearea units: Not Reported
 Longitude: -156.46745777
 Horiz Acc measure: 1
 Horiz Collection method: Interpolated from map
 Horiz coord refs: NAD83
 Vert measure units: feet
 Vert coord refs: Interpolated from topographic map
 Vert collection method: HILOCAL
 Aquifer name: Not Reported
 Aquifer type: Not Reported
 Construction date: 19420101
 Welldepth units: ft
 Wellholedepth units: Not Reported

Ground-water levels. Number of Measurements: 0

2 South 1/2 - 1 Mile Lower HI WELLS HI900000003261

Wid: 6-4928-001
 Well name: Puuene Arip TH
 Yr drilled: 1942
 Driller: Curtis Wong (Naval Facilities Engineering Command Hawaii, Asset Management, NAVFAC Hawaii)
 Quad map: 6
 Long634d: -156.4675
 Lat834d: 20.81778
 Gps: DOT, Airports Division
 Owner user: Not Reported
 Land owner: Not Reported
 Pump insta: Not Reported
 Old number: 1-
 Casing dia: 8
 Well depth: 70
 Solid case: Not Reported
 Use year: Not Reported
 Init head: 3.6
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Test down: Not Reported
 Test temp: Not Reported
 Pump gpm: 300
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot hole: Not Reported
 Bot perf: Not Reported
 Spec capac: 432
 Pump mgd: Not Reported
 Draft mgd: Not Reported
 Pump elev: Not Reported
 Aquil code: 60301
 Latest hd: Not Reported
 Pfr: Not Reported
 Wcr: Not Reported
 Surveyor: Not Reported
 Site id: HI900000003261

3 South 1/2 - 1 Mile Lower HI WELLS HI900000003262

Wid: 6-4928-002
 Well name: Puuene Arip Shaft
 Yr drilled: 1942
 Driller: Curtis Wong (Naval Facilities Engineering Command Hawaii, Asset Management, NAVFAC Hawaii)
 Quad map: 6
 Long634d: -156.46778
 Lat834d: 20.816389
 Gps: Hawaiian Commercial & Sugar Co. (HC&S)
 Owner user: Not Reported
 Land owner: Not Reported
 Pump insta: 34-SH
 Old number: 72
 Casing dia: 53
 Well depth: Not Reported
 Solid case: ABN - Sealed
 Use year: Not Reported
 Init head: 3.7
 Init head3: Not Reported
 Init cl: 0
 Test date: Not Reported
 Test down: Not Reported
 Test chlor: Not Reported
 Pump gpm: 2000
 Draft mgy: Not Reported
 Max chlor: Not Reported
 Geology: THO
 Pump yr: 0
 Draft yr: Not Reported
 Bot hole: Not Reported
 Bot perf: Not Reported
 Spec capac: Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

AREA RADON INFORMATION
 Federal EPA Radon Zone for MAUI County: 3
 Note: Zone 1 indoor average level > 4 pCi/L
 : Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L
 : Zone 3 indoor average level < 2 pCi/L

Pump mgd: 2.88
 Draft mgd: Not Reported
 Pump depth: Not Reported
 Aquil code: 60301
 Latest hd: Not Reported
 Pir: Not Reported
 Surveyor: Not Reported
 T: Not Reported

Federal Area Radon Information for Zip Code: 96753
 Number of sites tested: 10

| Area | Average Activity | % <= 4 pCi/L | % 4-20 pCi/L | % >20 pCi/L |
|-------------------------|------------------|--------------|--------------|--------------|
| Living Area - 1st Floor | 0.010 pCi/L | 100% | 0% | 0% |
| Living Area - 2nd Floor | Not Reported | Not Reported | Not Reported | Not Reported |
| Basement | Not Reported | Not Reported | Not Reported | Not Reported |

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

USGS 7.5 Digital Elevation Model (DEM)

Source: United States Geological Survey

EDR acquired the USGS 7.5 Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map

Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.

Source: FEMA

Telephone: 877-336-2627

Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory

Source: Office of Planning

Telephone: 808-587-2895

HYDROGEOLOGIC INFORMATION

AQUIFLOWR Information System

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit

Source: P.G. Schruben, R.E. Arndt and W.J. Bowiec. Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Belkman Map. USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)

The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database

Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)

Telephone: 800-672-5559

SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1985. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)

This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Well Index Database

Source: Commission on Water Resource Management

Telephone: 808-587-0214

CWRM maintains a Well Index Database to track specific information pertaining to the construction and installation of production wells in Hawaii

OTHER STATE DATABASE INFORMATION

RADON

Area Radon Information

Source: USGS

Telephone: 703-366-4020

The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones

Source: EPA

Telephone: 703-366-4020

Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities

Source: Federal Aviation Administration, 800-457-4656

Epcenters: World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United States Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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**APPENDIX V
QUALIFICATIONS OF THE ENVIRONMENTAL PROFESSIONAL**

PAST PROJECT EXPERIENCE

Sharla M. Nakashima

Name: **Sharla M. Nakashima**

Title: Environmental Scientist

Education: BS, Chemistry, University of Hawaii at Manoa, 2000

Training: OSHA 40 Hour HAZWOPER
DOT Hazardous Materials Handling

Experience: EnviroServices & Training Center, LLC, Environmental Chemist, 2000 to Present.
University of Hawaii, Chemistry Department, Graduate Research Assistant, 2000.

Ms. Nakashima's primary responsibilities are conducting Phase I and II environmental site assessments. She is also the lead person to conduct data QA/QC/validation/reduction. Ms. Nakashima possesses experience in operating global positioning system (GPS) instrumentation and conducting hazardous materials inventories/classifications/segregations/compatibility determinations.

PROFESSIONAL QUALIFICATIONS

Phase I Environmental Site Assessments on the Islands of Oahu, Maui, Kauai, Hawaii, Lanai; Environmental Professional. Ms. Nakashima has conducted numerous Phase I environmental site assessments throughout the State of Hawaii in accordance with generally accepted Phase I industry protocol as described in the ASTM E-1527 standard and to satisfy "all appropriate inquiry" as defined in 42 United States Code (U.S.C.) §9601(35)(B). Work sites included commercial, industrial, agricultural, condemned, and residential land ranging in size from small properties (less than 2.0 acres) to larger properties (greater than 300.0 acres).

Phase II Environmental Site Assessments/ Site Screening Assessments on the Islands of Oahu, Maui, Kauai, Hawaii, Lanai; Project Manager. Ms. Nakashima has performed numerous Phase II environmental site assessments and site screening assessments throughout the State of Hawaii. Projects included surface soil investigation utilizing both multi-incremental and discrete sampling protocols and subsurface soil/groundwater investigations using hand tools, direct-push rig, and hollow-stem augering techniques. Contaminants investigated included petroleum/petroleum-related compounds, heavy metals, pesticides/herbicides, PCBs, and dioxins/furans.

Phase II Environmental Site Assessments/ Site Screening Activities; GPS Team Leader. Ms. Nakashima utilized Trimble Navigation Global Positioning System (GPS) instrumentation and Geographical Information Systems (GIS) applications for numerous projects to identify/locate pre-determined sample locations, document sample locations or site features, and/or identify property limits. GIS data obtained were incorporated in both the planning and reporting phases of applicable projects.

Underground Storage Tank (UST) Closure and Release Response; Environmental Scientist. Ms. Nakashima has closed numerous UST systems throughout the State of Hawaii. Closure and release response activities were performed in accordance with Hawaii Administrative Rules 11-281. Duties included coordination and management of various subcontractors, documentation of closure (both removal and close in place), release assessment sample collection, site remediation, waste profiling/packaging/disposal, communication with State regulators, and report preparation.

Voluntary Response Program (VRP) Site Assessment and Remediation; Environmental Scientist/Project Manager. Ms. Nakashima has served as both environmental scientist and project manager on several VRP projects on the Island of Oahu. Ms. Nakashima worked on all phases of the VRP, including project scoping, planning document preparation, field sampling, data assessment, contaminated media removal/remediation, confirmation sampling, and report preparation. Contaminants addressed included petroleum/petroleum-related compounds, heavy metals, pesticides/herbicides, PCBs, and dioxins/furans.

Industrial Wastewater Discharge Permitting (IWDP), Environmental Scientist. Ms. Nakashima acquired an IWDP which authorized the facility to discharge industrial wastewater into the City and County of Honolulu's publicly owned treatment works (POTW) under Chapter 14 of the Revised Ordinances of Honolulu.

Underground Injection Control (UIC) Permitting, Environmental Scientist. Ms. Nakashima acquired a UIC permit for two dry wells located at a car rental facility in Kona, Hawaii. Work included investigation and application procedures required by the Hawaii Department of Health-Safe Drinking Water Branch.

Hazardous Materials Inventory, Environmental Chemist. Ms. Nakashima conducted a hazardous materials survey at over sixty (60) public intermediate and high schools on the islands of Oahu, Kauai, Maui, Molokai, Lanai and Hawaii. Work included identification and categorizing of over 30,000 hazardous materials, conducting photographic documentation, and determining NFPA labeling requirements for classroom storage areas potentially containing hazardous materials.

Household Hazardous Waste (HHW) Collection, Environmental Scientist. Ms. Nakashima assisted with the collection of HHW in Honolulu, Lahaina, Wailuku, Hilo, and Kona. Tasks included identification, packaging, labeling, transportation and disposition of HHW in accordance with OSHA, EPA, and DOT protocol.

Hazardous Waste Characterization and/or Disposal, Environmental Scientist. Ms. Nakashima assisted in the disposal of various chemicals and hazardous wastes at an abandoned laboratory in Waimanalo, Oahu. Additional sites included several public, intermediate and high schools. Tasks included identification, packaging, labeling, transportation and disposition of hazardous waste in accordance with OSHA, EPA, DOT, and local regulations.

Asbestos Air-Monitoring, City and County – Department of Agriculture, Environmental Scientist. Ms. Nakashima assisted and/or conducted air monitoring using low volume sampling pumps during asbestos abatement activities.

Laboratory Studies, Research Assistant. Ms. Nakashima conducted studies of protein conformational dynamics through photothermal methods and purified horse heart myoglobin within thin layered polymer slides and organic solvents. Lab experience also included utilization of Gas Chromatography (GC) -Mass Spectrometry (MS), High Performance Liquid Chromatography (HPLC), Nuclear Magnetic Resonance (NMR), Infrared (IR) spectrometry, and Ultraviolet/Visible (UV-VIS) Spectrometer.

APPENDIX J

ECONOMIC AND FISCAL IMPACT ASSESSMENT

**PŪLEHUNUI REGIONAL
INFRASTRUCTURE MASTER PLAN
ECONOMIC AND FISCAL IMPACT ASSESSMENT**

Final Report

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Prepared by:



1001 Bishop Street, Suite 650
Honolulu, HI 96813

October 2018

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List of Acronyms -

ATAAustin Tutsumi and Associates
 DAGSDepartment of Accounting and General Services, State of Hawai'i
 DBEDT Department of Business, Economic Development and Tourism, State of
 Hawai'i
 DEISDraft Environmental Impact Statement
 DHHL Department of Hawaiian Home Lands, State of Hawai'i
 DLNR Department of Land and Natural Resources, State of Hawai'i
 DOFAW Division of Forestry and Wildlife, Department of Land and
 Natural Resources, State of Hawai'i
 DOT State Department of Transportation, State of Hawai'i
 EIS Environmental Impact Assessment
 FAR Floor Area Ratio
 FTE Full-time equivalent
 FY2017 Fiscal year ending June 30, 2017
 GET General Excise Tax
 HRS Hawai'i Revised Statutes
 MRPSCMaui Regional Public Safety Complex
 N/A Not applicable
 NGO Non-governmental organization
 PSD Department of Public Safety, State of Hawai'i
 SF Square Feet
 TAT Transient Accommodations Tax

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Report Text

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**Pūlehuunui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT**

**Pūlehuunui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT**

EXECUTIVE SUMMARY

This report is intended to accompany an Environmental Impact Assessment (EIS) for the Pūlehuunui Regional Infrastructure Master Plan; the EIS may be consulted for further context. The Pūlehuunui Regional Infrastructure Master Plan addresses potential developments on two properties owned by the State of Hawai‘i, Department of Hawaiian Home Lands (DHHL), known as Pūlehuunui South and Pūlehuunui North, together with various regional infrastructure projects. The potential developments on these two DHHL properties together with the regional infrastructure projects are defined in the EIS the “Proposed Action”, and that terminology is used herein also.

The regional infrastructure projects would facilitate the potential developments on DHHL’s Pūlehuunui South and Pūlehuunui North properties, plus other proposed developments on nearby lands controlled by three other State agencies: the Department of Land and Natural Resources (DLNR), and Department of Accounting and General Services (DAGS)/Department of Public Safety (PSD).

This report provides an assessment of the economic and fiscal impacts of the Proposed Action within Maui County (County) and the State of Hawai‘i (State). In addition, this report assesses the impacts of other projects proposed in the area by DLNR and PSD/DAGS, since those projects may be facilitated by the Proposed Action, depending on the selected infrastructure alternative(s)

The chapters following this Executive Summary should be consulted for further information on this study’s background, the project elements, study findings, and definition of key terminology used herein.

PROPOSED ACTION IMPACTS

The table on the next page summarizes the total (direct, indirect and induced) statewide impacts of the Proposed Action, which include the regional infrastructure projects plus the various developments contemplated by DHHL on its Pūlehuunui South and Pūlehuunui North properties. The Proposed Action will entail an investment of approximately \$1.03 billion in 2018 dollars over 19-year buildout period from 2020 to 2038. It will generate substantial employment and fiscal benefits for both the County and State during this period, and on an ongoing basis thereafter.

**Table 1: Summary of Economic and Fiscal Impacts –
Proposed Action, Total Statewide
(2018 dollars)**

| | 2028 | 2038 | Ongoing |
|--|----------------|-----------------|-----------------|
| Average annual FTE employment:¹ | | | |
| Development-related | 600 | 490 | 0 |
| Operations-related | | | |
| On-site ² | 1,520 | 3,070 | 3,070 |
| Net new jobs in State | 2,100 | 4,300 | 4,300 |
| Total personal earnings per year:³ | | | |
| Development-related | \$40.2 million | \$33.0 million | \$0.0 |
| Operations-related | \$98.7 million | \$198.0 million | \$197.6 million |
| Average earnings per FTE job:² | | | |
| Development-related | \$67,000 | \$67,000 | N/A |
| Operations-related | \$47,000 | \$46,000 | \$46,000 |
| In-migrant resident population: | | | |
| To the County | 200 | 490 | 470 |
| To the State | 100 | 220 | 220 |
| Fiscal impacts: | | | |
| Net additional revenues: | | | |
| For the County | \$1.3 million | \$2.3 million | \$2.3 million |
| For the State | \$9.5 million | \$12.6 million | \$9.0 million |
| Revenue/expenditure ratio: | | | |
| For the County | 2 | 2 | 2 |
| For the State | 11 | 8 | 6 |

Source: PBR HAWAII, 2018. See also Exhibit I-1.

¹ FTE = Full-time equivalent, defined as 40 hours per week or 2,080 hours per year.

² On-site estimates reflect direct employment only.

³ Earnings defined to include wage, salary and proprietary incomes, plus directors’ fees and employer contributions to health insurance, less employee contributions to social insurance. Not in millions.

CUMULATIVE IMPACTS

In addition to the Proposed Action, this study addresses developments proposed at DLNR's Industrial and Business Park (DLNR Industrial and Business Park), and the DAGS/PSD Maui Regional Public Safety Complex (MRPSC). Altogether, the infrastructure and potential developments by all four agencies are referred to as the Pūlehuunui Projects, and their Cumulative costs are estimated at \$2.34 billion over the projection period, with total impacts as summarized below.

| Table 2: Summary of Economic and Fiscal Impacts – Cumulative, Total Statewide | | | |
|--|-----------------------|-----------------|-----------------|
| | (2018 dollars) | | |
| | 2028 | 2038 | Ongoing |
| Average annual FTE employment:⁴ | | | |
| Development-related | 1,400 | 1,070 | 0 |
| Operations-related | 3,830 | 8,800 | 8,800 |
| On-site ⁵ | 4,800 | 11,400 | 11,400 |
| Net new jobs in State | | | |
| Total personal earnings per year:⁶ | | | |
| Development-related | \$95.1 million | \$72.3 million | \$0.0 million |
| Operations-related | \$228.3 million | \$550.7 million | \$550.2 million |
| Average earnings per FTE job:² | | | |
| Development-related | \$68,000 | \$68,000 | N/A |
| Operations-related | \$48,000 | \$48,000 | \$48,000 |
| In-migrant resident population: | | | |
| To the County | 590 | 1,470 | 1,420 |
| To the State | 230 | 530 | 520 |
| Fiscal impacts: | | | |
| Net additional revenues: | | | |
| For the County | \$5.1 million | \$8.0 million | \$8.1 million |
| For the State | \$20.7 million | \$31.2 million | \$26.4 million |
| Revenue/expenditure | | | |
| For the County | 4 | 3 | 3 |
| For the State | 12 | 9 | 8 |

Source: PBR HAWAII, 2018. See also Exhibit 1-2.

⁴ FTE = Full-time equivalent, defined as 40 hours per week or 2,080 hours per year.

⁵ (See page 2)

⁶ Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance.

1 – INTRODUCTION

REPORT ORGANIZATION

The body of this report is organized as follows:

The report text is presented in four chapters:

1. Introduction - Study background, objectives and key parameters of the analysis.
2. Project Parameters – Description of the project elements that are the subject of this assessment, and their associated development costs.
3. Projected Impacts – Study findings relating to economic, population and fiscal impacts.
4. Study Conditions and Terminology – Definitions and other important factors underlying the study.

Exhibits follow the text and offer more detailed analyses and findings.

BACKGROUND

PBR HAWAII has prepared an Environmental Impact Statement (EIS) in accordance with Chapter 343, Hawai'i Revised Statutes (HRS) for a regional infrastructure master plan (the Pūlehuunui Regional Infrastructure Master Plan) to serve certain State lands located along Maui Veterans Highway (the former Mokulele Highway). This EIS effort is led by the State Department of Hawaiian Home Lands (DHHL) on behalf of four State agency stakeholders in the area: DHHL, the Department of Land and Natural Resources (DLNR), the Department of Accounting and General Services (DAGS) and the Department of Public Safety (PSD).

The agencies contemplate various developments on their Pūlehuunui area properties over the next 19 years, to serve respective missions of each agency. This study provides an economic and fiscal assessment of these potential developments, together with the infrastructure necessary to support them, as a component of the EIS disclosure document.

Study Objective

The objective of this study is to estimate the economic and fiscal impacts of the Proposed Action within Maui County (County) and the State of Hawai'i (State). In addition, this study estimates the impacts of other projects proposed in the area by

Pūlehuunui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

DLNR and PSD/DAGS, since those projects may be facilitated by the Proposed Action, depending on the selected infrastructure alternative(s). Factors evaluated include:

- **Economic impacts:**
 - Development-related employment
 - Operations-related employment
 - Personal earnings deriving from development and operations
- **Population impacts:**
 - Employees who relocate to the County or State because of a work opportunity generated by the project
 - Persons who relocate to the County or State because of the project's new residential opportunities
- **Fiscal impacts:**
 - Property tax and other County government revenues
 - General excise tax, income tax, transient accommodations tax and other State government revenues
 - County and State government operating expenditures
 - County and State net fiscal impacts and revenue/expenditure ratios

Project Nomenclature

The Pūlehuunui Regional Infrastructure Master Plan addresses several component interests and developments. Within this study, the various elements are grouped and referred to as:

- **“Proposed Action”** – This term is adopted from the accompanying EIS, and refers to the proposed regional infrastructure projects, together with developments contemplated by DHHL on its Pūlehuunui South and Pūlehuunui North properties.
- **“Other Area Projects”** – This is defined as the developments proposed at DLNR’s Industrial and Business Park (DLNR Industrial and Business Park), as well as the DAGS/PSD Maui Regional Public Safety Complex (MRPSC)⁷.

⁷The MRPSC is proposed by PSD within lands for which DLNR holds title and DAGS will have some management oversight. This project may be referenced herein with respect to PSD only and is considered for analysis purposes to occur on an approximately 40-acre site.

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- **“The Pūlehuunui Projects”** – This term refers to all the projects of the Pūlehuunui Regional Infrastructure Master Plan that are evaluated in this economic and fiscal impact assessment, including the Proposed Action and Other Area projects.

- **“Cumulative” / “Cumulative impacts”** – These titles refer to the economic and fiscal impacts of all the Pūlehuunui Projects considered together.

Dollar Denomination

Unless otherwise stated, all dollar amounts referenced are in 2018 dollars.

Reporting Periods

This analysis begins in 2020, after the Final EIS is presumed to be accepted, and key entitlement activities for the Pūlehuunui Projects are anticipated to be complete. Because impacts can vary considerably by the Pūlehuunui Projects’ stage of development, the conclusions are presented with respect to three time periods:

- **Early Development and Operations (2020-2028)** – This 9-year period encompasses the major planning, master ground leasing, design, financing, and groundbreaking, together with initial construction and operations for the Pūlehuunui Projects.
- **Completion of Development, Lease-up and Buildout (2029-2038)** – The next 10-year period encompass full buildout of the Pūlehuunui Projects, and stabilization of sub-tenant leases and operations.
- **Stabilization (2039 on)** – This depicts the long-term impacts of the Pūlehuunui Projects, after initial developments are complete and operations are stabilized.

2 – PROJECT PARAMETERS

PROJECT ELEMENTS

Overview

The specific elements evaluated in this assessment are summarized in the table below. Narrative descriptions follow, and more detail is available in Exhibit 2-1.

| Table 3: Summary of Land Use Elements Evaluated | | | |
|---|-------|------------------------------|--|
| | Acres | Assumed scale at buildout | Notes |
| PROPOSED ACTION: | | | |
| Regional Infrastructure Pūlehuunui South (DHHL) | N/A | | See Exhibit 2-1 <i>Uses anticipated to prioritize Beneficiaries</i> |
| Agricultural homesteads | 238 | 100 homestead lots | Up to 100 homes |
| General agriculture | 146 | 1 or 2 farms | No building allocated |
| Commercial enterprises | 70 | 300,000 SF building area | 0.10 FAR ⁸ |
| Education | 33 | 140,000 SF building area | Multiple entities, 0.10 FAR |
| Community facilities | 80 | 40,000 SF building area | 0.01 FAR |
| Pūlehuunui North (DHHL) | | | <i>Emphasis on third party developers/income</i> |
| Cultural center/visitor attraction | 40 | | |
| Hotel | 5 | 200 rooms | |
| Light industrial | 80 | 1,320,000 SF building area | 0.38 FAR |
| Commercial | 16 | 260,000 SF building area | 0.38 FAR |
| OTHER AREA PROJECTS: | | | |
| DLNR Industrial and Business Park | | | <i>Emphasis on third party developers/income</i> |
| DOFAW Baseyard | 20 | 75,000 sf building area | 0.08 FAR |
| Light industrial | 139 | 2,363,000 sf building area | 0.39 FAR |
| Commercial | 68 | 1,156,000 sf building area | 0.39 FAR |
| PSD - MRPSC | 40 | 843 detainees and/or inmates | <i>Public facility</i> |

Source: PBR HAWAII, 2018; See Exhibit 2-1 for further detail.

⁸ FAR – Floor Area Ratio

Regional Infrastructure

Major infrastructure improvements to facilitate the Pūlehuunui Projects were defined by engineering consultant Austin Tsutsumi and Associates (ATA) to include regional water, wastewater and road systems. ATA identified more than one design option to satisfy each system need and the specific solution to be implemented for each will be determined in the future. For current purposes, the lowest cost, apparently feasible design alternative for each is assessed, so as to not overstate jobs or income benefits related to construction. The design solutions modelled herein include⁸:

- **Water system** - Connect the Pūlehuunui Projects to the County water system (ATA Alternative 1).
- **Wastewater system** – Develop a new private wastewater system on Pūlehuunui South lands (ATA Alternative 2A).
- **Transportation solutions** – Various road and related improvements to be negotiated with the State Department of Transportation (DOT). This analysis assumes a pro rata share relative to the Pūlehuunui Projects’ Cumulative impacts, and overall regional improvement needs, as estimated by ATA.

DHHL Pūlehuunui South

The Pūlehuunui South property comprises 646 acres held by DHHL on the east side of Maui Veterans Highway. This area is planned to support DHHL beneficiary (Beneficiary) interests such as homesteading, food sustainability, economic self-sufficiency, education, community-building, and social and cultural enhancement. A broad variety of potential land uses have been suggested by Beneficiaries, and this assessment evaluates a conceptual land use plan reflecting those ideas. The agricultural homesteads would be restricted to Beneficiary lessees, and other land uses are anticipated to give priority to Beneficiary and/or community association-related uses. Major use categories include:

- **Agricultural homesteads** (238 acres) – 100, approximately two-acre homestead sites to be offered to Beneficiaries, with home development and agricultural uses at the discretion of the lessees.
- **General agriculture** (146 acres) – Area intended to support more intensive farming or ranching on large lots assumed to be leased under a revocable permit(s) to a commercial entity(ies), with anticipated priority to Beneficiary-owned entities.

⁸ See ATA, “Preliminary Engineering and Drainage Report for Pūlehuunui Community Project”, 2018 (Appendix C to the Pūlehuunui EIS) for more complete description of the design solutions evaluated, as well as potential alternative solutions.

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permit(s) to a commercial entity(ies), with anticipated priority to Beneficiary-owned entities.

- **Commercial enterprises (70 acres)** - A variety of commercial and industrial enterprises is envisioned in several areas. These areas might offer areas to pack, process, warehouse or add value to products harvested from the general agriculture or homestead lands; they might also include areas for relatively land-extensive light industrial business uses catering to Beneficiaries, or commercial uses such as daycare facilities or ancillary retail/restaurant facilities.
- **Education (33 acres)** – It is hoped that Pūlehuunui South will support educational opportunities for area Beneficiaries and potentially the general Maui Island community. Example enterprises could include a Hawaiian immersion K-12 school; business coaching, job training and/or occupational therapy programs; agricultural outreach or other programs associated with secondary or community college curricula; mālama ‘āina programs, or the like. The assumed land allocation is seen to be sufficient to support several such uses over time.
- **Community facilities (80 acres)** – Other areas are allocated for non-profit or similar ventures that provide community support and enhancement. These might include a community center with meeting rooms, luau grounds, halau, and commercial kitchen(s); a pu‘uhonua retreat; Beneficiary community gardens; Beneficiary-led agritourism, cultural tourism or similar ventures; a farmers’ market or food truck area to promote Pūlehuunui and other Maui agricultural products, and the like.
- **Other areas (79 acres)** – The remaining lands are allocated for open space, roads, drainage facilities, and similar uses, and are not subject to evaluation in this study.

DHHL Pūlehuunui North

The Pūlehuunui North parcel comprises 184 acres held by DHHL on the west side of Maui Veterans Highway. This area is proposed for income-generating land uses to support DHHL’s Beneficiary-related programs.

For the purposes of this study, it is assumed that DHHL would execute one or more long-term master ground lease(s) to an entity that would develop a suite of land uses consistent with the DHHL Maui Island Plan, the market outlook at the time, and with the approval of DHHL. The economic and fiscal impact assessment for this area is based on a representative set of potential income-generating land uses that include:

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- **Cultural center/visitor attraction (40 acres)** – A commercial attraction to showcase authentic Hawaiian and/or Polynesian culture is a potential income-generating land use at Pūlehuunui North. Based on the market context, the project as evaluated herein might attract some 350,000 visitors per year, including Maui Island residents and visitors.
 - **Hotel (5 acres)** – A hotel of some 200 rooms could complement the cultural center/visitor attraction, and cater to the growing Maui visitor interest in off-beach accommodations that are well situated with respect to transportation modes.
 - **Light industrial and commercial (96 acres)** – The balance of the developable areas at Pūlehuunui North is assumed to support a variety of light industrial and commercial facilities that take advantage of the site’s location at the crossroads linking Central Maui, Kihei/Wailea and West Maui. Likely uses are expected to be of lower intensity than supported in Kahului, and could include warehousing, entertainment, light manufacturing, service retail or retail/restaurant.
- In order to model differential employment and income generating characteristics, the economic and fiscal impact assessment assumes that at buildout, 16 acres of this combined area are developed with commercial uses and 80 acres with light industrial uses.

DLNR Industrial and Business Park

DLNR proposes an Industrial and Business Park on 280 acres on the east side of Maui Veterans Highway as a means of providing long-term income to support a wide range of DLNR programs. DLNR plans to ground lease some 83 lots¹⁰ ranging in size from 0.5 to 5.9-acres each, for various light industrial, commercial, government and nonprofit uses. Project characteristics assumed herein are based on information provided in the Draft Environmental Impact Statement (DEIS) for the DLNR Industrial and Business Park.¹¹ Major uses that would generate economic and fiscal impacts for the County and State include:

¹⁰ Count excludes the DOPAW Baseyard site that DLNR would retain and may include some lots planned as roads.

¹¹ Munekeyo Hiraga, “Economic and Fiscal Impact Assessment Report: DLNR Industrial and Business Park,” May 2018 (presented as Appendix N to the DEIS and referred to herein as “Munekeyo”). Impacts shown herein differ from those presented in Munekeyo due to different reporting periods, project groupings and other analytical approaches. Therefore, the impacts attributed to the DLNR Industrial and Business Park may appear to differ from those reported by Munekeyo but are presented herein in a format consistent with the other assessments.

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- **DOFAW Baseyard** (20 acres) – This site will allow DLNR’s Division of Forestry and Wildlife (DOFAW) to relocate and grow its Maui administrative and baseyard functions from its existing 3-acre site in Wailuku, Maui.
- **Light industrial** (139 acres) – Light industrial uses are the main commercial focus of the DLNR Industrial and Business Park and are envisioned to cater to users that have been priced out of the Kahului area.
- **Commercial** (68 acres) – Complementary development by commercial lessees is also anticipated, with expected focus on the businesses and employees of the rest of the DLNR Industrial and Business Park.

PSD MRPSC

DAGS and PSD have previously identified some 40 to 45 acres of State lands as the preferred site for the Maui Regional Public Safety Complex (MRPSC). In this study, analysis of the MRPSC is not location-dependent; the analyses herein simply assume that the selected site is in Pūlehuui and that the MRPSC will utilize the regional infrastructure described under the proposed action. The MRPSC is intended to provide a safe and secure environment for the care and custody of adult offenders originating from the Second Circuit Court, which serves Maui, Molokaʻi and Lānaʻi; it is intended to later add other related programs. The MRPSC would replace an existing smaller facility in Wailuku and is planned in two phases: the first will accommodate a detainee and inmate population of 608 men and women, while the second will expand capacity to 843 detainees and inmates.

The analyses presented in this report show the MRPSC site at 40 acres and certain analyses focus on its Phase 1, since detailed plans, budgets and schedules for the implementation of Phase 2 were not available at the time of this assessment. Should Phase 2 be implemented within the reporting timeframe, it could increase the net economic and fiscal benefits depicted for Maui County and the State compared to what is reported herein.

PROJECT COSTS

The Pūlehuui Projects are expected to generate some \$2.34 billion in development expenditures in the State, of which the Proposed Action would account for about \$1.03 billion, and the Other Area Projects \$1.32 billion. In total, these expenditures are expected to average \$141.6 million per year between 2020 and 2028, and \$106.9 million per year between 2029 and 2038.

Most development costs are for construction, representing “hard costs” such as labor and materials. While about 80% of direct construction labor is anticipated to come from within the County, materials are typically purchased from off-island and/or out-of-State. Additionally, development budgets cover design, engineering,

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legal and other professional services, as well as permitting, insurance, administrative and office costs, etc. Substantial shares of these professional services and “other” budgets can be expected to be expended outside of Maui County.

Table 4: Order of Magnitude Development Costs
(2018 dollars)

| | Total | Average annual, 2020-2028 | Average annual, 2029-2038 |
|-----------------------------------|--------------------------|---------------------------|---------------------------|
| PROPOSED ACTION: | | | |
| Regional Infrastructure | \$97.5 million | \$8.4 million | \$2.2 million |
| Pūlehuui South (DHHL) | \$293.9 million | \$9.4 million | \$20.9 million |
| Pūlehuui North (DHHL) | \$636.1 million | \$42.0 million | \$25.8 million |
| Subtotal | \$1,027.5 million | \$59.8 million | \$49.0 million |
| OTHER AREA PROJECTS: | | | |
| DLNR Industrial and Business Park | \$1,054.7 million | \$52.8 million | \$58.0 million |
| PSD - MRPSC | \$261.6 million | \$29.1 million | \$0.0 million |
| Subtotal | \$1,316.3 million | \$81.8 million | \$58.0 million |
| CUMULATIVE | \$2,343.8 million | \$141.6 million | \$106.9 million |

Source: DHHL, 2018; DLNR, 2018; PSD, 2018. See Exhibits 2-3 and 2-4 for further detail.

Altogether, about 58% or \$599.7 million of the Proposed Action development expenditures are anticipated to be realized in Maui County, while the balance could benefit other counties of the State, particularly the City and County of Honolulu.

3 – PROJECTED IMPACTS

OVERVIEW

The Pūlehuunui Regional Infrastructure Master Plan will generate substantial employment and fiscal benefits during its development and operations. Findings are presented for the Proposed Action and the Pūlehuunui Projects as a whole (Cumulative impacts), with impacts summarized here as total (direct, indirect and induced) impacts. Detail is also shown to identify the share of each variable anticipated to be realized in Maui County, in comparison to the overall statewide impact. For details of impacts by development element, the reader is referred to the exhibits noted below each table. More information on the current study methodology and definition of key terms such as “direct”, “indirect” and “induced” impacts, are provided in Chapter 4.

The analyses undertaken herein reflect economic multipliers and coefficients derived from the State of Hawaii, Department of Business, Economic Development and Tourism (DBEDT), “The Hawaii State Input-Output Study: 2012 Benchmark Report,” March 2016, and DBEDT’s “The 2012 Hawaii Inter-County Input-Output Study,” May 2016 (collectively herein, DBEDT 2016).

EMPLOYMENT

The Pūlehuunui Projects will generate new employment through direct, indirect and induced economic impacts. The employment opportunities are segregated into those temporary positions that would originate from the Projects’ development, and those permanent positions that would be supported by their operations.

Development-Related

During its buildout, the Proposed Action is estimated to generate some 490 to 600 full-time equivalent (FTE)¹ jobs annually statewide, including positions supported directly and indirectly by its initial development expenditures. About 65% of these jobs are expected to be located on Maui, representing about 320 to 390 FTE jobs in an average year between 2020 and 2038.

Table 5: Average Annual FTE Development Employment

| | 2020-2028 | 2029-2038 | Ongoing |
|----------------------------|-----------|-----------|---------|
| PROPOSED ACTION: | | | |
| Maui County | 390 | 320 | 0 |
| State | 600 | 490 | 0 |
| CUMULATIVE IMPACTS: | | | |
| Maui County | 910 | 700 | 0 |
| State | 1,400 | 1,070 | 0 |

Source: PBR HAWAII, 2018. See also Exhibit 3-4.

Operations-Related

The employment impacts of a real estate development are often thought of as those that occur at its new facilities. While this is important, and many such on-site jobs will be new, others may be jobs that would have existed, or that previously existed, elsewhere in the County and/or State. Therefore, assessment of the Pūlehuunui Projects’ operations-related employment impacts is presented two ways: first, in terms of on-site employment, and secondly, as net new employment.

By definition, on-site operating employment will be located in Maui County. On the other hand, the net new employment impact is considered in terms of those that can be expected to be located anywhere in the County and the total impacts statewide.

By buildout in 2038, the Proposed Action is expected to support some 3,070 FTE jobs on-site, but to have created some 4,300 FTE positions statewide. Of this statewide total, about 83%, or 3,600 positions are estimated to have been created in Maui County. These “net new” jobs include technical, managerial and staff positions at the various Pūlehuunui Projects themselves, and many other positions in myriad industries that can be expected to be generated throughout the economy via indirect and induced economic factors.

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| Table 6: Average Annual FTE Operational Employment | | | |
|--|-------|--------|---------|
| | 2028 | 2038 | Ongoing |
| PROPOSED ACTION: | | | |
| On-site (all Maui County) | 1,520 | 3,070 | 3,070 |
| Net new employment: | | | |
| Maui County | 1,700 | 3,600 | 3,600 |
| State | 2,100 | 4,300 | 4,300 |
| CUMULATIVE IMPACTS: | | | |
| On-site (all Maui County) | 3,830 | 8,800 | 8,800 |
| Net new employment: | | | |
| Maui County | 4,000 | 9,400 | 9,400 |
| State | 4,800 | 11,400 | 11,400 |

Source: PBR HAWAII, 2018. See also Exhibits 3-7 and 3-8.

EARNINGS

Evaluation of personal earnings is based on the County-wide net new jobs. This study defines earnings in alignment with the framework of the DBEDT 2016 models: earnings include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance. As used herein, earnings exclude gratuities and bonuses that may also apply to certain types of work.

Development-Related

Development-related positions attributable to the Proposed Action are expected to support total earnings of some \$33 million to \$40 million in a typical year, statewide, during the Projects' design and construction. These earnings average about \$67,000 per FTE job, including direct construction-related jobs as well as the indirect and induced opportunities created throughout the local economy. The many jobs created directly by the development are expected to enjoy higher salaries than this overall average, in the range of about \$86,000 to \$87,000 FTE.

According to DBEDT 2016, about 65% of earnings can be expected to be realized in Maui County. This would represent about \$21 million to \$26 million in annual personal earnings deriving from the Proposed Action.

Including the Other Area Projects, the Cumulative statewide impact on personal earnings is projected to amount to some \$72 million to \$95 million per year.

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| Table 7: Average Annual Personal Earnings Attributable to Development Employment (2018 dollars) | | | |
|---|-----------------|-----------------|-------------|
| | 2020-2028 | 2029-2038 | Ongoing |
| PROPOSED ACTION: | | | |
| Maui County | \$26.0 million | \$21.3 million | \$0 million |
| State | \$40.2 million | \$33.0 million | \$0 million |
| <i>Average per FTE job (State)</i> | <i>\$67,000</i> | <i>\$67,000</i> | <i>N/A</i> |
| CUMULATIVE IMPACTS: | | | |
| Maui County | \$61.4 million | \$46.7 million | \$0 million |
| State | \$95.1 million | \$72.3 million | \$0 million |
| <i>Average per FTE job (State)</i> | <i>\$69,000</i> | <i>\$68,000</i> | <i>N/A</i> |

Source: PBR HAWAII, 2018. See also Exhibit 3-6.

Operations-Related

Statewide, total net new personal earnings for Hawai'i residents are projected at nearly \$198 million per year for the Proposed Action. On average, these net new FTE positions are expected to earn about \$46,000 to \$47,000 each.

| Table 8: Average Annual Personal Earnings Attributable to Operational Employment (2018 dollars) | | | |
|---|-----------------|-----------------|-----------------|
| | 2028 | 2038 | Ongoing |
| PROPOSED ACTION: | | | |
| Maui County | \$79.8 million | \$160.1 million | \$159.7 million |
| State | \$98.7 million | \$198.0 million | \$197.6 million |
| <i>Average per FTE job (State)</i> | <i>\$47,000</i> | <i>\$46,000</i> | <i>\$46,000</i> |
| CUMULATIVE IMPACTS: | | | |
| Maui County | \$184.6 million | \$445.2 million | \$444.9 million |
| State | \$228.3 million | \$550.7 million | \$550.2 million |
| <i>Average per FTE job (State)</i> | <i>\$48,000</i> | <i>\$48,000</i> | <i>\$48,000</i> |

Source: PBR HAWAII, 2018. See also Exhibit 3-9 and 3-10.

Maui residents are anticipated to realize about 81% of the statewide total annual earnings supported by the Proposed Action, or nearly \$160 million per year by 2038 and annually thereafter.

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By 2038, including the Other Area Projects, total operational employment earnings could represent over \$550 million per year in Cumulative impacts statewide.

POPULATION

Resident population movements may be driven by the Pūlehuunui Projects' employment opportunities as well as the new residential opportunities at the planned agricultural homesteads. In-migrant employee impacts are assessed for the Projects' direct employment impacts only. Those housed at the MRPSC are not considered to impact County or State population as they are assumed to have been established residents of the County, or already housed at the existing jail facility.

In addition to these resident impacts, the possible hotel uses at Pūlehuunui North can be expected to have a de facto population impact, meaning persons present in the County or State on any given day.

Population impacts are of interest in themselves, and are also evaluated because additional persons would be expected to require additional State and County resources and services, and the costs of those operations are the subject of analysis in the fiscal impacts section.

Employment Influences

Employment opportunities created by the Pūlehuunui Projects could encourage some out-of-State residents, including former Hawai'i residents, to move to Maui. Others may commute to Maui from another island on a daily or longer-term basis. Based on recent construction and development management experiences, an average of 10 percent of the development labor force is expected to be filled by persons who commute from, or move from another County. A smaller share of this out-of-County group, about 3 percent of the development workforce, can be expected to have moved from out-of-State because of a development-related employment opportunity created by the Pūlehuunui Projects.

With respect to operations-related positions, it is assumed that about 8 percent of positions will be filled by persons moving from another county, while those moving from out-of-State because of ongoing work opportunities at Pūlehuunui Projects are estimated at 5 percent, representing a sub-set of the inter-County movers.

Some of these relocated persons could also bring dependent(s) with them.

Homestead Influences

Pūlehuunui South is planned to include 100 agricultural homestead lots. While DHHL has observed that home development in its agricultural homestead communities is very slow, so as not to underestimate potential population impacts, it is assumed

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that all 100 potential lots are improved with homes by 2038, and that up to 60 percent of these households move from another County because of this homestead opportunity. Additionally, it is assumed that the homes are occupied as primary residences with a household size that reflects an average for recent DHHL applicants, or about 3.8 persons.¹²

Resident Population Impacts

During development, the Proposed Action could be associated with up to 490 persons who may have relocated to Maui County from another County. Within that group, a subset of some 220 could be persons who relocated from another state. These population impacts are expected to decline after 2038, as the impact of the temporary initial development employment diminishes.

Considering the Pūlehuunui Projects as a whole, the Cumulative resident population impacts could represent up to 1,470 new persons in the County, of whom 530 might also be new to the State, with declines after 2038, when initial construction is complete.

Table 9: In-Migrant Resident Population

| | 2028 | 2038 | Ongoing |
|----------------------------|------|-------|---------|
| PROPOSED ACTION: | | | |
| To Maui County | 200 | 490 | 470 |
| To the State | 100 | 220 | 220 |
| CUMULATIVE IMPACTS: | | | |
| To Maui County | 590 | 1,470 | 1,420 |
| To the State | 230 | 530 | 520 |

Source: PBR HAWAII, 2018. See also Exhibit 4-1.

Visitor Population Impacts

Considering a 200-room potential hotel at Pūlehuunui North and recent operating ratios for comparison properties, the Pūlehuunui Projects could also accommodate some 340 guests on an average day. Such persons would contribute to de facto population, representing persons present in the County or State on any given day, and therefore consuming resources and services.

About 10 percent of these visitors are estimated to be kama'āina, and while therefore their presence on Maui represents a de facto population impact for the County, it would not represent any impact to the State.

¹² SMS, DHHL Beneficiaries Study Applicant Report, 2014¹, February 2015. The average number of household members expected to move with applicants should an award be received was reported at 3.78 persons.

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FISCAL IMPACTS

The Pūlehuunui Projects include many elements that will directly serve or benefit important missions of the State agencies considered, in both qualitative and financial terms. However, this section focuses only on the fiscal impacts of the Project elements, in terms of their generation of new revenues and expenses for County and State governments.

County

The County's main source of revenue is real property taxes. The Pūlehuunui Projects will generate substantial additional County real property taxes that are expected to exceed the associated County operating expenditures throughout their development and operations.

- **Proposed Action** - Net additional County operating revenues for the Proposed Action is estimated at \$2.3 million per year by buildout in 2038, with new revenues representing twice the estimated new County government expenditures.
- **Cumulative impacts** - The County's Cumulative return from all Pūlehuunui Projects is estimated at more than \$8 million per year by the time of buildout. The anticipated additional County revenues are expected to represent three to four times the additional operating expenses that may result from the Pūlehuunui Projects' development.

State

With the State government's more diverse taxing powers, the Pūlehuunui Projects' fiscal impacts are expected to be even more significant than the County's, in both relative and absolute terms.

- **Proposed Action** – Towards 2038, when development activity and operations are both still active, the State's net additional operating revenues attributable to the Proposed Action are estimated at over \$12 million per year, with a revenue to expenditure ratio of about eight.
- After completion of the initial buildout, net additional State revenues are anticipated to continue at about \$9 million per year, with ongoing new revenues amounting to about six times new expenditures.

- **Cumulative impacts** - Considering all Pūlehuunui Projects combined, the State is anticipated to realize more than \$31 million per year, in 2018 dollars by around 2038. Net additional ongoing revenues thereafter could be on the

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order of \$27 million per year. In terms of the ratio of additional State operating revenues to expenditures, the Cumulative Projects are expected to show ratios ranging from about 8:1 to 12:1.

Summary

The total (including direct, indirect and induced) fiscal impacts of the Pūlehuunui Regional Infrastructure Master Plan are summarized as follows:

| Table 10: Estimated Total Fiscal Impacts (2018 dollars) | | | |
|---|----------------|----------------|------------------------------------|
| | 2028 | 2038 | Ongoing (stabilized annual) |
| PROPOSED ACTION: | | | |
| Net additional revenues (\$mil) | | | |
| To the County | \$1.3 million | \$2.3 million | \$2.3 million |
| To the State | \$9.5 million | \$12.6 million | \$9.0 million |
| Net revenue/expenditure ratio | | | |
| For the County | 2 | 2 | 2 |
| For the State | 11 | 8 | 6 |
| CUMULATIVE IMPACTS: | | | |
| Net additional revenues (\$mil) | | | |
| To the County | \$5.1 million | \$8.0 million | \$8.1 million |
| To the State | \$20.8 million | \$31.5 million | \$26.7 million |
| Net revenue/expenditure ratio | | | |
| For the County | 4 | 3 | 3 |
| For the State | 12 | 9 | 8 |

Source: PBR HAWAII, 2018. See also Exhibit 5-7.

In addition to the government revenue and cost impacts quantified above, the Pūlehuunui Regional Infrastructure Master Plan will result in the implementation of several needed regional infrastructure projects that will benefit government as well Hawai'i residents, as described in Chapter 2 and in the accompanying EIS.

4 – STUDY CONDITIONS AND TERMINOLOGY

Special considerations on which the preceding results rely are presented in this chapter. For a more complete understanding of the study analyses, the reader may refer to the exhibits in the next section of this report, and the notes that accompany each exhibit.

LAND TENURE

The lands considered herein are owned by State entities. The various improvements described on these lands are understood to be undertaken by government entities, or to be developed by private or non-governmental organizations (NGOs) pursuant to long-term ground leases from the respective State entities.

ANALYTICAL CONSIDERATIONS

Use and Classification of Residential Units

The agricultural homesteads at Pūlehuunui South are expected to attract some who previously lived outside of the County or even out-of-State, as discussed in the previous chapter. For purposes of evaluating economic and fiscal impacts, those who are new to Maui Island are distinguished from those who are already established island residents.

- New County or State residents residing at Pūlehuunui South may bring new investments, earnings and expenditures to the County and/or State. Conversely, they will also require additional government resources and services, such as related to their use of public schools, parks, wastewater systems and roads.
- Previously established County residents who may move to Pūlehuunui South are assumed to live somewhere in the County whether or not the agricultural homesteads are offered. Thus, while they may increase population at Pūlehuunui South itself, from the County and State's standpoint, their presence is not a new impact.

Commercial Impacts

The Pūlehuunui Projects' commercial facilities are expected to attract spending from Pūlehuunui Projects' residents and visitors. However, it is likely that Maui residents and visitors would have spent an equivalent amount on dining out and/or personal services whether or not the Pūlehuunui Projects' commercial facilities were developed. Given a competitive market on the island, in some cases the planned

facilities could represent a geographic reallocation of spending among areas. Therefore, new spending attributable to the Pūlehuunui Projects is seen as a function only of those new visitors and residents that the Pūlehuunui Projects attract to the County or State.

In other words, on-site facilities will employ workers, pay taxes and generate other economic and fiscal benefits. These are valid impacts and most of these jobs would be located on-site. However, the net benefits of the Pūlehuunui Regional Infrastructure Master Plan are best measured in terms of the spending by new residents and visitors that the Pūlehuunui Projects attract to the island, and the taxes and other benefits these persons will generate throughout the County and State. Many of these spending impacts are likely to be felt off-site, benefitting enterprises and establishments throughout the County and State.

Government Expenditures

County and State expenditures as estimated herein are based on the structure of tax collections and services for the fiscal year ending June 30, 2017 (FY2017), with adjustment to 2018 dollars. Cost information is obtained from the Comprehensive Annual Financial Reports of the respective jurisdictions. The impacts estimated herein would differ if County and/or State governmental taxing and spending policies were to be materially altered.

Government Revenues

Government revenues are largely derived from the same sources noted for expenditures. County real property tax revenues are based on rates that were in effect during the fiscal year ending June 30, 2018. State income tax revenues are based on 2017 rates¹³, as applicable to married taxpayers filing jointly, in income brackets relevant to the employment opportunities created.

Tax structures related to the State's Transient Accommodations Tax (TAT) and General Excise Tax (GET) that were altered by the summer 2017 State Legislature's Special Session have been incorporated into the analyses.

¹³ The State's 2018 tax tables were not available as of time of drafting this report, therefore 2017 rates were used as a provisional estimate, with the understanding that the State may enact certain changes in 2018 tables to reflect changes in the December 2017 Federal tax law changes.

DEFINITION OF KEY TERMINOLOGY

Consistent with established input-output economic theory, the following definitions apply to types of impacts:

- **Direct impacts** - Those economic, population or other impacts attributable to persons or activities that are a direct result of the proposed development. For instance, direct employment impacts are expected to include those involved in building the proposed facilities, such as construction workers, and those who would later work at them in their operations.

Many, but not all direct impacts can be expected to occur on-site. For instance, a portion of the construction budget is for architects and engineers. While such persons' employment might be temporarily dependent on contracts related to the Pūlehuunui Projects, most such professionals would be expected to work from offices located off-site, such as in downtown Wailuku or Honolulu. Likewise, administrative and managerial staff located off-site would support construction professionals working on-site.

- **Indirect impacts** - Indirect impacts occur when the businesses or persons who are directly affected make expenditures for additional supplies or services. For instance, some of the additional retail spending by visitors or residents attracted to the County or State by the Pūlehuunui Projects could be spent on eating out. These elevated dining expenditures could indirectly increase demand for produce, seafood and meats from Hawai'i farms, fishermen and/or ranching enterprises. The Pūlehuunui Projects would have thus indirectly supported new business opportunities for area providers of such goods and services.

- **Induced impacts** - Induced impacts occur throughout the community when those persons or companies that have benefited from the direct or indirect impacts of the Pūlehuunui Projects spend their associated earnings on consumer goods and services. For instance, a construction worker may spend her earned wages to buy a new pair of shoes, or to pay for her child's day care. The farmer who sells produce to a restaurant at Pūlehuunui North may use some of his profit to take his family out to the movies. The businesses and individuals impacted by such re-spending are said to enjoy induced economic impacts from the Pūlehuunui Projects.

- **Total impacts** - Total impacts are defined as the sum of direct, indirect and induced impacts for any given variable.

- **Resident population** - Resident population refers to all those persons who habitually reside in a given area, whether or not they are temporarily away.

- **De facto population** - De facto population includes all those present in the County or State on any given day. It differs from resident population by subtracting those residents who are temporarily away and adding those visitors who are temporarily present.
- **Full-time equivalent** - This study measures employment opportunities in full-time equivalent (FTE) units. One full-time equivalent position is defined herein as 2,080 hours of employment per year, including paid vacation and sick leave. This is equivalent to 40 hours per week and may also be referred to as a "person-year" of employment. Two half-time jobs would be considered to together represent one FTE job.
- **Earnings** - This study employs the definition of earnings that corresponds to the DBEDT 2016 models, which includes wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance. Earnings as so defined exclude gratuities and bonuses that may also apply to certain types of work.

REPORT CONDITIONS

Assumptions regarding the scale, nature and timing of the Pūlehuunui Projects are made to assess its economic and fiscal impacts. This study relies on physical parameters, layouts, timelines, budgets, development and operating plans and other inputs provided by the various landowners, their consultants, and other sources as noted.

This assessment also incorporates information provided by government agencies, developers, brokers, landowners, and other sources as cited in the exhibits. While attempts have been made to verify such information via multiple sources, it is not always possible to do so. PBR HAWAII cannot guarantee the accuracy of all information upon which its assessments may be based.

This report has been prepared for the planning purposes of DHHL, DLNR, PSD, DAGS and their consultant teams, as well as for public disclosure of the nature of the Pūlehuunui Regional Infrastructure Master Plan. It is not intended to be used for any solicitation of investment.

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Pūlehunui Regional Infrastructure Master Plan ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 1-1 Summary of Economic and Fiscal Impacts - Proposed Action, Statewide 2018 dollars

| | Comment | 2028 | 2038 | Ongoing |
|--|--|----------|----------|----------|
| Development costs | <i>In millions</i> | \$537.8 | \$489.7 | \$0.0 |
| Average annual FTE employment:¹ | Direct, indirect and induced (except on-site) | | | |
| Development-related | | 600 | 490 | 0 |
| Operations-related | <i>Generated at Project facilities (direct impacts only)</i> | 1,520 | 3,070 | 3,070 |
| On-site | <i>New to State</i> | 2,100 | 4,300 | 4,300 |
| Net new jobs in State | | | | |
| Total personal earnings per year:² | Direct, indirect and induced (millions) | | | |
| Development-related | <i>Average annual</i> | \$40.2 | \$33.0 | \$0.0 |
| Operations-related | <i>For net new jobs only</i> | \$98.7 | \$198.0 | \$197.6 |
| Average earnings per FTE job:² | Direct, indirect and induced (not in millions) | | | |
| Development-related | <i>Average annual</i> | \$67,000 | \$67,000 | n/a |
| Operations-related | <i>For net new jobs only</i> | \$47,000 | \$46,000 | \$46,000 |
| In-migrant resident population: | Average daily employees, dependents, and new island residents | | | |
| To the County | | 200 | 490 | 470 |
| To the State | | 100 | 220 | 220 |
| Fiscal impacts: | New revenues less expenditures | | | |
| For the County | | \$1.3 | \$2.3 | \$2.3 |
| For the State | | \$9.5 | \$12.6 | \$9.0 |
| Revenue/expenditure ratio: | | | | |
| For the County | | 2 | 2 | 2 |
| For the State | | 11 | 8 | 6 |

1 FTE = Full-time equivalent, defined as 40 hours per week or 2,080 hours per year.

2 Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance.

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Exhibit 1-2
Summary of Economic and Fiscal Impacts -
Cumulative, Statewide
2018 dollars

| | 2028 | 2038 | Ongoing |
|--|-----------|-----------|----------|
| Development costs | \$1,274.4 | \$1,069.4 | \$0.0 |
| Average annual FTE employment:¹ | | | |
| Development-related | 1,400 | 1,070 | 0 |
| Operations-related | | | |
| On-site | 3,830 | 8,800 | 8,800 |
| Net new jobs in State | 4,800 | 11,400 | 11,400 |
| Total personal earnings per year:² | | | |
| Development-related | \$95.1 | \$72.3 | \$0.0 |
| Operations-related | \$228.3 | \$550.7 | \$550.2 |
| Average earnings per FTE job:² | | | |
| Development-related | \$68,000 | \$68,000 | n/a |
| Operations-related | \$48,000 | \$48,000 | \$48,000 |
| In-migrant resident population: | | | |
| To the County | 590 | 1,470 | 1,420 |
| To the State | 230 | 530 | 520 |
| Fiscal impacts: | | | |
| Net additional revenues: | | | |
| For the County | \$5.1 | \$8.0 | \$8.1 |
| For the State | \$20.8 | \$31.5 | \$26.7 |
| Revenue/expenditure ratio: | | | |
| For the County | 4 | 3 | 3 |
| For the State | 12 | 9 | 8 |

1 FTE = Full-time equivalent, defined as 40 hours per week or 2,080 hours per year.
2 Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance.

Exhibit 2-1
Project Concepts and Potential Development Timing

| Highlights of period: | Notes & assumptions | | | |
|--|---------------------------|---------------|-----------|--|
| | 2020-2028 | 2029-2038 | 2039-2048 | At buildout |
| Regional Infrastructure (development): | Start 2019 | Finish 2032 | | |
| DHHL - Pūlehuui N. (leasing & buildout): | Start 2021 | Buildout 2026 | | |
| DHHL - Pūlehuui S. (leasing & buildout): | Start 2021 | Buildout 2026 | | |
| DLNR - Industrial Land Business Park (leasing & buildout): | Start 2024 | Buildout 2028 | | |
| PSD - MRPSC Phase 1 (development): | 2022-2023 | | | Stability defined as 85% of lots leased (2033) |
| PROPOSED ACTION: | | | | |
| Regional Infrastructure - | | | | |
| Water system (Alt. 1) | 2019-2022 | | | |
| Wastewater system (Alt. 2A) | 2019-2025 | | | |
| Road improvements | 2023-2028 | 2029-2032 | | |
| DHHL projects - | | | | |
| Pūlehuui South | 646 Total acres | | | |
| Recreation space & other | 79 Acres | 59 | 20 | 79 |
| Agricultural homesteads | | | | |
| Leases awarded | 238 Acres | 30 | 70 | 100 |
| Homes completed ¹ | 100% of lots at buildout | 15 | 85 | 100 |
| General agriculture | 146 Acres | 146 | - | 146 |
| Commercial enterprises | | | | |
| Land areas put in service | 70 Acres | 28 | 42 | 70 |
| Building improvements | 0.10 FAR | 60,000 | 240,000 | 300,000 |
| Gross leasable SF | | | | |
| Education | | | | |
| Land areas put in service | 33 Acres | 7 | 26 | 33 |
| Building improvements | 0.10 FAR | 10,000 | 130,000 | 140,000 |
| Community facilities | | | | |
| Land areas put in service | 80 Acres | 24 | 56 | 80 |
| Building improvements | 0.01 FAR | 10,000 | 30,000 | 40,000 |
| Pūlehuui North | | | | |
| Roads, open space & other | 184 Total acres | | | |
| Cultural center/visitor attraction | 43 Acres | 32 | 11 | 43 |
| Hotel | 40 Acres | 40 | 0 | 40 |
| Light industrial | 5 Acres | 200 | 0 | 200 |
| Land areas developed | 80 Acres | 56 | 24 | 80 |
| Land areas put in service | 85% of area, first period | 48 | 32 | 80 |
| Building improvements | 0.38 FAR | 630,000 | 690,000 | 1,320,000 |
| Commercial | | | | |
| Land areas developed | 16 Acres | 11 | 5 | 16 |
| Land areas put in service | 85% of area, first period | 10 | 6 | 16 |
| Building improvements | 0.38 FAR | 130,000 | 130,000 | 260,000 |
| Gross leasable SF | | | | |
| OTHER AREA PROJECTS: | | | | |
| DLNR Industrial and Business Park | | | | |
| Roads and open space | 280 Total acres | | | |
| DOPAW Baseyard | 53 Acres | 37 | 16 | 53 |
| Light industrial ² | 20 Acres | 20 | - | 20 |
| Commercial ² | 139 Acres | 49 | 90 | 139 |
| Building improvements ³ | 68 Acres | 24 | 44 | 68 |
| Gross leasable SF | 0.36 FAR | 690,000 | 2,994,000 | 3,594,000 |
| PSD - Maui Regional Public Safety Complex (MRPSC)⁴ | | | | |
| Land areas developed | 40 Total acres | 40 | 0 | 40 |

Note: Regional infrastructure is intended to serve potential new developments at the Maui Raceway Park and other DLNR lands in the Project Area, as well as those projects identified. However, no development plans are currently available for the Raceway Park and other DLNR lands at this time.
1 Maximum housing production at full buildout. DHHL experience suggests fewer homes likely to be built over the time period.
2 Between 79 and 81 leasable lots of 0.4 to 0.9 acres each planned for industrial and commercial use.
3 Represents 0.08 FAR at DOPAW Baseyard and 0.38 at commercial and industrial areas, based on estimated 75,000 at DOPAW Baseyard, 2.36 million square feet of light industrial, and 1.9 million square feet of commercial building area, as reported by Manuwa Frigida, 2016.
4 Represents 0.36 FAR at the proposed 100,000 sq ft office space existing at the Waialeale facility, with accommodations for 600 (Phase 1) to 943 (potential Phase 2) inmates or detainees on a 40 to 45-acre site. Analysis addresses Phase 1 only.

Pūhuhui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 2-2
Cumulative Development by Benchmark Dates

| PROPOSED ACTION: | Reporting unit | | Ongoing |
|--|---|---|---|
| | 2028 | 2038 | |
| Regional infrastructure - Water system (Alt. 1) Road improvements | Complete Complete Underway | Complete | |
| DHHL projects - Pūhuhui South | | | |
| Roads, open space & other Agricultural homesteads Leases awarded Homes completed ¹ General agriculture Commercial enterprises Land areas put in service Building improvements | 59 30 15 146 28 60,000 | 79 100 100 146 70 300,000 | 79 100 100 146 70 300,000 |
| Education Land areas put in service Building improvements Community facilities Land areas put in service Building improvements | 7 10,000 24 10,000 | 33 140,000 80 40,000 | 33 140,000 80 40,000 |
| Pūhuhui North | | | |
| Roads, open space & other Regional center/visitor attraction Hotel Light industrial Land areas developed Land areas put in service Building improvements Commercial Land areas developed Land areas put in service Building improvements | 32 40 200 56 48 630,000 11 130,000 | 43 40 200 80 80 1,320,000 16 260,000 | 43 40 200 80 80 1,320,000 16 260,000 |
| OTHER AREA PROJECTS: DLNR Industrial and Bus. Park - Roads and open space DOFAW Baseyard Light industrial² Commercial³ Building improvements³ | | | |
| | 37 20 49 24 690,000 | 53 20 139 68 3,594,000 | 53 20 139 68 3,594,000 |
| PSD - MRPSC⁴ | 40 | 40 | 40 |

1. Maximum housing production at full buildout. DHHL experience suggests fewer homes likely to be built over the time period.
2. Between 79 and 81 leasable lots of 0.4 to 5.9 acres each planned for industrial and commercial use.
3. Represents 0.06 FAR at DOFAW Baseyard and 0.39 at commercial and industrial areas, based on estimated 75,000 at DOFAW Baseyard, 2.36 million square feet of light industrial, and 1.15 million square feet of commercial building areas, as reported by Muneayo Hiraga, 2018.
4. New facility proposed to replace existing Waialuku facility, with accommodations for 608 (Phase 1) to 843 (with a potential Phase 2) inmates or detainees on a 40 to 45 acre site.

Pūhuhui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 2-3
Estimated Development Costs - Total for Each Period
2018 dollars, in millions

| PROPOSED ACTION: | Basis/reference | 2020-2028 | 2029-2038 | Total |
|---|---|---|---|---|
| | | Professional services - Regional infrastructure DHHL lands - Pūhuhui South Pūhuhui North Subtotal, Professional Services | Architectural, engineering, construction management, legal & consultants | \$6.0 \$3.4 \$19.8 \$29.2 |
| Construction - Regional infrastructure DHHL lands - Pūhuhui South Pūhuhui North Subtotal, Construction | Hard costs: infrastructure, land, building construction Excludes agricultural land preparation and buildings | \$64.2 \$77.6 \$340.7 \$482.6 | \$18.7 \$189.6 \$227.0 \$435.9 | \$82.9 \$267.3 \$568.3 \$918.5 |
| Other Regional infrastructure DHHL lands - Pūhuhui South Pūhuhui North Subtotal, Other | Soft costs: Hawaii office, fees & permits, insurance, marketing, etc. | \$5.3 \$3.4 \$17.4 \$26.1 | \$1.5 \$9.9 \$14.3 \$25.8 | \$6.8 \$13.3 \$31.7 \$51.8 |
| Total, Direct Projects | | \$537.8 | \$489.7 | \$1,027.5 |
| OTHER AREA PROJECTS: DLNR Industrial and Bus. Park - PSD - MRPSC | Same as above | \$39.6 \$4.9 \$44.5 | \$56.5 \$0.0 \$56.5 | \$96.1 \$4.9 \$101.0 |
| Construction - DLNR Industrial and Bus. Park - PSD - MRPSC Subtotal, Construction | Same as above | \$404.0 \$217.2 \$621.2 | \$478.4 \$0.0 \$478.4 | \$882.4 \$217.2 \$1,099.6 |
| Other DLNR Industrial and Bus. Park - PSD - MRPSC Subtotal, Other | Same as above | \$31.4 \$39.6 \$71.0 | \$44.8 \$0.0 \$44.8 | \$76.2 \$39.6 \$115.8 |
| Total, Other Area Projects | | \$736.6 | \$579.7 | \$1,316.3 |

| SUMMARY | | | |
|--------------------|---|-------------------------|-----------|
| Proposed Action: | Regional infrastructure and projects on DHHL land | Total development costs | |
| Mau County | \$313.9 | \$285.8 | \$599.7 |
| State | \$537.8 | \$489.7 | \$1,027.5 |
| Cumulative: | | | |
| Mau County | \$745.9 | \$624.2 | \$1,369.1 |
| State | \$1,274.4 | \$1,069.4 | \$2,343.8 |

Sources: Department of Hawaiian Home Lands, 2018; Muneayo Hiraga, "Economic and Fiscal Impact Assessment Report: DLNR Industrial & Business Park," May 2018, 2018;
Fukuda Valuation & Consulting LLC, "Feasibility Analysis for the Proposed DLNR Industrial and Business Park," February 21, 2018; State of Hawaii, Department of Public Safety (PSD), 2018.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 2-4

Estimated Development Costs - Average Annual in Period
2018 dollars, in millions

| | 2020-2028 | 2029-2038 |
|---|---------------|---------------|
| PROPOSED ACTION: | | |
| Professional services - | | |
| Regional Infrastructure | \$0.7 | \$0.2 |
| DHHL Pūlehuui South | \$0.4 | \$1.0 |
| DHHL Pūlehuui North | \$2.2 | \$1.6 |
| Subtotal, Professional Services | \$3.2 | \$2.8 |
| Construction - | | |
| Regional Infrastructure | \$7.1 | \$1.9 |
| DHHL Pūlehuui South | \$6.6 | \$19.0 |
| DHHL Pūlehuui North | \$37.9 | \$22.8 |
| Subtotal, Construction | \$51.6 | \$43.6 |
| Other - | | |
| Regional Infrastructure | \$0.6 | \$0.2 |
| DHHL Pūlehuui South | \$0.4 | \$1.0 |
| DHHL Pūlehuui North | \$1.9 | \$1.4 |
| Subtotal, Other | \$2.9 | \$2.6 |
| Total, Direct Projects | \$56.8 | \$49.0 |
| OTHER AREA PROJECTS: | | |
| <i>Exhibit 2-3, averaged within reporting periods</i> | | |
| Professional services - | | |
| DLNRI Industrial and Bus. Park - | \$4.4 | \$5.7 |
| PSD - MRPSC | \$0.5 | \$0.0 |
| Subtotal, Professional Services | \$4.9 | \$5.7 |
| Construction - | | |
| DLNRI Industrial and Bus. Park - | \$44.9 | \$47.8 |
| PSD - MRPSC | \$24.1 | \$0.0 |
| Subtotal, Construction | \$69.0 | \$47.8 |
| Other - | | |
| DLNRI Industrial and Bus. Park - | \$3.5 | \$4.5 |
| PSD - MRPSC | \$4.4 | \$0.0 |
| Subtotal, Other | \$7.9 | \$4.5 |
| Total, Other Area Projects | \$81.8 | \$56.0 |

| | Average annual development costs |
|-------------------------|----------------------------------|
| Proposed Action: | |
| Maui County | \$34.9 |
| State | \$59.8 |
| Cumulative: | |
| Maui County | \$92.7 |
| State | \$141.6 |

Note: For presentation purposes, total spending is averaged within each reporting period shown and does not reflect potential year-by-year experience of expenditures.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-1

Hotel Operations and Revenues
2018 dollars, in millions, except as noted

| | 2028 | 2038 | Ongoing |
|-------------------------------------|------------|------------|------------|
| PROPOSED ACTION: | | | |
| <i>Exhibit 2-2</i> | | | |
| Number of rooms | 200 | 200 | 200 |
| Unit occupancy assumptions - | | | |
| Annual occupancy | 70% | 77% | 77% |
| Average party size | 2.2 | 2.2 | 2.2 |
| Projected guest mix - | | | |
| <i>Presumed from other Counties</i> | | | |
| Hawaii residents | 10% | 10% | 10% |
| Out-of-state residents - | | | |
| US | 75% | 75% | 75% |
| International | 15% | 15% | 15% |
| Subtotal | 90% | 90% | 90% |
| Total | 100% | 100% | 100% |
| Average daily guests - | | | |
| Kamāhāna | 31 | 34 | 34 |
| Out-of-state residents | 231 | 254 | 254 |
| US | 50 | 55 | 55 |
| International | 310 | 340 | 340 |
| Total, rounded | 310 | 340 | 340 |
| Potential Hotel revenues, | | | |
| annual - | | | |
| Rooms | \$10.2 | \$11.2 | \$11.2 |
| Other (F&B, other) | \$1.8 | \$2.0 | \$2.0 |
| Total | \$12.0 | \$13.2 | \$13.2 |
| OTHER AREA PROJECTS: | | | |
| | N/A | N/A | N/A |

| | Regional Infrastructure and projects on DHHL land |
|--|---|
| SUMMARY | |
| Proposed Action: | |
| Maui County | 310 |
| State | \$12.0 |
| Cumulative: | |
| Maui County | \$280 |
| State | \$10.8 |
| Total new spending | \$11.9 |
| <i>Above plus DLNR and PSD project impacts</i> | |
| Proposed Action: | |
| Maui County | 310 |
| State | \$12.0 |
| Cumulative: | |
| Maui County | \$280 |
| State | \$10.8 |
| Total new spending | \$11.9 |
| <i>Above plus DLNR and PSD project impacts</i> | |

Sources: Department of Hawaiian Home Lands, 2018; State of Hawaii, Hawaii Tourism Authority, 2016 Annual Visitor Research Report; Ihd, Hawaii Hotels Performance, 2018.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-2
Average Annual New Visitor Expenditures
2018 dollars, in millions, except as noted

| PROPOSED ACTION: Expenditures in County - Kamāhāna spending New visitors Direct expenditures (hotel) Indirect & induced | Basis/reference (not in millions) | | 2028 | 2038 | Ongoing |
|--|---|--|-----------------------|------------------------|------------------------|
| | Exhibit 2-3 | | | | |
| | 16% of visitors shown in Exhibit 2-3 Based on share of hotel revenues ¹ | | 5 | 5 | 5 |
| | 0.87 Statewide multiplier ² | | \$0.2 | \$0.2 | \$0.2 |
| | 69% Adjusted for County share ³ | | \$0.1 | \$0.1 | \$0.1 |
| Subtotal | | | \$0.3 | \$0.3 | \$0.3 |
| Out-of-State visitor spending New visitors Direct expenditures (all) Indirect & induced | 65% of visitors shown in Exhibit 2-3 \$211 Per person per day ¹ 0.87 Statewide multiplier ² | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Subtotal | 69% Adjusted for County share ³ | | \$11.8 | \$13.0 | \$13.0 |
| Total to County, Direct Projects | | | \$12.1 | \$13.3 | \$13.3 |
| Expenditures in State - Out-of-State visitor spending New visitors Direct expenditures Indirect & induced | Same as above Same as above Same as above | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Total to State, Direct Projects | Without County adjustment | | \$17.1 | \$18.8 | \$18.8 |
| OTHER AREA PROJECTS | No visitor revenue impact anticipated | | N/A | N/A | N/A |

| PROPOSED ACTION: Direct jobs - Professional services DHHL Properties Subtotal, Professional Services Construction Regional infrastructure DHHL Properties Subtotal, Construction Other Regional infrastructure DHHL Properties Subtotal, Other Subtotal direct jobs (rounded) Indirect and induced jobs (rounded) Total jobs, Direct Projects | Basis/reference | | 2028-2028 | 2029-2038 | Total |
|--|---|--|-----------------------|------------------------|------------------------|
| | Exhibit 2-3 and DBEDT, 2016 ² | | | | |
| | 16% of visitors shown in Exhibit 2-3 Based on share of hotel revenues ¹ | | 5 | 5 | 5 |
| | 0.87 Statewide multiplier ² | | \$0.2 | \$0.2 | \$0.2 |
| | 69% Adjusted for County share ³ | | \$0.1 | \$0.1 | \$0.1 |
| Subtotal | | | \$0.3 | \$0.3 | \$0.3 |
| Out-of-State visitor spending New visitors Direct expenditures (all) Indirect & induced | 65% of visitors shown in Exhibit 2-3 \$211 Per person per day ¹ 0.87 Statewide multiplier ² | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Subtotal | 69% Adjusted for County share ³ | | \$11.8 | \$13.0 | \$13.0 |
| Total to County, Direct Projects | | | \$12.1 | \$13.3 | \$13.3 |
| Expenditures in State - Out-of-State visitor spending New visitors Direct expenditures Indirect & induced | Same as above Same as above Same as above | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Total to State, Direct Projects | Without County adjustment | | \$17.1 | \$18.8 | \$18.8 |
| OTHER AREA PROJECTS | No visitor revenue impact anticipated | | N/A | N/A | N/A |

Note: Cultural center/visitor attraction conservatively assumed to serve to reallocate expenditures by existing residents rather than to generate new visitor expenditures.
¹ Based on average daily spending per person by visitors arriving by air to Maui island in 2016, as shown in State of Hawaii, Hawaii Tourism Authority, 2016 Annual Visitor Research Report, Table 2.4.
² Based on Type II final demand multipliers for output among 20 industry groups as shown in State of Hawaii, Department of Business, Economic Development and Tourism, "The Hawaii State Input-Output Study: 2012 Benchmark Report," March 2016, Table 2.4.
³ Rate of County retention based on Ibbotson, "The 2012 Hawaii Inter-County Input-Output Study," May 2016, Table 28.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-3
Development Employment - Total in Period
Full-time equivalent jobs¹

| PROPOSED ACTION: Direct jobs - Professional services DHHL Properties Subtotal, Professional Services Construction Regional infrastructure DHHL Properties Subtotal, Construction Other Regional infrastructure DHHL Properties Subtotal, Other Subtotal direct jobs (rounded) Indirect and induced jobs (rounded) Total jobs, Direct Projects | Basis/reference | | 2028-2028 | 2029-2038 | Total |
|--|---|--|-----------------------|------------------------|------------------------|
| | Exhibit 2-3 and DBEDT, 2016 ² | | | | |
| | 16% of visitors shown in Exhibit 2-3 Based on share of hotel revenues ¹ | | 5 | 5 | 5 |
| | 0.87 Statewide multiplier ² | | \$0.2 | \$0.2 | \$0.2 |
| | 69% Adjusted for County share ³ | | \$0.1 | \$0.1 | \$0.1 |
| Subtotal | | | \$0.3 | \$0.3 | \$0.3 |
| Out-of-State visitor spending New visitors Direct expenditures (all) Indirect & induced | 65% of visitors shown in Exhibit 2-3 \$211 Per person per day ¹ 0.87 Statewide multiplier ² | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Subtotal | 69% Adjusted for County share ³ | | \$11.8 | \$13.0 | \$13.0 |
| Total to County, Direct Projects | | | \$12.1 | \$13.3 | \$13.3 |
| Expenditures in State - Out-of-State visitor spending New visitors Direct expenditures Indirect & induced | Same as above Same as above Same as above | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Total to State, Direct Projects | Without County adjustment | | \$17.1 | \$18.8 | \$18.8 |
| OTHER AREA PROJECTS | No visitor revenue impact anticipated | | N/A | N/A | N/A |

| PROPOSED ACTION: Direct jobs - Professional services DHHL Properties Subtotal, Professional Services Construction Regional infrastructure DHHL Properties Subtotal, Construction Other Regional infrastructure DHHL Properties Subtotal, Other Subtotal direct jobs (rounded) Indirect and induced jobs (rounded) Total jobs, Other Area Projects | Basis/reference | | 2028-2028 | 2029-2038 | Total |
|--|---|--|-----------------------|------------------------|------------------------|
| | Exhibit 2-3 and DBEDT, 2016 ² | | | | |
| | 16% of visitors shown in Exhibit 2-3 Based on share of hotel revenues ¹ | | 5 | 5 | 5 |
| | 0.87 Statewide multiplier ² | | \$0.2 | \$0.2 | \$0.2 |
| | 69% Adjusted for County share ³ | | \$0.1 | \$0.1 | \$0.1 |
| Subtotal | | | \$0.3 | \$0.3 | \$0.3 |
| Out-of-State visitor spending New visitors Direct expenditures (all) Indirect & induced | 65% of visitors shown in Exhibit 2-3 \$211 Per person per day ¹ 0.87 Statewide multiplier ² | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Subtotal | 69% Adjusted for County share ³ | | \$11.8 | \$13.0 | \$13.0 |
| Total to County, Direct Projects | | | \$12.1 | \$13.3 | \$13.3 |
| Expenditures in State - Out-of-State visitor spending New visitors Direct expenditures Indirect & induced | Same as above Same as above Same as above | | 163 \$9.1 \$9.0 | 201 \$10.1 \$8.8 | 201 \$10.1 \$8.8 |
| Total to State, Direct Projects | Without County adjustment | | \$17.1 | \$18.8 | \$18.8 |
| OTHER AREA PROJECTS | No visitor revenue impact anticipated | | N/A | N/A | N/A |

Note: Cultural center/visitor attraction conservatively assumed to serve to reallocate expenditures by existing residents rather than to generate new visitor expenditures.
¹ Based on average daily spending per person by visitors arriving by air to Maui island in 2016, as shown in State of Hawaii, Hawaii Tourism Authority, 2016 Annual Visitor Research Report, Table 2.4.
² Based on Type II final demand multipliers for output among 20 industry groups as shown in State of Hawaii, Department of Business, Economic Development and Tourism, "The Hawaii State Input-Output Study: 2012 Benchmark Report," March 2016, Table 2.4.
³ Rate of County retention based on Ibbotson, "The 2012 Hawaii Inter-County Input-Output Study," May 2016, Table 28.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-4

Development Employment - Average Annual in Period
Full-time equivalent jobs¹

| | 2020-2028 | 2029-2038 |
|--|------------|------------|
| PROPOSED ACTION: | | |
| Direct jobs - | | |
| Professional services | | |
| Regional infrastructure | 3 | 1 |
| DHHL Properties | 14 | 12 |
| Subtotal, Professional services | 17 | 13 |
| Construction | | |
| Regional infrastructure | 29 | 8 |
| DHHL Properties | 192 | 172 |
| Subtotal, Construction | 221 | 180 |
| Other | | |
| Regional infrastructure | 3 | 1 |
| DHHL Properties | 13 | 14 |
| Subtotal, Other | 17 | 15 |
| Subtotal direct jobs (rounded) | 280 | 210 |
| Indirect and induced jobs (rounded) | 340 | 280 |
| Total jobs, Direct Projects | 600 | 490 |
| OTHER AREA PROJECTS: | | |
| Direct jobs - | | |
| Professional services | | |
| DLNR Industrial and Bus. Park - | 20 | 25 |
| PSD - MRPSC | 2 | 0 |
| Subtotal, Professional services | 22 | 25 |
| Construction | | |
| DLNR Industrial and Bus. Park - | 165 | 197 |
| PSD - MRPSC | 100 | 0 |
| Subtotal, Construction | 265 | 197 |
| Other | | |
| DLNR Industrial and Bus. Park - | 20 | 26 |
| PSD - MRPSC | 25 | 0 |
| Subtotal, Other | 45 | 26 |
| Subtotal direct jobs (rounded) | 350 | 250 |
| Indirect and induced jobs (rounded) | 450 | 330 |
| Total jobs, Other Area Projects | 800 | 580 |

| | Average annual FTE jobs |
|---|-------------------------|
| SUMMARY | |
| Proposed Action Impacts: | |
| Regional infrastructure and projects on DHHL land | |
| Mau County | 390 |
| State | 600 |
| 65% of State | 320 |
| 490 | |
| Cumulative Impacts: | |
| Above plus DLNR and PSD project impacts | |
| Mau County | 910 |
| State | 1,400 |
| 65% of State | 700 |
| 1,070 | |

Notes: For presentation purposes, total spending is averaged within each reporting period shown and does not reflect potential year-to-year experience of expenditures.
1 Full-time equivalent (FTE) defined as 40 hours per week or 2,080 hours per year.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-5

Personal Earnings from Development - Total in Period
2018 dollars, in millions

| | 2020-2028 | 2029-2038 |
|--|----------------|----------------|
| PROPOSED ACTION: | | |
| Direct earnings - | | |
| Professional services | | |
| Regional infrastructure | \$3.0 | \$0.9 |
| DHHL Properties | \$11.6 | \$13.1 |
| Subtotal, Professional services | \$14.6 | \$14.0 |
| Construction | | |
| Regional infrastructure | \$23.1 | \$6.7 |
| DHHL Properties | \$150.6 | \$150.2 |
| Subtotal, Construction | \$173.7 | \$156.9 |
| Other | | |
| Regional infrastructure | \$2.0 | \$0.6 |
| DHHL Properties | \$7.9 | \$9.2 |
| Subtotal, Other | \$9.9 | \$9.8 |
| Subtotal, direct earnings | \$198.2 | \$180.7 |
| Indirect and induced earnings | \$163.9 | \$149.1 |
| Total earnings, Direct Projects | \$362.0 | \$329.8 |
| OTHER AREA PROJECTS: | | |
| Direct earnings - | | |
| Professional services | | |
| DLNR Industrial and Bus. Park - | \$19.8 | \$28.3 |
| PSD - MRPSC | \$2.4 | \$0.0 |
| Subtotal, Professional services | \$22.2 | \$28.3 |
| Construction | | |
| DLNR Industrial and Bus. Park - | \$145.5 | \$172.2 |
| PSD - MRPSC | \$78.2 | \$0.0 |
| Subtotal, Construction | \$223.6 | \$172.2 |
| Other | | |
| DLNR Industrial and Bus. Park - | \$11.9 | \$17.0 |
| PSD - MRPSC | \$15.0 | \$0.0 |
| Subtotal, Other | \$26.9 | \$17.0 |
| Subtotal, direct earnings | \$278.8 | \$217.5 |
| Indirect and induced earnings | \$221.4 | \$175.7 |
| Total earnings, Other Area Projects | \$494.2 | \$393.1 |

| | Total development earnings (2018) |
|---|-----------------------------------|
| SUMMARY | |
| Proposed Action Impacts: | |
| Regional infrastructure and projects on DHHL land | |
| Mau County | \$233.8 |
| State | \$362.0 |
| 65% of State | \$213.0 |
| \$329.8 | |
| Cumulative Impacts: | |
| Above plus DLNR and PSD project impacts | |
| Mau County | \$553.0 |
| State | \$856.2 |
| 65% of State | \$466.9 |
| \$722.9 | |

Notes: Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance.
1 State of Hawaii, Department of Business, Economic Development and Tourism, "The Hawaii State Input-Output Study: 2012 Benchmark Report," March 2016; Ibid, "The 2012 Hawaii Inter-County Input-Output Study," May 2016.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-6

Personal Earnings from Development - Average Annual
2018 dollars, in millions except average earnings

| PROPOSED ACTION: | Basis/reference | 2020-2028 | 2029-2038 |
|--|---|----------------------|----------------------|
| Average annual in period - Direct jobs | Exhibits 3-5 Professional services, construction and other | \$22.0 \$18.2 | \$18.1 \$14.9 |
| Indirect & induced earnings | | \$40.2 | \$33.0 |
| Total earnings | | | |
| Average per new FTE job - Direct jobs | Exhibits 3-4 and 3-5 Professional services, construction and other | \$86,000 \$54,000 | \$86,000 \$53,000 |
| Indirect & induced jobs | | \$67,000 | \$67,000 |
| Average per job | | | |
| OTHER AREA PROJECTS: | | | |
| Average annual in period - Direct earnings | Exhibits 3-5 Professional services, construction and other | \$30.3 \$24.6 | \$21.7 \$17.6 |
| Indirect & induced earnings | | \$54.9 | \$39.3 |
| Total earnings | | | |
| Average per new FTE job - Direct jobs | Exhibits 3-4 and 3-5 Professional services, construction and other | \$87,000 \$55,000 | \$87,000 \$53,000 |
| Indirect & induced jobs | | \$65,000 | \$63,000 |
| Average per job | | | |
| \$65,000 | | | |

| SUMMARY | Total earnings (average annual) |
|--------------------------|---|
| Proposed Action Impacts: | Regional Infrastructure and projects on DHHL land |
| Mau County | 66% of State |
| State | \$26.0 \$40.2 |
| Cumulative Impacts: | Above plus DLNR and PSD project impacts |
| Mau County | 66% of State |
| State | \$51.4 \$95.1 |

Notes: Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-7

On-Site Operational Employment
FTE jobs, all on Island of Maui

| PROPOSED ACTION: | Basis/reference | 2028 | 2038 | Ongoing |
|---|--|--------------|--------------|--------------|
| Regional Infrastructure: | | | | |
| Wastewater treatment plant | 0.0 FTE | 0 | 0 | 0 |
| Wastewater system (Alt. 2A) | 3.0 FTE | 3 | 3 | 3 |
| Read improvements | 0.0 FTE | 0 | 0 | 0 |
| Subtotal | | 3 | 3 | 3 |
| Pūlehuui South | | | | |
| Agricultural homesteads | 0.3 FTE per home | 5 | 30 | 30 |
| General agriculture | 5.0 FTE, excl. planting, harvesting ¹ | 5 | 5 | 5 |
| Commercial enterprises | 1,200 square feet/FTE employee | 50 | 250 | 250 |
| Education | Multiple schools/facilities | 20 | 100 | 100 |
| Subtotal | | 80 | 385 | 385 |
| Pūlehuui North | | | | |
| Cultural center/visitor attraction | 400 FTE at stabilization | 280 | 400 | 400 |
| Held | 0.75 FTE per occupied room | 105 | 116 | 116 |
| Light industrial | 800 square feet/FTE employee | 788 | 1,650 | 1,650 |
| Commercial | 500 square feet/FTE employee | 260 | 520 | 520 |
| Subtotal | | 1,433 | 2,686 | 2,686 |
| Total, Direct Projects (rounded) | | 1,520 | 3,070 | 3,070 |
| OTHER AREA PROJECTS: | | | | |
| DLNR Industrial and Bus. Park - | | | | |
| DOFAW Baseyard | 100 jobs ² | 100 | 100 | 100 |
| Light industrial | 800 square feet/FTE employee ³ | 1,033 | 2,950 | 2,950 |
| Commercial | 500 square feet/FTE employee ³ | 809 | 2,310 | 2,310 |
| PSD - MRPSC | | | | |
| Subtotal | 368 employees ⁴ | 368 | 368 | 368 |
| Total, Other Area Projects (rounded) | | 2,309 | 5,728 | 5,728 |
| Total, Direct Projects (rounded) | | 2,310 | 5,730 | 5,730 |

| SUMMARY | Direct on-site jobs |
|--------------------------|---|
| Proposed Action Impacts: | Regional Infrastructure and projects on DHHL land |
| Mau County | 1,520 |
| State | 1,520 |
| Cumulative Impacts: | Above plus DLNR and PSD project impacts |
| Mau County | 3,830 |
| State | 3,830 |

Note: Full-time equivalent (FTE), defined as 40 hours per week or 2,080 hours per year. Excludes Realtors and brokers that may locate on-site.
 1 Year-round employment based on orchard or 18-month low-maintenance crops such as macadamia nuts, mango, pineapple or bananas. Covers irrigation, pest control, mowing, security, etc., but excludes substantial seasonal employment involved in land preparation, planting and harvesting. Higher maintenance crops such as vegetables could support FTE.
 2 State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife, private correspondence, 2018.
 3 FTE defined based on jobs as reported by Nuebel's Hines, "Economic and Fiscal Impact Analysis Report, DLNR Industrial and Business Park," May 2018, with adjustment to FTE for part-time work based on average weekly hours in 2017 for all nonfarm private sector payroll in the Kahului-Waikoloa-Abama MSA, as reported by the Hawaii Workforce Incentive.
 4 State of Hawaii, Department of Public Safety, private correspondence, 2018.

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Exhibit 3-8
Net Additional Operational Employment
FTE jobs, Statewide¹

| PROPOSED ACTION: | Basis/reference (not in millions) | 2028 | 2038 | Ongoing |
|--|---|--------------|--------------|--------------|
| Direct jobs - | | | | |
| Attributable to new State residents ² | DBEDT, 2016 ratios ³ | - | 6 | 6 |
| Regional infrastructure | Exhibit 3-7 | 3 | 3 | 3 |
| DHHL - Pūhenui South | 0% new jobs (supplementary/subsistence) | - | - | 0 |
| Agricultural homesteads | 100% new jobs | 30 | 150 | 150 |
| General agriculture | 60% new jobs | 5 | 25 | 25 |
| Commercial enterprises | 60% new jobs | 20 | 100 | 100 |
| Education | 100% new jobs | 55 | 255 | 255 |
| Subtotal | | 280 | 400 | 400 |
| DHHL - Pūhenui North | 100% new jobs | 82 | 91 | 91 |
| Cultural center/visitor attraction | DBEDT, 2016 ratios ³ | 42 | 690 | 690 |
| Visitor spending impact | 60% new jobs | 40 | 312 | 312 |
| Light industrial | 60% new jobs | 168 | 2 | 2 |
| Commercial | DBEDT, 2016 ratios ³ | 2 | 1,795 | 1,795 |
| Real estate leasing | | 983 | 2,060 | 2,060 |
| Subtotal | | 1,060 | 2,280 | 2,280 |
| Indirect & induced jobs | DBEDT, 2016 ratios ³ | 1,080 | 4,300 | 4,300 |
| Total jobs, Direct Projects, rounded | | 2,100 | 4,300 | 4,300 |
| OTHER AREA PROJECTS: | | | | |
| Direct jobs - | | | | |
| DLNR Industrial and Bus. Park | 100 jobs, less existing | 23 | 23 | 23 |
| DOFAM Baseyard | 60% new jobs | 620 | 1,770 | 1,770 |
| Light industrial | 60% new jobs | 485 | 1,386 | 1,386 |
| Commercial | 388 jobs, less existing | 181 | 181 | 181 |
| PSD - MRPSC | | 1,310 | 3,360 | 3,360 |
| Subtotal, rounded | | 1,420 | 3,720 | 3,720 |
| Indirect & induced jobs - | DBEDT, 2016 ratios ³ | 1,420 | 3,720 | 3,720 |
| Total jobs, Other Area Projects, rounded | | 2,700 | 7,100 | 7,100 |

| SUMMARY | Net additional FTE jobs (rounded) | 2028 | 2038 | Ongoing |
|---------------------------------|---|-------|--------|---------|
| Proposed Action Impacts: | Regional infrastructure and projects on DHHL land | 1,700 | 3,600 | 3,600 |
| Mauai County | 83% of State | 2,100 | 4,300 | 4,300 |
| State | | 4,000 | 9,400 | 9,400 |
| Cumulative impacts: | Above plus DLNR and PSD project impacts | 4,800 | 11,400 | 11,400 |
| Mauai County | 83% of State | 4,800 | 11,400 | 11,400 |
| State | | 4,800 | 11,400 | 11,400 |

1 FTE = Full-time equivalent, defined as 40 hours per week or 2,080 hours per year.
2 Category addresses commercial and other impacts of spending by full- or part-time residents attracted to the State because of the Project in categories such as retail, wholesale, eating & drinking, ground transportation, accommodations, telecommunications, and entertainment, etc. Such spending and its job impact will be dispersed on the island, not just in Maui County.
3 State of Hawaii, Department of Business, Economic Development and Tourism, "The Hawaii State Input-Output Study: 2012 Benchmark Report," March 2016; *Ibid.*, "The 2012 Hawaii Inter-County Input-Output Study," May 2016.

Pūhenui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 3-9
Personal Earnings from Net New Operations - Average Annual
2018 dollars, in millions, except as noted

| PROPOSED ACTION: | Basis/reference (not in millions) | 2028 | 2038 | Ongoing |
|--------------------------------------|--|---------|---------|---------|
| Regional Infrastructure | Estimated average FTE salary, or other basis, ¹ | | | |
| Pūhenui South | \$73,500 Water and sewer facilities | \$0.2 | \$0.2 | \$0.2 |
| General agriculture | \$45,100 Crop production | \$0.2 | \$0.2 | \$0.2 |
| Commercial enterprises | \$47,100 Average, select industries | \$1.4 | \$7.1 | \$7.1 |
| Education | \$49,100 Educational services | \$1.0 | \$4.9 | \$4.9 |
| Pūhenui North (DHHL) | \$37,000 Amusement and recreation facilities | \$10.4 | \$14.8 | \$14.8 |
| Cultural center/visitor attraction | DBEDT, 2016 ratios ² | \$47.5 | \$4.9 | \$4.9 |
| Visitor spending | \$47,100 Average, select industries | \$21.5 | \$4.9 | \$4.9 |
| Light industrial | \$38,200 Average wages, Maui County | \$6.0 | \$11.9 | \$11.9 |
| Commercial | \$54,000 Average wages, Maui County | \$0.0 | \$0.3 | \$0.3 |
| New Hawaii residents | Commercial properties, Ex. 3-10 | \$0.4 | \$0.4 | \$0.4 |
| Av. annual commercial leasing - | | \$0.4 | \$0.4 | \$0.4 |
| Initial lease-up | | \$0.0 | \$0.2 | \$0.4 |
| Releasing after 2030 | | \$46.3 | \$91.6 | \$91.4 |
| Subtotal, direct earnings | | \$52.4 | \$106.4 | \$106.2 |
| Indirect and induced earnings | DBEDT, 2016 ratios ² | \$98.7 | \$198.0 | \$197.6 |
| Total, Direct Projects | | \$151.1 | \$304.4 | \$303.8 |
| OTHER AREA PROJECTS: | As estimated by Other Area consultants ³ | | | |
| Direct | | \$61.7 | \$163.6 | \$163.6 |
| Indirect & induced | | \$67.9 | \$189.1 | \$189.1 |
| Total, Other Area Projects | | \$129.6 | \$352.7 | \$352.7 |

| SUMMARY | Total annual earnings | 2028 | 2038 | Ongoing |
|---------------------------------|---|---------|---------|---------|
| Proposed Action Impacts: | Regional infrastructure and projects on DHHL land | \$79.8 | \$160.1 | \$159.7 |
| Mauai County | 81% of State | \$98.7 | \$198.0 | \$197.6 |
| State | | \$184.6 | \$445.2 | \$444.9 |
| Cumulative impacts: | Above plus DLNR and PSD project impacts | \$228.3 | \$550.7 | \$550.2 |
| Mauai County | 81% of State | \$228.3 | \$550.7 | \$550.2 |
| State | | \$228.3 | \$550.7 | \$550.2 |

Notes: Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance. They exclude tips.
1 Earnings are FTE and thus may appear to exceed wages in industries where employment is often typically than full-time. Factors based on Maui County data from Hawaii Workforce Information, Quarterly Census of Employment and Wages by Industry, 2016, inflated to 2018 dollars based on 2016-2017 change in Honolulu CPI.
2 State of Hawaii, Department of Business, Economic Development and Tourism, "The Hawaii State Input-Output Study: 2012 Benchmark Report," March 2016; *Ibid.*, "The 2012 Hawaii Inter-County Input-Output Study," May 2016.
3 Estimates for Other Area Projects adjusted to reflect assessment of share of jobs that would be new to County and State, and inflation to 2018 dollars.

Exhibit 3-10
Personal Earnings from Net New Operations -
Average Per FTE Job
2018 dollars, in millions, except as noted

| Basis/reference | 2028 | 2038 | Ongoing |
|---------------------------------|-----------------|-----------------|-----------------|
| PROPOSED ACTION: | | | |
| Direct jobs | | | |
| Indirect and induced jobs | \$44,000 | \$44,000 | \$44,000 |
| Weighted average per job | \$45,000 | \$47,000 | \$47,000 |
| | \$47,000 | \$46,000 | \$46,000 |
| OTHER AREA PROJECTS: | | | |
| Direct jobs | \$47,000 | \$49,000 | \$49,000 |
| Indirect and induced jobs | \$45,000 | \$51,000 | \$51,000 |
| Weighted average per job | \$46,000 | \$50,000 | \$50,000 |
| SUMMARY | | | |
| Proposed Action Impacts: | | | |
| Mauai County | \$47,000 | \$44,000 | \$44,000 |
| State | \$47,000 | \$46,000 | \$46,000 |
| Cumulative Impacts: | | | |
| Mauai County | \$46,000 | \$47,000 | \$47,000 |
| State | \$48,000 | \$48,000 | \$48,000 |

Notes: Earnings defined to include wage, salary and proprietary incomes, plus directors' fees and employer contributions to health insurance, less employee contributions to social insurance.

Exhibit 4-1
Average Daily In-Migrant Population

| Basis/reference | 2028 | 2038 | Ongoing |
|---|----------------|-------|---------|
| PROPOSED ACTION: | | | |
| Homestead residents - | | | |
| In-migrants to State | 4 | 28 | 28 |
| In-migrants to County | 24 | 168 | 168 |
| Employers - | | | |
| In-migrants to the State ¹ | 8 | 6 | - |
| Development employees | 53 | 103 | 103 |
| Direct operational | 43 | 83 | 82 |
| Dependents ² | | | |
| In-migrants to State ³ | 100 | 190 | 190 |
| | <i>Rounded</i> | | |
| In-migrants to County ³ | 26 | 21 | - |
| Development employees | 84 | 165 | 165 |
| Operational employees | 70 | 134 | 132 |
| Dependents ² | | | |
| In-migrants to County ³ | 180 | 320 | 300 |
| | <i>Rounded</i> | | |
| Total In-migrants: | | | |
| To State | 100 | 220 | 220 |
| To County | 200 | 480 | 470 |
| OTHER AREA PROJECTS: | | | |
| Employers - | | | |
| In-migrants to the State ¹ | 11 | 8 | - |
| Development employees | 66 | 168 | 168 |
| Direct operational | 53 | 135 | 134 |
| Dependents ² | | | |
| In-migrants to State ³ | 130 | 310 | 300 |
| | <i>Rounded</i> | | |
| In-migrants to County ³ | 5 | 3 | - |
| Development employees | 105 | 269 | 269 |
| Operational employees | 84 | 215 | 215 |
| Dependents ² | | | |
| In-migrants to County ³ | 130 | 490 | 480 |
| | <i>Rounded</i> | | |
| Total In-migrants: | | | |
| To State | 130 | 310 | 300 |
| To County | 390 | 860 | 850 |
| SUMMARY | | | |
| Total In-migrants | | | |
| Regional Infrastructure and projects on DHHL land | 200 | 490 | 470 |
| Mauai County | 100 | 220 | 220 |
| State | 590 | 1,470 | 1,420 |
| Cumulative Impacts: | | | |
| Mauai County | 230 | 530 | 520 |
| State | | | |

¹ Subset of County In-migrants. See footnote 3 below. Share of employees moving from out-of-State because of job opportunity will vary depending on specific County and other U.S. labor market conditions. For example, if Maui County has a higher unemployment rate than other counties, it may attract a higher share of in-migrants.

² In-migrant dependents estimated to average 0.1 per in-migrant development employee, and 1.0 per in-migrant operational employee.

³ In-migrants to the County include all those moving to the State plus any that may move between islands due to job opportunities at the Project.

⁴ Factors adjusted from those used in source documents, per updated market conditions, current reporting periods and consistency with current analysis.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-1
Government Revenues - County of Maui, Annual
2018 dollars, in millions, except as noted

| | Tax rates per \$1000 assessed value (not in mils) | | | |
|---|---|--|--------------|--------------|
| | 2028 | 2038 | Ongoing | |
| PROPOSED ACTION: | | | | |
| Real property taxes - | | | | |
| Pūlehuui South | | | | |
| Agricultural homesteads | \$2.85 | Homowner (less exemption) | \$0.0 | \$0.0 |
| General agriculture | \$6.00 | Agricultural | \$0.0 | \$0.0 |
| Commercial enterprises | \$7.45 | Industrial | \$0.2 | \$0.5 |
| Educational areas | \$0.00 | Presumed tax-exempt | \$0.0 | \$0.0 |
| Community areas | \$0.00 | Presumed tax-exempt | \$0.0 | \$0.0 |
| Less existing tax payments | | Pūlehuui South, current tax: \$400 | (\$0.0) | (\$0.0) |
| Pūlehuui North | | | | |
| Cultural center/visitor attraction | \$7.25 | Commercial | \$0.4 | \$0.4 |
| Hotel | \$9.37 | Hotel & Resort | \$0.3 | \$0.3 |
| Light industrial | \$7.45 | Industrial | \$1.2 | \$2.3 |
| Commercial-land | \$7.25 | Commercial | \$0.3 | \$0.6 |
| Less existing tax payments | | Pūlehuui North, current tax: \$600 | (\$0.0) | (\$0.0) |
| Net new property tax revenues | \$2.3 | \$4.0 | \$4.0 | \$4.0 |
| Transient accommodations tax¹ | \$0.0 | \$0.0 | \$0.0 | \$0.0 |
| Total, Direct Projects | \$2.3 | \$4.0 | \$4.0 | \$4.0 |
| OTHER AREA PROJECTS: | | | | |
| Real property taxes - | | | | |
| DLNR Ind. and Business Park | \$0.00 | State exemption | \$0.0 | \$0.0 |
| DOF-AW Baseyard | \$2.9 | Industrial | \$4.9 | \$4.9 |
| Light industrial uses | \$7.45 | Commercial | \$3.0 | \$3.0 |
| Commercial uses | \$7.25 | Commercial | \$1.8 | \$1.8 |
| Less existing tax payments | | Business Park site, current tax: \$763 | (\$0.0) | (\$0.0) |
| PSD - MRPSC | \$0.00 | State exemption | \$0.0 | \$0.0 |
| Less existing tax payments | | MRPSC site, current tax: \$0 | \$0.0 | \$0.0 |
| Net new property tax revenues | \$4.7 | \$7.8 | \$7.8 | \$7.8 |
| Transient accommodations tax¹ | \$0.0 | \$0.0 | \$0.0 | \$0.0 |
| Total Other Area Projects | \$4.7 | \$7.8 | \$7.8 | \$7.8 |

| | Net new County tax revenues | | |
|---------------------------------|-----------------------------|--------|--------|
| | Maui County | State | |
| Proposed Action Impacts: | \$2.3 | \$4.0 | \$4.0 |
| Maui County | \$0.0 | \$0.0 | \$0.0 |
| State | | | |
| Cumulative Impacts: | \$7.0 | \$11.9 | \$11.9 |
| Maui County | \$0.0 | \$0.0 | \$0.0 |
| State | | | |

Source and notes: 2018-2019 Maui County Real Property Tax schedule. Assessment excludes additional revenues from fuel taxes, licenses and permits; public utility franchise taxes, investment & other miscellaneous revenue sources.
1 Since 2013, the counties receive a fixed dollar amount from the State's TAT collections (\$103 million, of which Maui County is allocated 22.8% or \$23.4 million. Since the County is already receiving its full allocation, increased TAT collections due to the Project will not benefit County revenues.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-2
Government Revenues - State of Hawaii, Annual
2018 dollars, in millions, except as noted

| | Basis/reference (not in millions) | | | |
|---|---|---------------|---------------|---------------|
| | 2028 | 2038 | Ongoing | |
| PROPOSED ACTION: | | | | |
| General excise taxes, on: | | | | |
| Development ¹ | \$2.50 | \$2.05 | \$0.00 | \$0.00 |
| Brokerage commissions | 4.0% of commissions | \$0.0 | \$0.0 | \$0.0 |
| Spending by in-migrant employees | 4.0% of share of employee earnings | \$0.1 | \$0.1 | \$0.1 |
| Hotel revenues | 4.0% of total revenues | \$0.5 | \$0.5 | \$0.5 |
| Transient accommodations | | | | |
| Hotel revenues | 80.2% State share of Projects TAT generation ² | \$0.9 | \$1.0 | \$1.0 |
| Individual income taxes:³ | | | | |
| Development employees | 6.4% effective tax rate on av. family AGI | \$1.9 | \$1.6 | \$0.0 |
| Operational employees | 6.1% effective tax rate on av. family AGI | \$4.5 | \$9.0 | \$9.0 |
| Total, Direct Projects | \$10.5 | \$14.4 | \$10.8 | \$10.8 |
| OTHER AREA PROJECTS: | | | | |
| General excise taxes, on: | | | | |
| Development ¹ | \$3.43 | \$2.42 | \$0.00 | \$0.00 |
| Brokerage commissions | 4.0% of commissions | \$0.02 | \$0.01 | \$0.01 |
| Spending by in-migrant employees | 4.0% of share of employee earnings | \$0.09 | \$0.20 | \$0.19 |
| Individual income taxes:³ | | | | |
| Development employees | 6.4% effective tax rate on av. family AGI | \$2.7 | \$1.9 | \$3.2 |
| Operational employees | 6.2% effective tax rate on av. family AGI | \$6.0 | \$16.3 | \$16.3 |
| Total, Other Area Projects | \$12.2 | \$20.8 | \$19.7 | \$19.7 |
| SUMMARY | | | | |
| Proposed Action Impacts: | | | | |
| Maui County | \$0.0 | \$0.0 | \$0.0 | \$0.0 |
| State | \$10.5 | \$14.4 | \$10.8 | \$10.8 |
| Cumulative Impacts: | | | | |
| Maui County | \$0.0 | \$0.0 | \$0.0 | \$0.0 |
| State | \$22.6 | \$35.3 | \$30.5 | \$30.5 |

Note: Projections are subject to change with tax rate or policy changes subsequent to July 2018.

Projections exclude corporate income tax on commercial rents and operational income, as well as miscellaneous State tax revenues including tobacco and liquor taxes, liquid fuel tax, motor vehicle weight & registration tax, fines & forfeitures, licenses, franchise tax, rental motor vehicle surcharge tax, public service companies tax, tax on premiums of insurance companies and other fees and taxes.

1 Based on 4% on 100% of all costs, plus a wholesale tax of 0.5% against 40% (estimated materials budget) of construction costs.

2 Tax provisions in Act 1 (Senate Bill 4) that were enacted as part of the State of Hawaii 2017 Special Legislative Session increased the State TAT from 9.25% to 10.25%, with the 2018 TAT projected at 10.25%. The 2018 TAT is projected to be 10.25% for Maui County and 10.25% for the State of Hawaii. The 2018 TAT is projected to be 10.25% for Maui County and 10.25% for the State of Hawaii. This is currently set at \$103 million per year, which has already been exceeded. Therefore any new TAT collections other than that generated by the 1% rate increase will be used to offset the 2018 TAT collections.

3 Based on estimated average family incomes for all Project-related job holders, and on 2017 Tax Tables and Tax Rate Schedule II, for married taxpayers filing joint returns. 2017 tables used as provisional estimate for 2018 tables, which were not available as of the time of this study, and which are expected to incorporate some changes reflecting the December 2017 Federal tax law changes. Adjusted Gross Income (AGI) assumed to be 25% less than total average family earnings, considering potential deductions. Projections

Pūlehuunui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-3
Statement of Activities (Expenses) - County of Maui
Per Capita in Fiscal Year July 1, 2016 to June 30, 2017

| | Net expense ¹ | Service population ² | Net expenditures (not in thousands) per: | |
|---|--------------------------|---------------------------------|--|----------------|
| | | | Resident | Visitor |
| PRIMARY GOVERNMENT: | | | | |
| Governmental activities - | | | | |
| General government | \$195,370,353 | 218,000 | \$575 | \$575 |
| Public Safety | \$119,967,265 | 218,000 | \$550 | \$550 |
| Highways and Streets | \$45,281,878 | 218,000 | \$208 | \$208 |
| Sanitation | \$73,819,944 | 218,000 | \$339 | \$339 |
| Social Welfare | \$33,161,906 | 165,800 | \$200 | \$0 |
| Culture and recreation | \$36,263,340 | 218,000 | \$166 | \$166 |
| Legislative | \$7,407,639 | 218,000 | \$34 | \$34 |
| Interest | \$6,867,907 | 218,000 | \$32 | \$32 |
| Subtotal | \$448,140,232 | | \$2,104 | \$1,904 |
| Business-type activities³ | | | | |
| Department of Water Supply | \$0 | 165,800 | \$0 | \$0 |
| Housing, Interim Financing and Buy-Back | \$0 | 218,000 | \$0 | \$0 |
| Revolving Fund | \$0 | | \$0 | \$0 |
| Golf Course Special Fund | \$2,776,105 | | \$13 | \$13 |
| Subtotal | \$2,776,105 | | \$13 | \$13 |
| Total, primary government | \$450,916,337 | | \$2,116 | \$1,916 |
| Total, in FY2017 dollars | \$450,916,337 | | \$2,116 | \$1,916 |
| Estimated in 2018 dollars, based on increase of:⁴ | 2.5% | | | |

1 Expenses less operating and capital grants and contributions, which are primarily intergovernmental transfers and other grants to the County government, most from State and Federal governments. Business-type activities and component unit net expenses also exclude charges for services, since such programs are intended to recover all or a significant portion of their costs through fees or charges. Set to zero if net charges and contributions exceed expenses.

2 Estimated resident and visitor population for January 1, 2017 based on U.S. Census Bureau, American Factfinder, "Annual Estimates of the Resident Population" and State of Hawaii, Department of Business, Economic Development and Tourism, Research & Economic Analysis Division.

3 Net expense shows only those activities requiring government or other subsidy after service charges, grants and contributions but before debt service where applicable, set to "0" if the category showed net positive revenues for the year.

4 Based on rate of change between 2016 and 2017 Honolulu CPU, as reported by U.S. Department of Labor, Bureau of Labor Statistics.

Sources: County of Maui, Department of Finance, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2017," Statement of Activities, pg. 38, June 30, 2017.

Pūlehuunui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-4
Statement of Activities (Expenses) - State of Hawaii
Per Capita in Fiscal Year July 1, 2016 to June 30, 2017

| | Net expense ¹ (thousands) | Service population ² | Net expenditures (not in thousands) per: | |
|---|--------------------------------------|---------------------------------|--|----------------|
| | | | Resident | Visitor |
| PRIMARY GOVERNMENT: | | | | |
| Governmental activities - | | | | |
| General government | \$569,069 | 1,592,800 | \$376 | \$376 |
| Public safety | \$222,291 | 1,592,800 | \$140 | \$140 |
| Highways | \$322,291 | 1,592,800 | \$202 | \$202 |
| Conservation of natural resources | \$127,670 | 1,592,800 | \$80 | \$80 |
| Health | \$767,057 | 1,428,000 | \$537 | \$0 |
| Welfare | \$1,135,333 | 1,428,000 | \$795 | \$0 |
| Lower education | \$2,902,274 | 1,428,000 | \$2,032 | \$0 |
| Higher education | \$899,199 | 1,428,000 | \$630 | \$0 |
| Other education | \$27,248 | 1,428,000 | \$19 | \$0 |
| Culture and recreation | \$69,229 | 1,592,800 | \$62 | \$62 |
| Urban redevelopment and housing | \$220,324 | 1,428,000 | \$154 | \$0 |
| Economic development and assistance | \$103,202 | 1,428,000 | \$72 | \$0 |
| Interest expense | \$212,042 | 1,592,800 | \$133 | \$133 |
| Subtotal | \$7,914,941 | | \$5,408 | \$1,168 |
| Business-type activities³ | | | | |
| Airports | \$0 | 1,592,800 | \$0 | \$0 |
| Harbors | \$0 | 1,592,800 | \$0 | \$0 |
| Unemployment compensation | \$0 | 1,428,000 | \$0 | \$0 |
| Nominal proprietary fund | \$0 | 1,592,800 | \$0 | \$0 |
| Subtotal | \$0 | | \$0 | \$0 |
| Total, primary government | \$7,914,941 | | \$5,408 | \$1,168 |
| COMPONENT UNITS, NET EXPENSE:⁴ | \$1,222,671 | (see note) | \$849 | \$80 |
| Total, in FY17 dollars | \$9,137,612 | | \$6,257 | \$1,228 |
| Estimated in 2018 dollars, based on increase of:⁵ | 2.5% | | | |

1 Expenses less operating and capital grants and contributions, which are primarily intergovernmental transfers and other grants to the State government, most from the Federal government. Business-type activities and component unit net expenses also exclude charges for services, since such programs are intended to recover all or a significant portion of their costs through fees or charges.

2 Resident population for January 1, 2016 based on annual estimates of resident population as of July 1, 2015 and 2016, U.S. Census Bureau, American Factfinder, "Annual Estimates of the Resident Population" and Hawaii, Department of Business, Economic Development and Tourism, Research & Economic Analysis Division.

3 Net expense shows only those activities requiring government or other subsidy after service charges, grants and contributions but before debt service where applicable, i.e., the entity is set to "0" where the unit or activity showed net positive revenues for the year.

4 Semi-autonomous entities including the University of Hawaii, the Hawaii Housing Finance and Development Corporation, the Hawaii Public Housing Authority, the Hawaii Health Systems Corporation, the Hawaii Tourism Authority, the Hawaii Community Development Authority, and the Hawaii Hurricane Relief Fund. All but HFDC showed net expense for the year. All but HTRA allocated to primary residents only.

5 Based on rate of change between FY2016 and 2nd half 2016 Honolulu CPU, as reported by U.S. Department of Labor, Bureau of Labor Statistics. 2017 CPU figures not available.

Sources: State of Hawaii, Department of Accounting and General Services, "State of Hawaii: Comprehensive Annual Financial Report For the Fiscal Year Ended June 30, 2017," Statement of Activities (pg. 32), December 28, 2017.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-5

Government Expenditures - County of Maui
2018 dollars, in millions, except as noted

| PROPOSED ACTION: Basis for County projection - FTE In-migrants to County Visitors from off-island ¹ | Basis/reference (not in millions) | | |
|--|-----------------------------------|----------------|----------------|
| | 2028 | 2038 | Ongoing |
| New Project residents, employees and dependents, Exhibit 4-1 | 200 | 490 | 470 |
| Exhibit 2-3 | 310 | 340 | 340 |
| Annual expenditures - FTE In-migrants to County Visitors from off-island | \$0.4 \$0.6 | \$1.1 \$0.7 | \$1.0 \$0.7 |
| New County expenditures | \$1.0 | \$1.7 | \$1.7 |
| OTHER AREA PROJECTS: Basis for County projection - FTE In-migrants to County Visitors from off-island ¹ | 390 | 960 | 960 |
| New Project residents, employees and dependents, Exhibit 4-1 | - | - | - |
| Annual expenditures - FTE In-migrants to County Visitors from off-island | \$0.8 \$0.0 | \$2.1 \$0.0 | \$2.1 \$0.0 |
| New County expenditures | \$0.8 | \$2.1 | \$2.1 |

| SUMMARY Proposed Action Impacts: Maui County State | Additional County expenditures Regional infrastructure and projects on DMHL land | | |
|---|---|----------------|----------------|
| | 2028 | 2038 | Ongoing |
| | \$1.0 | \$1.7 | \$1.7 |
| | \$0.0 | \$0.0 | \$0.0 |
| Cumulative Impacts: Maui County State | \$1.9 \$0.0 | \$3.9 \$0.0 | \$3.7 \$0.0 |

¹ Hotel projected to attract minimal visitors from on-island; all assumed to come from off-island for modeling purposes.

Pūlehuui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-6

Government Expenditures - State of Hawaii
2018 dollars, in millions, except as noted

| PROPOSED ACTION: Basis for State projection - FTE In-migrants to State Visitors from out-of-State | Basis/reference (not in millions) | | |
|---|-----------------------------------|----------------|----------------|
| | 2028 | 2038 | Ongoing |
| New Project residents, employees and dependents, Exhibit 4-1 | 100 | 220 | 220 |
| Exhibit 2-3 | 280 | 310 | 310 |
| Annual expenditures - FTE In-migrants to State Visitors from out-of-State | \$0.6 \$0.4 | \$1.4 \$0.4 | \$1.4 \$0.4 |
| New State expenditures | \$1.0 | \$1.8 | \$1.8 |
| OTHER AREA PROJECTS: Basis for State projection - FTE In-migrants to State Visitors from out-of-State | 130 | 310 | 300 |
| New Project residents, employees and dependents, Exhibit 4-1 | - | - | - |
| Annual expenditures - FTE In-migrants to State Visitors from out-of-State | \$0.8 \$0.0 | \$2.0 \$0.0 | \$1.9 \$0.0 |
| New State expenditures | \$0.8 | \$2.0 | \$1.9 |

| SUMMARY Proposed Action Impacts: Maui County State | Additional State expenditures Regional infrastructure and projects on DMHL land | | |
|---|--|----------------|----------------|
| | 2028 | 2038 | Ongoing |
| | \$0.0 | \$0.0 | \$0.0 |
| | \$1.0 | \$1.8 | \$1.8 |
| Cumulative Impacts: Maui County State | \$0.0 \$1.8 | \$0.0 \$3.8 | \$0.0 \$3.7 |

Pūlehuunui Regional Infrastructure Master Plan
ECONOMIC AND FISCAL IMPACT ASSESSMENT

Exhibit 5-7
County & State Government Fiscal Impact
2018 dollars, in millions

| | Basis/reference | 2028 | 2038 | Ongoing |
|--|-----------------|---------------|---------------|---------------|
| PROPOSED ACTION: | | | | |
| County of Maui: | | | | |
| New operating revenues | Exhibit 5-1 | \$2.3 | \$4.0 | \$4.0 |
| New operating expenditures | Exhibit 5-5 | \$1.0 | \$1.7 | \$1.7 |
| Net additional operating revenues | | \$1.3 | \$2.3 | \$2.3 |
| Revenue to expenditure ratio ¹ | | 2 | 2 | 2 |
| State of Hawaii: | | | | |
| New operating revenues ² | Exhibit 5-2 | \$10.5 | \$14.4 | \$10.8 |
| New operating expenditures | 0 | \$1.0 | \$1.8 | \$1.8 |
| Net additional operating revenues | | \$9.5 | \$12.6 | \$9.0 |
| Revenue to expenditure ratio ¹ | | 11 | 8 | 6 |
| OTHER AREA PROJECTS: | | | | |
| County of Maui - | | | | |
| New operating revenues | Exhibit 5-1 | \$4.7 | \$7.8 | \$7.8 |
| New operating expenditures | Exhibit 5-5 | \$0.8 | \$2.1 | \$2.1 |
| Net additional operating | | \$3.8 | \$5.7 | \$5.8 |
| Revenue to expenditure ratio ¹ | | 6 | 4 | 4 |
| State of Hawaii: | | | | |
| New operating revenues ² | Exhibit 5-2 | \$12.2 | \$20.8 | \$19.7 |
| New operating expenditures | 0 | \$0.8 | \$2.0 | \$1.9 |
| Net additional operating revenues | | \$11.3 | \$18.8 | \$17.8 |
| Revenue to expenditure ratio ¹ | | 15 | 10 | 10 |
| SUMMARY | | | | |
| Fiscal Impacts | | | | |
| <i>Regional Infrastructure and projects on DHHL land</i> | | | | |
| Proposed Action: | | | | |
| Net additional revenues - | | | | |
| Maui County | | \$1.3 | \$2.3 | \$2.3 |
| State | | \$9.5 | \$12.6 | \$9.0 |
| Revenue/expenditure ratio: | | 2 | 2 | 2 |
| Maui County | | 11 | 8 | 6 |
| State | | | | |
| <i>Above plus DLIR and PSD project impacts</i> | | | | |
| Cumulative: | | | | |
| Net additional revenues - | | | | |
| Maui County | | \$5.1 | \$8.0 | \$8.1 |
| State | | \$20.8 | \$31.5 | \$26.7 |
| Revenue/expenditure ratio: | | 4 | 3 | 3 |
| Maui County | | 12 | 9 | 8 |
| State | | | | |

1 New revenues divided by new expenditures.
2 Excludes potential developer/owner contributions such as development or maintenance of public facilities.
3 Excludes potential income taxes from any operating entities.

APPENDIX K

2014 MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into on this 1st day of May, 2014, by and between the DEPARTMENT OF HAWAIIAN HOME LANDS, an agency of the State of Hawaii ("DHHL"), the DEPARTMENT OF LANDS AND NATURAL RESOURCES ("DLNR"), an agency of the State of Hawaii, the DEPARTMENT OF PUBLIC SAFETY ("PSD"), an agency of the State of Hawaii, and the DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES, an agency of the State of Hawaii ("DAGS"), referred to herein singularly as "Party" or collectively as "Parties."

WITNESSETH:

WHEREAS, the Parties desire to undertake a cooperative effort in land use planning, fiscal coordination, and infrastructure construction on approximately nine hundred thirty six (936) acres of state lands, portions of which are managed by DHHL, and portions of which are managed by DLNR, in Pulehuniui, Island of Maui, State of Hawaii, as described in the attached Exhibit "A" to this MOU (hereinafter referred to as the "Pulehuniui Lands");

WHEREAS, DAGS and PSD are exploring the possibility of constructing and managing a correctional facility on a portion of the Pulehuniui Lands and wish to work collaboratively with DHHL and DLNR to ensure adequate infrastructure for the Pulehuniui Lands;

WHEREAS, the potential development of the Pulehuniui Lands presents an opportunity for each Party to fulfill its mission while benefiting from economies of scale, joint infrastructure financing, planning and development, as well as providing significant economic benefits to the Maui community;

WHEREAS, the Parties are entering into this MOU to confirm their mutual understandings with respect to studying the feasibility of and planning for an infrastructure development project proposed for the Pulehuniui Lands consisting of a Water Distribution System and a Sewer Collection System ("Project"), and to establish a collaborative process to approve and complete the Project; and

WHEREAS, the Parties desire to work collaboratively to secure funding for studying the feasibility of and planning for the Project.

NOW THEREFORE, the Parties agree as follows:

1. **PROJECT DESCRIPTION.** The Project is preliminarily envisioned by the Parties as construction of a Water Distribution System and an onsite Sewer Collection System to service the Pulehuniui Lands. A preliminary infrastructure plan for these two components has

been prepared by Austin, Tsutsumi & Associates, Inc. ("Consultant"), and is attached as Exhibit "B" to this MOU. These two components are described as follows:

A. **Water System Plan.** An onsite domestic water distribution system is to be constructed to provide service to all developments on the Pulehuniui Lands. The water distribution system will provide potable water and fire protection to all Parties. One of the several options the Consultant identified involves drilling brackish wells with a reverse osmosis water treatment facility on a portion of the Pulehuniui Lands managed by DHHL. Separate potable water, fire, and brackish water lines will throughout the portions of the Pulehuniui Lands proposed for development utilizing a pressurized water delivery system.

B. **Wastewater System Plan.** An onsite sewer collection system is to be constructed to service all proposed developments by the Parties on the Pulehuniui Lands. The collected sewage will be routed to a proposed onsite self-contained wastewater treatment facility ("WWTF") located on a portion of the Pulehuniui Lands managed by DHHL. The sewer collection system is expected to be comprised primarily of gravity lines with a forcemain and pump connected to the WWTF. The primary method of disposal of the effluent from the WWTF is expected to be irrigation reuse, with injection wells providing a backup disposal system. To achieve this goal, an R-1 non-potable water distribution system will be established throughout the Pulehuniui Lands for irrigation use by the Parties.

2. **BUDGET REQUESTS.** DHHL shall be the lead agency in making the FY2015 and FY2016 budget requests to the Legislature for feasibility and planning funding for the Project. DLNR, PSD, and DAGS shall make their best efforts to support DHHL's budget requests;

3. **COLLABORATIVE PROCESS AND TIMELINE.** The Parties shall make their best efforts to work in a collaborative manner to achieve the following goals within the timeframe provided:

| <u>Target Date</u> | <u>Transaction</u> | <u>Status</u> |
|--------------------|---|---------------|
| January 2014 | Legislative Request by DHHL for \$4 Million CIP funds for feasibility, planning and design of the Project | Completed |
| April 2014 | Execution of the MOU | |
| July 2014 | Secure legislative appropriation | |

Target Date Transaction Status

| | | |
|---------------|---|--|
| | release | |
| July 2014 | Initiate procurement process for feasibility/planning/design portion of Project | |
| December 2014 | Complete feasibility/planning/design portion of Project | |

4. **NOT A BINDING CONTRACT.** This MOU is not a legally binding contract. No Party may claim any legal rights under this MOU or seek any remedies against another Party or Parties for actions taken in reliance upon this MOU, including but not limited to, any partial or full performance hereunder or expenditure of time and/or money. Nothing in this MOU shall be deemed to construe the Parties as partners, joint venturers, or members in a principal/agent relationship. Nothing in this MOU shall be deemed to require expenditure of State funds or use of State lands. Any use of State lands or expenditure of State funds relating to the Project described in this MOU will be subject to all applicable laws and governmental approvals.

5. **COUNTERPARTS.** This MOU may be executed in counterparts, each of which shall be deemed an original, and said counterparts shall together constitute one and the same instrument.

THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK

IN VIEW OF THE ABOVE, the Parties execute this MOU by their signatures below.

DEPARTMENT OF HAWAIIAN HOME LANDS

APPROVED AS TO FORM: _____
By: [Signature]
Name: Jobic M.K. Masanajan
Its: Chairman, Hawaiian Homes Commission.

DEPARTMENT OF LAND AND NATURAL RESOURCES

APPROVED AS TO FORM: _____
By: _____
Name: _____
Its: _____

DEPARTMENT OF PUBLIC SAFETY

APPROVED AS TO FORM: _____
By: _____
Name: _____
Its: _____

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

APPROVED AS TO FORM: _____
By: _____
Name: _____
Its: _____

Memorandum of Understanding Between the Department of Hawaiian Home Lands, the Department of Land and Natural Resources, the Department of Public Safety, and the Department of Accounting and General Services.

IN VIEW OF THE ABOVE, the Parties execute this MOU by their signatures below.

DEPARTMENT OF HAWAIIAN HOME LANDS

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF LAND AND NATURAL RESOURCES

By: *William Alla*
Name: WILLIAM ALLA
Its: CHAIRPERSON, BOARD OF LAND AND NATURAL RESOURCES

APPROVED AS TO FORM:

William Alla
Deputy Attorney General
State of Hawaii

DEPARTMENT OF PUBLIC SAFETY

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

IN VIEW OF THE ABOVE, the Parties execute this MOU by their signatures below.

DEPARTMENT OF HAWAIIAN HOME LANDS

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF LAND AND NATURAL RESOURCES

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF PUBLIC SAFETY

By: *Ted Sakai*
Name: Ted Sakai
Its: Deputy Attorney General

APPROVED AS TO FORM:

Ted Sakai
Deputy Attorney General
State of Hawaii

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

Memorandum of Understanding Between the Department of Hawaiian Home Lands, the Department of Land and Natural Resources, the Department of Public Safety, and the Department of Accounting and General Services.

Memorandum of Understanding Between the Department of Hawaiian Home Lands, the Department of Land and Natural Resources, the Department of Public Safety, and the Department of Accounting and General Services.

IN VIEW OF THE ABOVE, the Parties execute this MOU by their signatures below.

DEPARTMENT OF HAWAIIAN HOME LANDS

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF LAND AND NATURAL RESOURCES

By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF PUBLIC SAFETY


By: _____
Name: _____
Its: _____

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

By: 
Name: Dean H. Seki
Its: Comptroller

APPROVED AS TO FORM:

Deputy Attorney General
State of Hawaii

Memorandum of Understanding Between the Department of Hawaiian Home Lands, the Department of Land and Natural Resources, the Department of Public Safety, and the Department of Accounting and General Services.

APPENDIX L

**DEPARTMENT OF PUBLIC SAFETY (PSD)
ACKNOWLEDGEMENT OF DHHL
DEVELOPMENT ASSUMPTIONS**



DAVID Y. LEE
GOVERNOR
STATE OF HAWAII

SHAN S. TRUTRU
DEPUTY GOVERNOR
STATE OF HAWAII

JOHIE M. K. MALKACHTANT
CHAIRMAN
HAWAIIAN HOMES COMMISSION

WILLIAM J. AILA, JR.
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS

P. O. BOX 1879
HONOLULU, HAWAII 96802

January 11, 2018

Mr. Clay Shimazu
January 11, 2018
Page 2

facilities and administrative offices. The secure housing will be for pre-trial detainees and sentenced inmates while the minimum security housing will be for inmates participating in programs to aid their transition back into the community.

The proposed MRPSC is anticipated to accommodate an initial population of 608, with plans for future expansion to approximately 843, in addition, a total staff of approximately 368 employees will be required for the new facility. The anticipated completion date of the proposed project is dependent on state funding and is thus not yet determined. For regional infrastructural planning purposes, an assumed completion date is 2023, this assumes a rough timeline of approximately 7 years after funding is obtained.

Water System

Potable water for the proposed project will be provided by the County Department of Water Supply's (DWS) potable water system which services the region. The estimated average daily demand for the project is 110,000 gallons per day (gpd) at the initial phase and 152,000 gpd at full build-out. The project's maximum daily demand is estimated at 166,000 gpd at the initial phase and 227,000 gpd at full build out. The project's peak hour flow demand is estimated at 331,000 gpd at the initial phase and 455,000 gpd at full build-out. A transfer of the existing potable water allocation for the Maui Community Correctional Center (MCCC) facility, which is approximately 102,000 gpd, to the new MRPSC will be requested from the DWS. A water commitment of 50,000 gpd from the DWS will be required for the proposed project.

The existing 12-inch water line located along Mokulele Highway will be extended along the existing access road to the project site. The water will pass through a DWS meter prior to entering the project site. An approximately 300,000 gallon potable water storage tank and booster pump will be constructed within the southwest portion of the project site to provide water source, pressure and to meet fire flow requirements for the on-site fire hydrants.

Memorandum

To: Clay Shimazu, Chief Planner
Hawaii Department of Public Safety

From: Kaleo Manuel, Acting Planning Program Manager
Planning Office, Department of Hawaiian Home Lands

Subject: Maui Regional Public Safety Complex (MRPSC)

Pursuant to our informal conversation on the proposed Maui Regional Public Safety Complex (MRPSC) project, we understand the following:

General Project Description

The general location is within portions of two adjacent larger parcels identified at Tax Map Keys (TMKs): (2) 3-8-008:037 (222.63 acres) and (2) 3-8-008:001 (398.1 acres), as shown in the attached map. The project area is approximately 40-45 acres.

The proposed MRPSC would provide a safe, secure, and humane environment for the care and custody of adult male and female offenders originating from the Second Circuit Court, which serves Maui, Molokai and Lanai and will eventually house other PSD programs operating in Maui County. In addition to addressing housing capacity, the MRPSC will provide significantly greater space for programs promoting rehabilitation and reducing recidivism.

The MRPSC will house pre-trial detainees, sentenced inmates and community work line and work furlough program inmates. The facility will include adult male and female secure and minimum security housing as well as a range of support

Non-potable water will be used for landscape irrigation within the project site. The source of water will be R-1 water from the project's WWTP. Estimated average daily demand is 130,055 gpd.

Wastewater System

The proposed project's wastewater system will include the development of an on-site individual WWTP to serve the project. The WWTP will treat wastewater to a tertiary level, producing R-1 quality water to be used for irrigation of the project site. The WWTP will be designed to treat an average flow of 138,000 gpd at the initial phase and 275,000 gpd at full build-out, with a peak hour flow of 480 gpm at the initial phase and 870 gpm at full build-out.

The projected average wastewater flow for the proposed project is approximately 110,000 gpd at the initial phase, and approximately 170,000 gpd at full build-out. The peak wastewater flow for the proposed project is approximately 275,000 gpd at the initial phase, and approximately 425,000 gpd at full build-out.

Drainage System

The proposed drainage system improvements for the project will consist of drain inlets, catch basins, and seven on-site retention basins. Retention basins will be sized to retain the increase in storm run-off from the proposed project based on a 50-year, 1-hour storm event. The proposed drainage system improvements will comply with the County's Drainage Standards.

Electrical System

The estimated electrical demand for the proposed project is 3,600 kilovolt-amperes (kVA). Based upon discussions with MECO, a new regional electrical substation is needed to serve the proposed project, as well as other anticipated development in the Punene area. MECO is currently considering locations for placement of the electrical substation.

A connection via fiber optic telecommunication cable from Hawaiian Telcom's pole line will be provided to serve the proposed project's voice and data telecommunication needs.

We understand the information contained herein is based upon the latest available calculations and projections for the subject property. It is anticipated that the information will be verified prior to any positive design commitments.

We are requesting your confirmation of this information provided to us during our conversation. If you have any questions, feel free to contact me at kaleo.l.manuel@hawaii.gov or 808-620-9481.

APPENDIX M

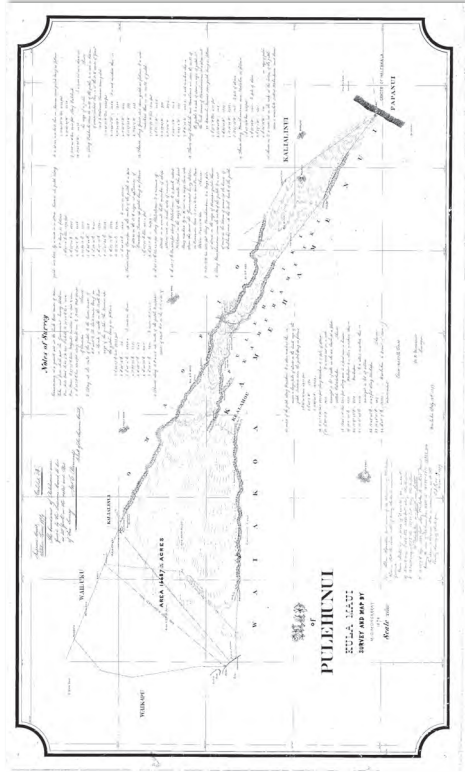
REVISED CULTURAL IMPACT ASSESSMENT

AA PROJECT NO. 1717

~~FINAL~~ REVISED

CULTURAL IMPACT ASSESSMENT FOR THE DEPARTMENT OF HAWAIIAN HOME LANDS PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

Pūlehunui Ahupua'a, Kula Moku, Wailuku Modern Tax District, Maui Island
TMK: (2) 3-08-008:008, 034, 035, and 036



*Moe kokolo ka uahi o Kula, he Hau
The smoke of Kula traveled low and swift, borne by the Hau wind.
'Ōlelo No'eau: 2170 (Pukui 1983:236)*

COVER PHOTO: LANDS OF THE PŪLEHUNUI (MONSARRAT 1878). KAONA BEHIND 'ŌLELO NO'EAU 2170
Said of one who is swift in movement. Also, in love and war much depends on swiftness and subtlety
(Pukui 1983:236).

The central isthmus of Maui, a large portion of which is encompassed by the lowlands of Pūlehunui
Ahupua'a, is well known for the swift winds that move across the plain that connects Maui
Kamohana (West Maui) and Maui Hikiina (East Maui).



Abstract

| | |
|--------------------------------------|---|
| Date | October 2018 -- FINAL |
| Project | Pūlehuunui Regional Infrastructure Master Plan |
| Proposing Agency (s) | Department of Hawaiian Home Lands (DHHL) |
| Project Area and Region of Influence | The potential area of direct effect, or project area, is considered the approximate 646-acre footprint of the South Parcel and approximate 184-acre footprint of the North Parcel within the DHHL Pūlehuunui Regional Infrastructure Master Plan in Pūlehuunui Ahupua'a, Kula Moku, Wailuku Modern Tax District, Maui Island. |

When assessing the presence or absence of direct and indirect effects of the proposed project on the traditional cultural practices of a region, traditional use and access to resources from the mountains to ocean, or mauka (mountain region) to makai (coastal region), must be taken into consideration. As such, the region of influence, or study area for the proposed project is defined as the geographic area encompassed by the known traditional boundaries of the *ahupua'a* of Pūlehuunui within the *moku* (traditional district) of Kula.

Results

Traditional *mō'ōlelo* (stories) and *wahi inoa* (place names), as well as historic maps, accounts given to the boundary commission suggests that while inland Pūlehuunui appears to have been fairly dry and barren with regard to traditional agriculture and agricultural practices, the lands of Pūlehuunui along the central Maui isthmus were well travelled. The position of these lands in relation to the agriculturally prosperous areas of Na Wai 'Ehā and upland Kula likely served as a transit area not only between the two agricultural areas, but also as a transit area to the rich marine resources of the coastline.

The central isthmus in general is also said to be an area inhabited by 'aumakua (guardian spirits) and traversed by *huaka'i pō* (nightmarchers) on the nights that honor Kane, Ku, Lono, or Kanaloa. This general area has also specifically been noted as the place in which the souls of those who lost their lives in the Battle of Kakanilua dwelt.

While small scale traditional cultivation of sweet potato and other dry land crops may have been possible within the central isthmus, there is currently no known traditional recollection or archaeological site remains to indicate that this was carried out prior to the arrival of Western vessels in the archipelago.

Though no physical alteration of traditional cultural resources, practices or beliefs are anticipated within the footprint of the proposed project area as a result of the proposed action, concerns with regard to dust, runoff, and sedimentation of the southern shorelines of Kīhei, or Kīheipuko'a, have

CULTURAL IMPACT ASSESSMENT FOR THE DEPARTMENT OF HAWAIIAN HOME LANDS PŪLEHUUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

Pūlehuunui Ahupua'a, Kula Moku, Wailuku Modern Tax District, Maui Island
TMK: (2) 3-08-008:008, 034, 035, and 036

2/13/2019
Final Revised

Prepared For:

Department of Hawaiian Home Lands

Prepared By:

Tanya Lee-Greig, M.A.

Under Contract To:

PBR HAWAII & Associates, Inc.
Honolulu, HI

'Āina Archaeology

O'ahu: 725 Kapi'olani Blvd, C400 Honolulu, HI 96813
Maui: 590 Līpoa Parkway, Suite 106 Kīhei, HI 96753

been shared. The fishing grounds off of the Pūlehuunui shoreline has provided for the families of Kīhei for generations. Concerns have been raised about maintaining the integrity of the nearshore reef and marine resources considering the proposals for increasing use of the *mauka* lands.

There are two drainages in relation to the South parcel that may be of concern. Keahuaui Gulch, which is located adjacent to and south of the southern project foot print drains into the Keālia wetland and Kīhei, while an un-named watercourse runs through the approximate center of the south project footprint and drains into Keālia wetland.

Additional concerns regarding maintenance of the gulches in terms of ensuring that the gulch bottoms are free of both naturally deposited debris (tree limbs) and man-made debris (refuse and green waste) were also raised as this type of debris have been known to end up in the near shore waters following a major flood event.

Finally, concerns regarding the potential use of off-site water sources were raised by two reviewers during the public comment period for the EIS Preparation Notice (EISPN). The lands of the central isthmus were likely primarily grasslands, general aridity and seasonality of water availability appears to have precluded intensive traditional settlement and continuous traditional agriculture. The transformation of the central isthmus into arable lands for large scale agriculture was dependent on the development of both the East Maui Irrigation system, which diverted surface water from the east Maui watershed, and the Wailuku Agribusiness system, which diverted surface water from the Na Wai 'Ehā watershed. A couple of EISPN comments included questions with regard to pulling water resources from the 'Īao Aquifer and surface water sources from the other streams of Na Wai 'Ehā, along with reservations about water allocation for the Proposed Action of the EIS, and how that may affect South Maui.

Recommendations
Honoring the Traditional Landscape while Protecting the Shoreline and Wetland Environment and Resources:

- Use traditional place names whenever possible in project design, signage, and other project related materials.
- Identify potential runoff and flooding zones within the project area to ensure proper maintenance of water channels in order to help minimize coastal resource degradation that may result from flooding.
- Monitor and record rain and weather patterns that may assist with maintaining the integrity of the coastal environs
- Increase awareness of the connectivity between the *mauka* and *makai* weather patterns of Kula Moku.
- As a part of farm and development plans, the use of appropriate native ground cover in non-cultivated areas should be considered

to minimize dust pollution that may result from modern agricultural practices and carried by the winds through the central valley.

- Advocate for the re-introduction and cultivation of native plants suitable to the area to the extent possible as a means to foster traditional woodwork and craftsmanship (see also Section 6.2).
- While traditional trail access has not occurred through the current project area in the last century, consider the potential trail systems during lot design to accommodate the traditional revival of accessing the shoreline through mauka-makai trail systems, as well as, transit between Waikapū and upland Kula.
- Prior to the initiation of land development, whether residential, business, or agriculture, appropriate blessings should be carried out as the central isthmus and lower region of Pūlehuunui is known as a place in which the spirits reside.
- Foster and encourage a *mālama 'āina* land stewardship ethic both within and beyond the physical boundaries of the DHHL Project Areas through:
 - Active enforcement and/or monitoring of established environmental Best Management Practices during and after construction within the DHHL Project Lands
 - Development of waste management plan to manage waste onsite and keep the gulches clear of refuse and green waste;
 - Continued consultation with Keālia Pond National Wildlife Refuge;
 - Environmental education and outreach programs driven by Beneficiary, agency, business, and/or nonprofit organizations.
 - Prospective developers or tenants at Pūlehuunui North who embrace this land ethic with sustainable business proposals and practices should be favorably considered from a cultural standpoint.

Oia i ka Wai – Water is Life

An assessment of potential water sources for the Proposed Action of the EIS is ongoing. Should water from either the Na Wai 'Ehā or East Maui Watershed be identified as possible preferred alternatives for the Proposed Action, continued close consultation with, and input from Native Hawaiian communities, as well as stakeholders that hold appurtenant and riparian rights within the originating watershed, and other public trust uses of water is highly recommended.

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The Hawaiian Homes Commission Act (§§204 and 206) vests DHHL with exclusive authority to control its lands, which means the DHHL Project Areas are not subject to State or County land use controls. Instead, DHHL established a planning system that includes a General Plan, Island Plans, Program Plans, Regional Plans, Special Plans and a number of implementing mechanisms. The Island Plans identify DHHL's land use designations, which are DHHL's equivalent to zoning.

DHHL's Island Plans are island-specific, 20-year visioning documents that designate land uses for DHHL-owned property. In 2004, DHHL adopted the (DHHL) *Maui Island Plan* which examined all DHHL land in terms of development constraints and opportunities and other criteria, to assign appropriate Land Use Designations to each parcel. The *Maui Island Plan* designates Pūlehuunui South primarily for General Agriculture use with 100 acres designated for Industrial Use. (Department of Hawaiian Home Lands, 2004). At Pūlehuunui North, the Maui Island Plan designates Parcel 36 for industrial use. The adjacent Parcels 8 and 35 were acquired subsequent to the Maui Island Plan, and the Maui Island Plan was amended to designate Commercial and Industrial uses on those parcels.

However, recent Beneficiary feedback indicated that the preferred land use program at Pūlehuunui South should include a much higher diversity of uses than those provided for under the existing *Maui Island Plan* designation which only includes General Agriculture and Industrial uses. In addition to the existing designations, Beneficiaries expressed a strong preference for agricultural homesteads, agricultural support, and community uses such as cultural education and central community gathering space. The land uses preferred by Beneficiaries at Pūlehuunui South correspond to DHHL land use designations of Subsistence Agriculture, Community Use, Supplemental Agriculture, and Commercial Use. Following the completion of the EIS process, DHHL will pursue an amendment of its Maui Island Plan to accommodate the proposed agricultural homesteads and other new uses at Pūlehuunui South. A proposed amendment to the *DHHL's Maui Island Plan*, was created to support this preference.

Land use programs in DHHL Project Areas will inform the regional infrastructure analysis which will also incorporate by reference other project information provided by DLNR and DAGS/PSD, for their respective proposed developments. DHHL land use programs are anticipated to involve commercial, light industrial, diversified agricultural, and subsistence agricultural use including agricultural homesteads for DHHL Beneficiaries. A portion of Pūlehuunui South may accommodate supporting regional infrastructure, pending consultation and appropriate technical studies. A more detailed description of the anticipated land uses is provided below.

1.1.1 Commercial/Industrial Uses

Commercial/light industrial use is anticipated to occupy up to 135 acres at Pūlehuunui North (figure) (including 40 acres for a possible cultural center/visitor attraction), plus five acres for a

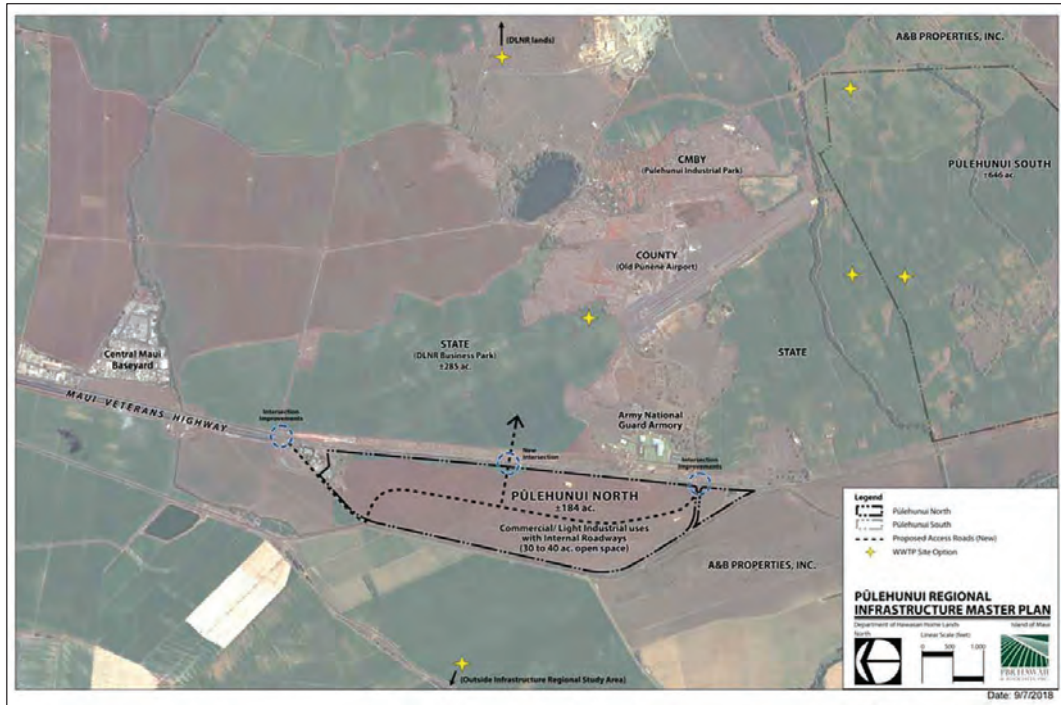


Figure 1-1. Proposed conceptual master plan for the DHHL Pūlehunui North Parcel (plan courtesy of PBR HAWAII & Associates, Inc.)

possible hotel at the discretion of a future developer), and approximately 115 acres at Pūlehunui South. Commercial/industrial use provides for the most flexible use of the DHHL Project Areas and could support retail, agribusiness processing, packaging, and/or marketing of agricultural goods produced at Pūlehunui South and throughout Central Maui. Light industrial-zoned lots on other Maui properties accommodate retail uses. Large, contiguous commercial lots within Pūlehunui North would be suitable for a more comprehensive commercial or retail complex and/or a visitor attraction destination, cultural center, business hotel or other large visitor industry-based use.

In addition to revenue generation to support DHHL activities, DHHL proposes to provide commercial/light industrial use areas in Pūlehunui South devoted to use by smaller businesses including those of DHHL Beneficiaries, to support Beneficiary economic development initiatives. Activities in this area will build capacity in the small business community by providing a space for individual businesses or Beneficiary individuals or organizations to produce and sell products and services in a highly-visible and central location off Maui Veterans Highway.

1.1.2 Open Space and Agricultural Uses

Between roughly 30 and 40 acres of open space have been assumed in the development plan to meet drainage needs at Pūlehunui North. The majority of Pūlehunui South (figure) will be used for agriculture, with some of its open space supporting agricultural crops selected to avoid impacting visual resources or business visibility.

1.2 PROJECT AREA OF POTENTIAL EFFECTS (APE)

The Guidelines for Assessing Cultural Impacts, adopted on November 19, 1997 by the Environmental Council, State of Hawai'i states:

(For) the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place (proposed project area). This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment.... An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices. (State of Hawaii Office of Environmental Quality Control 2012:11)

For this study, the ahupua'a of Pūlehunui is considered the study area while the development footprint of the proposed project is identified as the direct area of potential effect (hereinafter referred to as project area) (see also Figure 1-3). The purpose of this document is an attempt to identify traditional cultural practices that occur within the study area that may be potentially impacted during or as a result of development of the proposed project area.

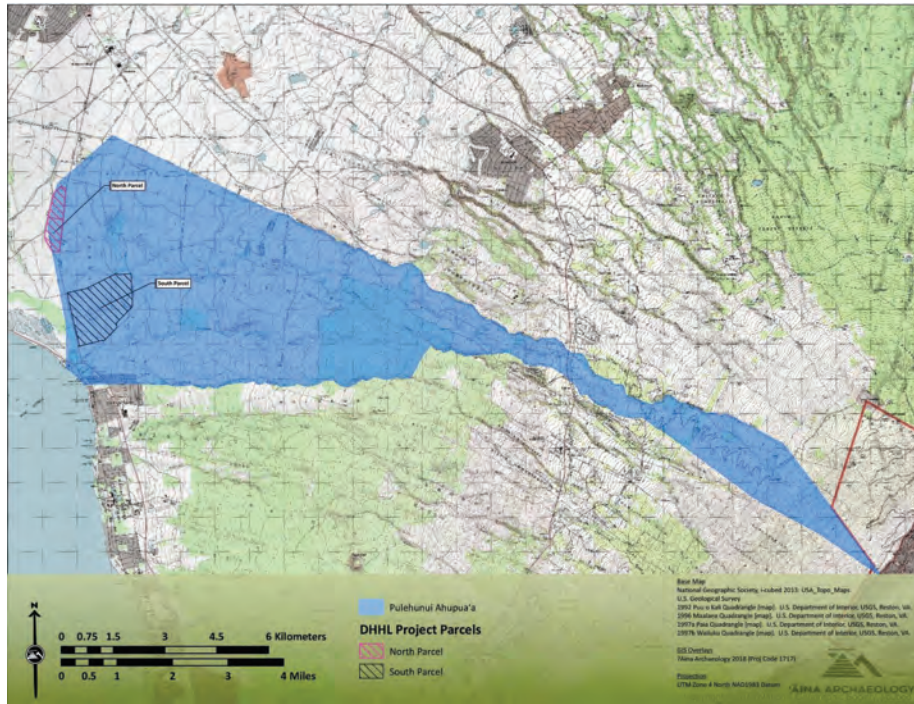


Figure 1-3. Portions of the USGS 7.5 minute Topographic Quadrangles for Wailuku (1997b), Paia (1997a), Puu o Kali (1992), and Maalaea (1996) showing the current project area (cross-hatched in blue) in relation to the overall study area of Pūlehunui Ahupua'a.

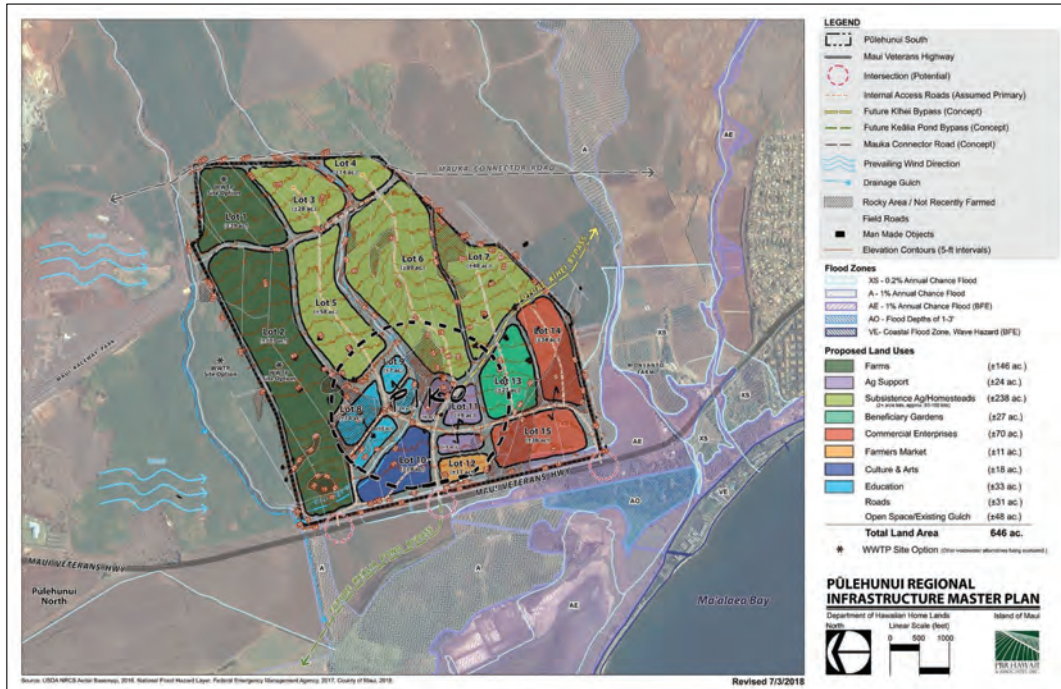


Figure 1-2. Proposed conceptual master plan for the DHHL Pūlehunui South Parcel (PBR HAWAII & Associates, Inc.)

2.0 ENVIRONMENTAL SETTING

2.1 NATURAL ENVIRONMENT

The most prominent geologic features of the study area is the large, dormant shield volcano of Haleakalā, with the broad flanks, deep gulches in the *mauka* reaches that grade to moderate to shallow embankments toward the central isthmus where the lava flows and alluvial fans of the West Maui mountains merge with that of Haleakalā (Stearns and MacDonald 1942:7). The average annual rainfall accumulation at the elevation of the current project area is generally less than 5 inches per year (Giambelluca et al. 2013), with the heaviest rainfall, approximately 2"-3", occurring during the winter months (December through February) and little (~0.25") to no rainfall during the summer months (June through August) (Giambelluca et al. 2013; Pratt and Gon III 1998:56). The resulting soils of the area are of the Pulehu-Ewa-Jaucus Association which are well-drained and excessively drained soils on alluvial fans and in basins that developed in alluvium weathered from basic igneous rock, coral, and seashells (Foote et al. 1972:8 and Maui General Soils Map). The specific soil units within the project area consists of patches of soils associated with the Waiakoa Soil Series (WeB, WgB, WhB, and WID2) and Alae Soil Series (AaB, Aca, and ACB), with larger expanses of units associated with the Pulehu (PpA, PRA, and PSA) and Ewa (EaA) Soil Series (Figure 2-1).

The Waiakoa Series consists of well-drained soils that can be found in the upland areas at elevations that range from 100 to 1,000 feet (Foote et al. 1972:126). These soils are generally gently sloping to moderately steep, with the upper portion of the profile influenced by volcanic ash. At the time of the USDA Soil Survey, Waiakoa soils were used for sugarcane, pasture, homesites, and wildlife habitat (see Table 2-1 for soil unit details). The Alae Soil Series can be found at lower elevations, at generally 50 to 600 feet, and consists of excessively drained soils on alluvial fans that developed in volcanic ash and recent alluvium (Foote et al. 1972:14). These soils are nearly level to gently sloping with many areas having cobbles on the surface. At the time of the USDA Soil Survey, lands characterized by Alae Soils were used for sugarcane and pasture with small acreages are used for truck crops (see Table 2-1 for soil unit details). The Ewa Soil Series also consists of well-drained soils that are generally found in basins and on alluvial fans on both Maui and O'ahu islands. Found near the shoreline, at elevations that range from near sea level to 150 feet, these soils are nearly level to moderately sloping and have developed in alluvium derived from basic igneous rock. At the time of the USDA Soil Survey, Ewa soils were used for sugarcane, truck crops, and pasture (Foote et al. 1972:29). Finally, larger expanses of the project area are underlain by soils associated with the Pulehu Soil Series. These soils occur on the islands of Lānaʻi, Maui, Molokaʻi, and Oʻahu and consists of well-drained soils on alluvial fans and stream terraces and in basins (Foote et al. 1972:115). Developed in alluvium washed from basic igneous rock, Pulehu soils are nearly level to moderately sloping and generally found at elevations that range from nearly sea level to 300 feet. At the time of the USDA Soil Survey, Pulehu soils were used for sugarcane, truck crops, pasture, homesites, and wildlife habitat (see Table 2-1 for soil unit details).

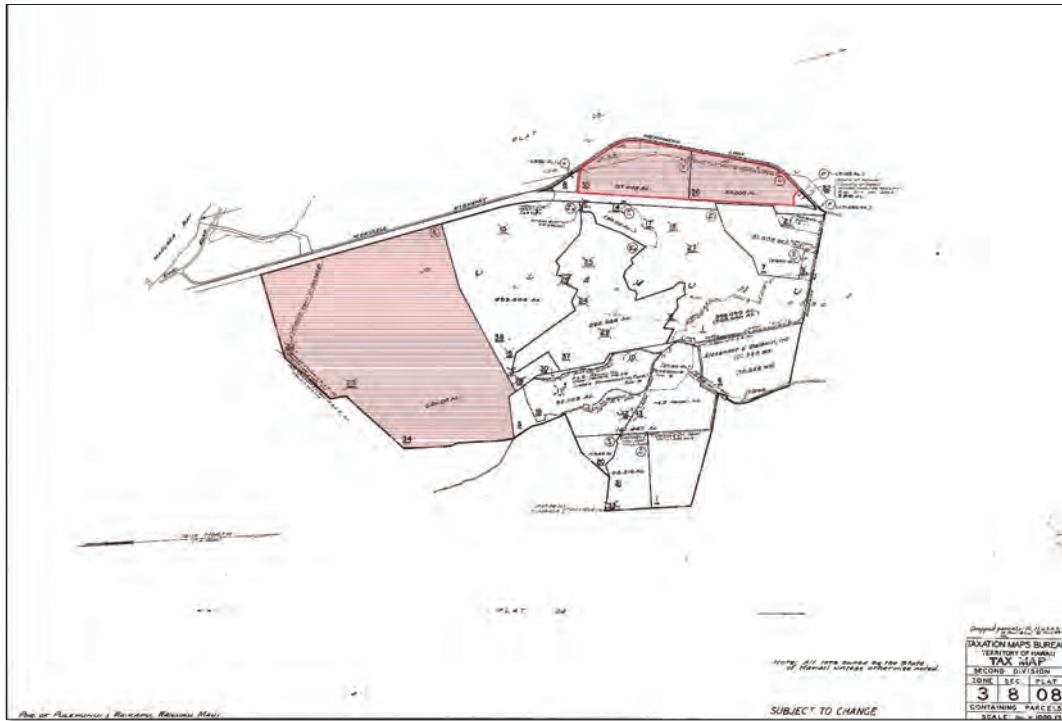


Figure 1-4. Tax Map Key (2)3-8-08 showing the location of the project parcel hatched in red.

Table 2-1. Soil Descriptions for Soil Units Found Within the Current Project Area (adapted from Foote et al. 1972)

| Soil Unit | Soil Unit Name | Soil Description | Land Use |
|-----------|--|--|--|
| AaB | Alae sandy loam, 3 - 7% slopes | Similar to AcA soils except that there are no cobblestones on the surface. Runoff is slow, and the erosion hazard is slight. In places there are few to many pebble-size rock fragments in the surface layer. | Sugarcane and pasture, small acreages used for truck crops |
| AcA | Alae cobbly sandy loam, 0 - 3% slopes | A representative profile shows the surface layer (~7 in. thick), is very dark grayish-brown, cobbly sandy loam that has granular structure. The substratum (~48 in. or more), is very dark grayish-brown, very dark gray, and grayish-brown sandy loam and coarse and very coarse sand. The soil is neutral or mildly alkaline in the surface layer and mildly to moderately alkaline in the substratum. Permeability is rapid. Runoff is slow, and the erosion hazard is no more than slight. | Sugarcane and pasture |
| AcB | Alae cobbly sandy loam, 3 - 7% slopes | Soil, runoff is slow and the erosion hazard is slight. | Sugarcane and pasture |
| EaA | Ewa silty clay loam, 0 - 3% slopes | A representative profile shows a surface layer that is dark reddish-brown silty clay loam (~18 in. thick). The subsoil (~ 42 in. thick), is dark reddish-brown and dark-red silty clay loam that has subangular blocky structure. The substratum is either coral limestone, sand, or gravelly alluvium. Runoff is very slow and the erosion hazard is no more than slight. | Sugarcane and homesites |
| PpA | Pulehu silt loam, 0 - 3% slopes | Similar to PsA soils, except that the texture is silt loam. | Sugarcane, small acreages used for homesites |
| PrA | Pulehu cobbly silt loam, 0 - 3% slopes | Similar to PsA soils, except that the texture is silt loam with many surface cobblestones. In some areas, cobblestones are common throughout the profile. Areas that are underlain by coral sand at a depth ranging from 20-36 in. was also included in this classification. | Sugarcane and pasture |

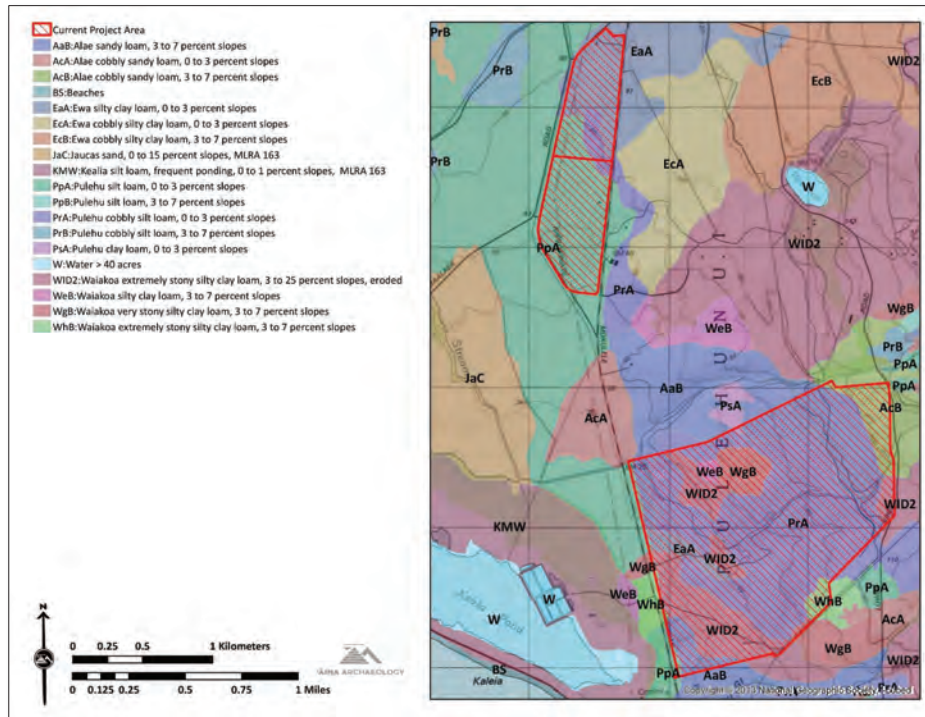


Figure 2-1. Portions of the USGS 7.5 minute Topographic Quadrangles for Wailuku (1997b), Paia (1997a), Puu o Kali (1992), and Maalaea (1996) showing the current project area (hatched in red) in relation to the underlying soil series (USDA-NRCS-NCGC 2001).

The above described geology, pattern of rainfall, and underlying soils once supported a lowland dry shrubland and grassland native ecosystem (Pratt and Gon III 1998:122). Vegetation along the lower elevation plains that would have been supported include grasslands of *pili* (*Heteropogon contortus*), *a'ali'i* (*Dodonaea viscosa*) shrublands, small patches of *ma'o* (Hawaiian cotton, *Gossypium tomentosum*), and dwarf shrublands of *ākoko* (*Chamaesyce* sp.) along with some occurrences of the now endangered *ko'oloa'ūla* (*Abutilon menziesii*) and shrubs of the amaranth family (*Achyranthes splendens* var. *rotundata*) (Pratt and Gon III 1998:127-128).

The lands of the project area have been altered by intensive land use for cattle pasture, as well as commercial sugarcane cultivation up until 2016. The lands are currently fallow and covered with non-native grasses, remnant stands of sugarcane, kiawe trees (*Prosopis pallida*), and *koa haole* (*Leucaena leucocephala*) (Figure 2-2), along with patches of tree tobacco (*Nicotiana glauca*) that are generally concentrated around abandoned ammunition magazine storage buildings from the World War II (WWII) era (Figure 2-3).

2.2 BUILT ENVIRONMENT

As previously noted, the proposed DHHL project is currently evaluating land use options for two parcels (North Parcel and South Parcel) located to the west and east of Maui Veterans Highway respectively (Figure 2-4). In general, the interior of both project parcels are largely characterized by fallow, former sugarcane fields, the built features within the overall project footprint currently consists of roughly paved cane-haul roads, unimproved in-field roads, and abandoned storage structures and a communications tower associated with the brief military use of the project lands during WW II (Figure 2-5 and Figure 2-6, see also Figure 2-3).

The immediately surrounding built environment however, is relatively unique to each location. With regard to the North Parcel, the most prominent built features adjacent to this parcel are the four-lane Maui Veterans Highway with a planted median that borders the eastern extent, the facilities of the Maui Humane Society to the north, and the two-lane Mehamaha Loop Road along the west and south extent. The built features in vicinity of the South Parcel includes the four-lane Maui Veterans Highway bordering the project parcel to the west, the former Naval Air Station (NAS) Puunene and Maui Airport landing strip to the north, Hawaiian Cement quarrying operation to the northeast, and the Kaiwahine residential subdivision to the south (see also Figure 2-4).

Table 2-1 (continued). Soil Descriptions for Soil Units Found Within the Current Project Area (adapted from Foote et al. 1972)

| Soil Unit | Soil Unit Name | Soil Description | Land Use |
|-----------|---|---|---|
| PsA | Pulehu clay loam, 0 - 3% slopes | A representative profile shows a dark brown surface layer of clay loam (~21 in. thick) underlain by dark-brown, dark grayish-brown, and brown, massive and single grain, stratified loam, loamy sand, fine sandy loam, and silt loam (~39 in. thick). Below this is coarse, gravelly or sandy alluvium. PsA soil is neutral in the surface layer and neutral to mildly alkaline below the surface layer. Permeability is moderate and runoff is slow, with a no more than slight erosion hazard. | Sugarcane, truck crops, and pasture |
| WeB | Waiakoa silty clay loam, 3 - 7% slopes | Similar to WgB soils, except that it is non-stony. | Sugarcane and small acreages of pasture and homesites |
| WgB | Waiakoa very stony silty clay loam, 3 - 7% slopes | A representative profile shows a surface layer that is a dark reddish-brown silty clay loam (~2 in. thick). The subsoil (~23 in. thick), is a dark reddish-brown and very dark grayish-brown silty clay loam that has prismatic structure or is massive. The substratum is very dark brown silty clay loam and hard, basic igneous rock. This soil is neutral in the surface layer and slightly acid to neutral in the subsoil. Permeability is moderate. Runoff is slow, and the erosion hazard is slight. In places roots penetrate to bedrock. | Sugarcane, pasture, and wildlife habitat |
| WhB | Waiakoa extremely stony silty clay loam, 3 - 7% slopes | Similar to WgB soils, except that stones cover 3 – 15% of the surface. | Sugarcane, pasture, and wildlife habitat |
| WID2 | Waiakoa extremely stony silty clay loam, 3 - 25% slopes, eroded | Similar to WgB soils, except that it is eroded and stones cover 3 – 15% of the surface. Runoff is medium, and the erosion hazard is severe. In most areas about 50% of the surface layer has been removed by erosion. | Pasture, and wildlife habitat |



Figure 2-4. World Imagery orthophoto (Esri et al. 2018) showing an overview of the natural and built environment of the lower region of Pūlehunui Ahupua'a (outlined in blue) in relation to the current project area (cross-hatched in blue).



Figure 2-2. Overview of the typical vegetation within the current project area.



Figure 2-3. Overview of the typical vegetation surrounding the abandoned ammunition magazine storage building within the current project area.



Figure 2-5. Aerial view of Puunene Airport in the fore and middle ground with Keālia Wetland in the background (Hawaii State Archives [HSA] Call number: PP-2-3-001; Date: ca. 1948 Photographer: U.S. Air Force)



Figure 2-6. Typical ammunition magazine storage building and environment within the current project area, view to south-southeast.

3.0 CULTURAL HISTORICAL BACKGROUND

The division of Maui's lands into political districts occurred during the rule of Kaka'alaneo, under the direction of his *kahuna*, Kalaiha'ōhi'a (Beckwith 1970:383). This division resulted in the creation of twelve districts or *moku* during traditional times: Kula, Honua'ula, Kahikinui, Kaupō, Kīpahulu, Hāna, Ko'olau, Hāmākuā Loa, Hāmākuā Poko, Na Poko or Na Wai 'Ehā (Wailuku), Kā'anapali, and Lahainā (Alexander 1882; Sterling 1998:3). The *moku o Ioko*, or *moku* as it is most commonly called, literally means "to cut across, divide, separate" (Lucas 1995:77). When used as a term of traditional land tenure, a *moku* is similar to a modern political district.

Within these *moku* are smaller units of land called *ahupua'a*, a word that is derived from the Hawaiian term *ahu* (altar), which was erected at the point where the boundary of land was intersected by the *alaiaa* (main road encircling the island), upon which a carved *pua'a* (hog) image, made of kukui wood and stained with red ochre was placed along with the tax of food items from that particular land unit as payment to the *ali'i* (chief) during the annual progression of the *akua makahiki* (Alexander 1882:4). The typical configuration of the *ahupua'a* extends from the sea to the mountain so that the *ali'i* (chiefs), as well as the *maka'āinana* (common people) could have access to products of the *uka* (mountain region), the cultivated land, and the *ka'i* (sea) (Alexander 1882:4). While the boundary generally followed prominent landforms (i.e. ridge lines, the bottom of a ravine, or defined by a depression) there were times where a stone or rock that was notable from a tradition or sacred use would mark a corner or determine a line (Alexander 1890:105-106). Along similar lines, the growth of a certain kind of tree, herb or grass, or the habitat of a certain kind of bird would sometimes define a division (Alexander 1890:105-106).

The current study area of Pūlehuui Ahupua'a is a traditional land division that is situated on the west flank Haleakalā, and includes a portion of the southwest facing shoreline that is located within the traditional *moku* of Kula (Figure 3-1 and Figure 3-2). Geographically, Pūlehuui Ahupua'a extends from the *pu'u* of Kīlohana at approximately 9520 ft. above mean sea level to the shoreline boundary that extends from Kīhei to the north and Kalae Pohaku to the south. While the *mauka* boundaries were undisputed and clearly defined by sections of Kōialoa Gulch, Hapapa Gulch, and Waiakoa Gulch to the south, along with Pūlehu Gulch to the north, the boundaries between Waikapū and Pūlehuui on the central isthmus were a different matter.

The issue at hand was whether or not Pūlehuui Ahupua'a extended into the central isthmus of Maui and include a section of coastline. Witness testimony for a boundary dispute between Waikapū and Pūlehuui in 1879 (Harris et al. 1879) describes the *ahupua'a* of Pūlehuui as broad along the lower western reaches where it overlies the central isthmus of Maui, the interior of which was strewn with stones in some places but mostly consisted of soil and black sand. The shared boundary with the *ahupua'a* of Waikapū to the west, was settled as extending from Kīhei to the north and ending at a place called Kaopala. Ultimately, the matter was taking to the Supreme Court who agreed with the finding of the Commissioner of Boundaries and ruled that

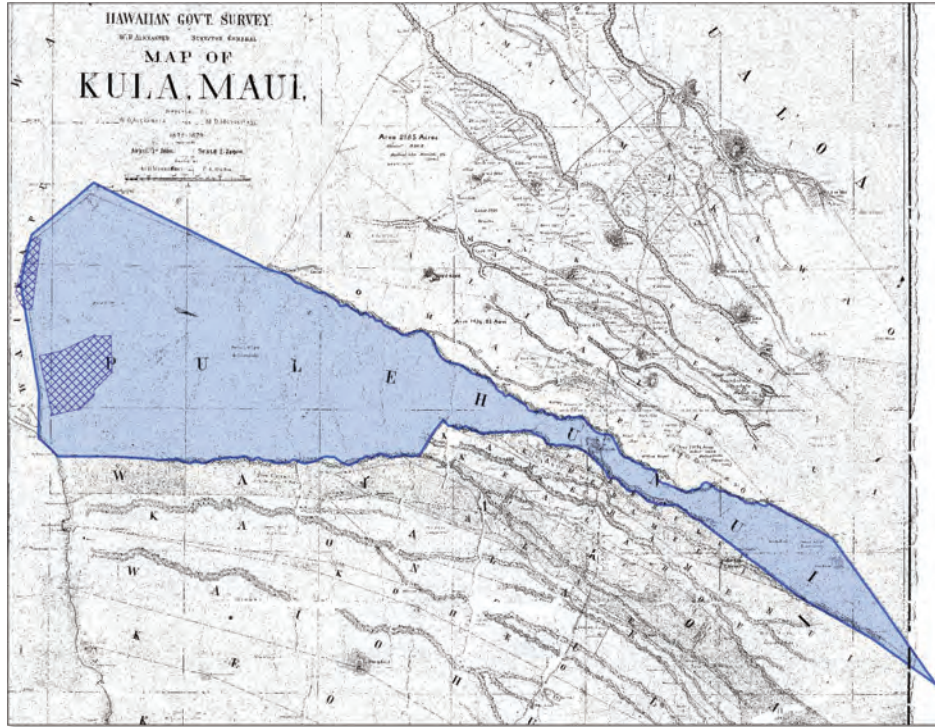


Figure 3-2. A portion of the Hawaiian Government Survey map (Monsarrat and Dodge 1880) of Kula Moku showing the configuration of Pūlehuui Ahupua'a (shaded in blue) in relation to the DHHL project parcels (cross-hatched in blue) and adjacent ahupua'a of Kula Moku.

the true and ancient boundary of Pūlehuui extended makai to Kaopala rather than further mauka at Pohakīkī'i and included the coastline from Kīhei to Kīheipuko'a. The lands of the current project area lie within this formerly disputed area of Pūlehuui (Figure 3-3).

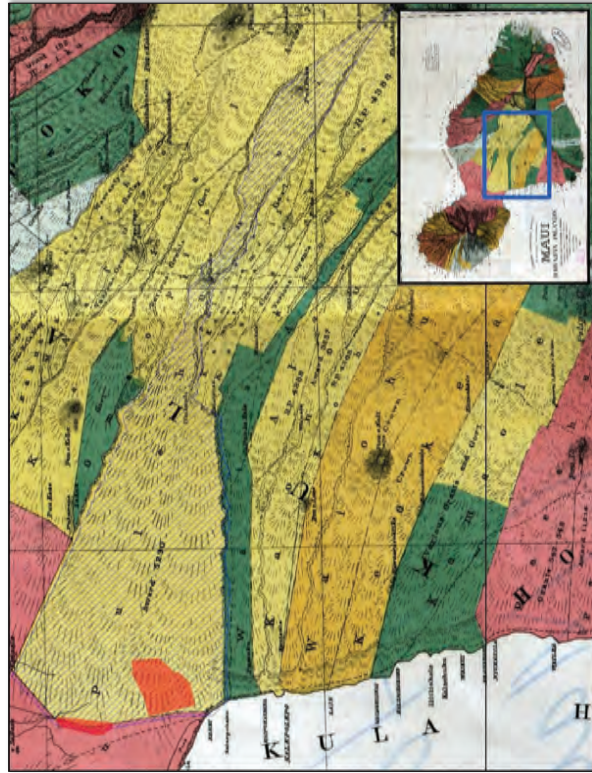


Figure 3-1. A portion of the F.S. Dodge map of Maui (1885) showing the DHHL project parcels (shown in red) in relation to Pūlehuui Ahupua'a (hatched in blue) and Kula Moku.



3.1 HE MO'OLELO NO PŪLEHUUNUI I KA WA KAHIKO

In the preface of *Place Names of Hawaii* (Pukui et al. 1974:x), Samuel Elbert states that:

Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.

Place names are far from static ... names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones ... it is all the more essential, then to record the names and the lore associated with them (the ancient names) now.

Intrinsic in the statements of Elbert is the knowledge that the oldest *wahi inoa* (place names) held meaning and could tell the story of an area, or recorded the resources of a particular place, prior to European contact. An analysis of the *wahi inoa* for the study area may yield some insight into the stories, patterns of life and land use within Pūlehuunui Ahupua'a. The names and geographic characteristics listed below are for land areas, fisheries, land divisions, markers, and other resources noted within the *makai, pū'āi* (isthmus), *waena* (mid-elevation zone), and *mauka* regions of Pūlehuunui Ahupua'a. These areas were identified through research of the Māhele 'Āina documents and other available historic literary resources which include the Hawaiian Government and Territorial Survey Maps (Dodge 1885; Monsarrat 1878; Monsarrat and Dodge 1880), the USGS Topographic 7.5-Minute Series Maps, and consultation with *kama'āina* of the region. Unless indicated otherwise, the spelling, orthography, and translations presented below are taken from Pukui and others (1974) where provided.

| | |
|---|---|
| Alakoa (<i>wahi inoa pū'āi</i>) | <i>Lit.</i> , soldiers street; a place in the middle of Pūlehuunui that was shared during testimony in the <i>ahupua'a</i> boundary dispute (Homai in Harris et al. 1879:244) |
| Haleokāne (<i>'ili</i>) | <i>Lit.</i> , house of Kāne |
| Hāpapa (<i>Gulch</i>) | <i>Lit.</i> , rock stratum; also noted as a stick for catching 'io (Hawaiian hawk, <i>Buteo solitarius</i>) (Pukui and Elbert 1986:59) |
| Hiolua (<i>Atolua</i>) (<i>'ili</i>) | Meaning currently unknown |
| Holaiamaa (<i>wahi inoa mauka</i>) | Meaning currently unknown |
| Kā'ōpala (<i>stream, wahi inoa pū'āi</i>) | <i>Lit.</i> , the rubbish; formerly known as Kailinawai, an ancient water course that divides two lands (Homai in Harris et al. 1879:244) |

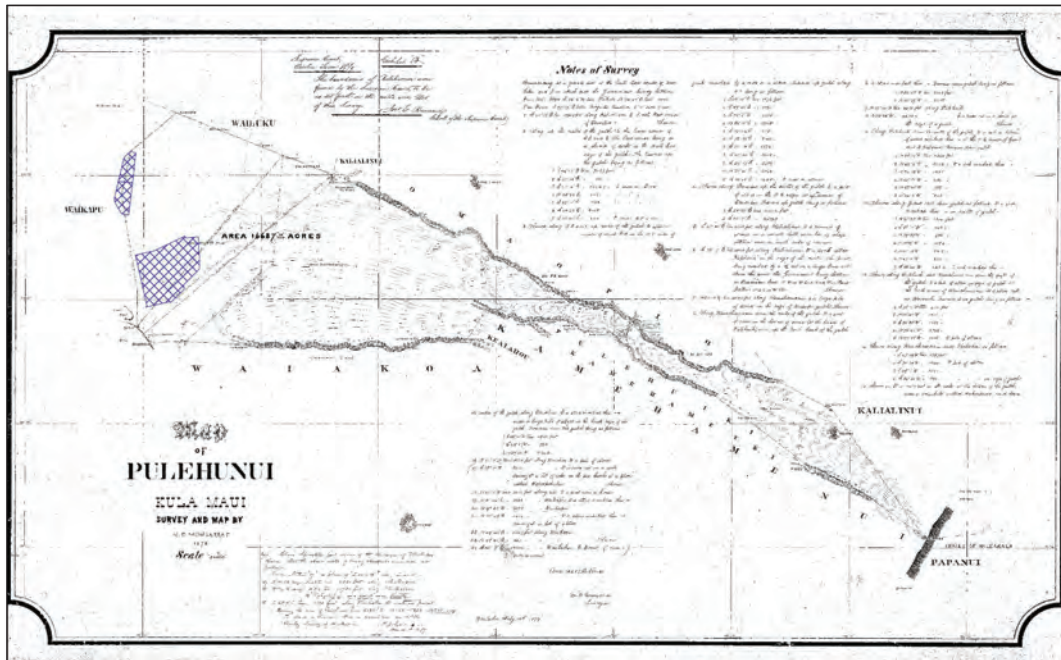


Figure 3-3. Monsarrat (1878) map showing the location of the DHHL project parcels in relation to the area of Pūlehuunui Ahupua'a that was under dispute in 1879 and final boundaries of Pūlehuunui Ahupua'a,

| | |
|--|---|
| Kaooaiki (gulch) | Kā'ao'ao is the name for a garden patch (Pukui and Elbert 1986:108) |
| Kaawiha (<i>wahi inoa mauka</i>) | Meaning currently unknown |
| Kahaipuaa (<i>wahi inoa mauka</i>) | Meaning currently unknown |
| Kailinawai (stream, <i>wahi inoa pū'āli</i>) | Former name of the place now called Ka'ōpala, because there the waters of the Haleakalā and the West Maui Mountains joined (Kalama in Harris et al. 1879:245) |
| Kalaepōhaku (<i>wahi inoa makai</i>) | <i>Lit.</i> , the stone promontory |
| Kaliainui (<i>kahawai</i> (stream)) | Possible reference to large castor oil plants (Kāliāli, <i>Ricinus communis</i>) (L. Andrews 1865:254) |
| Kalokōia (<i>wahi inoa mauka</i>) | Possible reference to a fish (<i>'i'a</i>) pond (<i>loko</i>) |
| Kaluanui (<i>'ili</i>) | <i>Lit.</i> , the big pit |
| Kaluaolohi (<i>wahi inoa mawaena</i>) | Meaning currently unknown |
| Kaluaopihī (<i>wahi inoa mauka</i>) | Meaning currently unknown |
| Kama'oma'o (plain of Kula, <i>wahi inoa pū'āli</i>) | <i>Lit.</i> , the greenness; noted as being at the eastern isthmus of Maui, connecting East and West Maui (Formander 1919:554) |
| Kamalailie (<i>wahi inoa mawaena</i>) | Meaning currently unknown |
| Kamehameiki (<i>mauka ahupua'a</i>) | <i>Lit.</i> , the <i>hame</i> tree (<i>Antidesme platyphyllum</i>), also known as <i>ha'a</i> and <i>me'hame</i> , possible reference to either an area where the <i>hame</i> tree is small or a small area of <i>hame</i> trees. |
| Kamehameui (<i>mauka ahupua'a</i>) | See above definition for Kamehameiki; possible reference to either an area where the <i>hame</i> tree is large or a large area of <i>hame</i> trees. |

| | |
|--|---|
| Kamuliwaa/Kamuliwai (<i>wahi inoa makai</i>) | The river; a location where the river enters the ocean; location possibly consistent with the place noted as Ka Muliwai o Pūlehuunui (Monsarrat 1878), noted as the fishery of Pūlehuunui was between Kamuliwaa and Kalaepōhaku (Imithia in Harris et al. 1879:246) |
| Kawiha (<i>'ili</i>) | Meaning currently unknown |
| Ke'ākū (<i>'ili</i>) | Noted in Place Names of Hawai'i as a large cave on the south slopes of Haleakalā, Andrews elaborates that it is located on the east side of the valley of Kā'ilī'i (L. Andrews 1865:278) |
| Keahuakapiēle (<i>wahi inoa mawaena</i>) | A hole was dug for water here (Kaupaa in Harris et al. 1879:247) |
| Kealahou (<i>mauka ahupua'a</i>) | Meaning currently unknown |
| Keali'i (<i>wahi inoa pū'āli</i>) | <i>Lit.</i> , the chief |
| Keālia (pond, wetland) | <i>Lit.</i> , the salt encrustation |
| Keanakahakoi (<i>wahi inoa mawaena</i>) | Meaning currently unknown |
| Keeakai (<i>'ili</i>) | Meaning currently unknown |
| Kīhei (<i>wahi inoa makai</i>) | <i>Lit.</i> , cape, cloak, boundary between the sea lines of Pūlehuunui and Waikapū (Homai in Harris et al. 1879:244), a sand spit that joins Kealia on the Honua'ula side (Kalama in Harris et al. 1879:245) |
| Kīheipūko'a (<i>wahi inoa makai</i>) | A place near Keālia, between Kalepolepo and Ma'āleaa (Sterling 1998:257) |
| Kīlohana (<i>pū'ū</i>) | <i>Lit.</i> , lookout point or outer tapa or best, superior |
| Koa Kūkahi (<i>wahi inoa mauka</i>) | Meaning currently unknown |

| | |
|---|---|
| Kohemalalama (stream) | Located just above Kīhei, curves and goes into Waikapū, also a part of the ancient name of Kaho'ōiawe – Kohe-mālamalama-o-Kanaloa. <i>Lit.</i> , the shining birth canal of Kanaloa (http://www.hokulea.com/reflection-pokulea-hikianalia-on-kahoolawe-lulu-1-3/) |
| Kukuinaene (ʻili) | Meaning currently unknown. Possible reference to <i>naʻenaʻe</i> , a fragrant species of a native genus (<i>Dubautia</i>) within the daisy family which was used to scent <i>kapa</i> (Pukui and Elbert 1986:258). Also the name of a fish within the surgeon family (<i>Acanthurus olivaceus</i>) |
| Kukuineene (ʻili) | Meaning currently unknown. Possible reference to <i>neʻneʻe</i> a native variety of taro also named <i>mōi</i> or a variety sweet potato (Pukui and Elbert 1986:251, 263). |
| Kula (moku) | <i>Lit.</i> , plain, possible reference to the broad flanks of Kula Moku |
| Kumuahane (lako iʻa) | Meaning currently unknown, a fishpond downstream of Kāʻōpala (Kupaialu in Harris et al. 1879:246) |
| Ōmaʻōpio (ahupuaʻa) | <i>Lit.</i> , whistling thrush; also a species of thrush (<i>Phaeornis obscura</i>) or a small bird resembling the <i>ou</i> , feathers dark colored. Also called <i>omau</i> , <i>olomau</i> , <i>kamau</i> (L. Andrews 1865:490) |
| Paʻaiea (wahi inoa mauka) | Meaning currently unknown |
| Pohakiʻikiʻi (wahi inoa pūʻaili) | Resting place for travelers (Kalama in Harris et al. 1879:245) |
| Puʻu Pahu (puʻu) | <i>Lit.</i> , drum hill |
| Puhawana (wahi inoa mawaena) | Meaning currently unknown |
| Pūlehuiki (mauka ahupuaʻa) | <i>Lit.</i> , small ash heap |
| Pūlehunui (ahupuaʻa, kahawai) | <i>Lit.</i> , great ash heap |
| Punaalana (ʻili) | Refers to floating coral (Lorrin Andrews 1922) |

| | |
|-------------------------------------|--|
| Waiahono (wahi inoa mawaena) | Possibly reference to the joining of the two mountains through the streams – Wai-a-hono – where <i>hono</i> is a reference to stitching, sewing, mending, or a joining of <i>wai</i> or water (Pukui and Elbert 1986:79) |
| Waiakoa (ahupuaʻa, kahawai) | <i>Lit.</i> , water [used] by warrior |
| Waianuhi (wahi inoa mauka) | Meaning currently unknown |
| Waikapū (ahupuaʻa) | <i>Lit.</i> , water [of] the conch |
| Wailuku (ahupuaʻa, moku) | <i>Lit.</i> , water [of] destruction |

While some of the meanings of the place names of Pūlehunui appear to have been lost to antiquity, regional place names that are known make references to plant resources such as the *hame* tree in Kamehameki and Kamehameui, the castor oil plant of *kāliāli* in the name of the *kahawai* of Kailiinui, along with once possible reference to cultivation in the name of Kaaooiki, which has been noted as a garden patch are also present in the *wahi inoa* of the *waena* and *mauka* regions. In the mid-elevations, or *waena* area, we see possible references to birds and bird catching near the bordering gulches in names such as Hāpapa and Ōmaʻōpio. The *pūʻaili* region is noted as the place in which the waters of Haleakalā and the West Maui Mountains converge with names like Kailinawai, Kāʻōpala, and Waiahono, as well as an area of transit between the two lands where travelers came to rest at Pohakiʻikiʻi and could possibly find water at Kahuakapiele. Along the coastline we see names like Keālia where salt is known to have been plentiful and a reference to the fishery of Kumuahane. Finally, the plain of Kamaʻōmaʻō is a *wahi pana* that is spoken of in stories of *ʻaumakua* (ancestral animal spirits) and recollections of battles between Maui and Hawaiʻi Island chiefs. Some of the names of the waterways and land areas within and adjacent to Pūlehunui Ahupuaʻa may speak to the battles between the warrior of the two island chiefs as well as that of the *ʻaumakua* in such names as Waiakoa, Alakoa, Kealiʻi, and Puʻu Pahu.

Handy et al. (1991) summarize the relationship between Hawaiians and the natural environment best in the following passage:

The sky, sea, and earth, and all in and on them are alive with meaning indelibly impressed upon every fiber of the unconscious as well as the conscious psyche. Hawaiian poetry and folklore reveal this intimate rapport with the elements, (Handy et al. 1991:23-24)

(T)he relationship which existed from very early times between the Hawaiian people... is abundantly exemplified in traditional mele (songs), in pule (prayer chants), and in genealogical records which associate the ancestors, primordial and more recent, with their individual homelands, celebrating always the outstanding qualities and features of those lands. (Handy et al. 1991:42)

The *mo'olelo* (traditional knowledge) of Pūlehunui revolves around the elemental characteristics of the *āina* (land) where the places of this *āina* are noted in name chants and the winds and rains of the region are recounted in legends and poems. The winds of Maui are described in the Legend of Kuapakaā of Moloka'i, as retold by Fornander (Fornander 1918), where Kuapakaā prepares to meet Keawenuiaumi in search of his father Pakaa, the *kahili* bearer and backbone of Keaweau. The chiefs accompanying Keawenuiaumi and Keawenuiaumi himself turn away from Pakaa upon finding him and Pakaa tells Kuapakaā to call out for the winds of Maui and Moloka'i to prevent them from leaving, ultimately releasing the winds from the wind calabash Laamaomao. Included in the winds recited in the *oli* (chant) is the wind name of *moku* of Kula which includes Pūlehunui:

| | |
|---------------------------------|--------------------------------------|
| ... | ... |
| <i>He papa ko Honuaulu,</i> | The papa is of Honuaulu, |
| <i>He naulu a'e ko Kamaloa,</i> | The naulu is of Kamaloa (Kaho'olawe) |
| <i>He kehau ko Kūla,</i> | The kehau is of Kūla, |
| <i>He uapokaa ko Kokomo,</i> | The uapokaa is of Kokomo, |
| <i>He ua elehei ko Līlīkai,</i> | The elehei-rain is of Līlīkai, |
| <i>He taiki ko Wailuku</i> | The taiki is of Wailuku |
| ... | ... |
| | (Fornander 1918:100-101) |

Along with the winds, the *kūpuna* (ancestors and elders) also had a highly nuanced understanding of the different rains of their *onehānau* (native-born place). As Akana and Gonzalez (2015:xv) point out in their phenomenal collection of Hawaiian rain names:

They knew that one place could have several different rains, and that each rain was distinguishable from another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people.

Some rain terms have recognizable Polynesian counterparts and are probably ancient, connecting us to our 'ohana across the oceans and across time...! Some rains are named after people... Rain names may be used for their literal or figurative meaning... Many rain names refer to native vegetation.... Some describe the rain's interaction with these plants.... Some rains may act different at certain times or may indicate a certain season.... Rains represent many things to our people. First and foremost, rains are integral to our survival.

While there rains names specific to Pūlehunui are yet to be found, through extensive research of Hawaiian language sources Akana and Gonzalez (2015) have compiled the *mo'olelo* which speaks of the rains of Kula Moku and identified a rain of Waihe'e that travels through Pūlehu:

| | |
|---|---|
| From a kanikau for L.L. Ua by his students at Lāhaināluna Seminary: | |
| <i>Ke ho'i nei ka 'uhane / ka malu niu o</i> | The spirit is returning to the shade of |
| <i>Lele</i> | the niu (coconut) trees of Lele |
| <i>I ka malu kuawo o Wailuku</i> | To the shelter of Wailuku Valley |

| | |
|--|---|
| <i>I ka ua Nāulu noe anu o Kula</i> | To the cold, misty Nāulu rain of Kula |
| <i>I ka ua noe uahi mode / ke pili</i> | To the smoky, misty rain that rests upon the pili grass |
| <i>I pili 'a ka ua me ka lā</i> | Joined are the rain and the sun |
| <i>Ke anu ho'i me ke ko'eko'e</i> | The cold and the chill |
| From a mele kālai'āina (political chant), for 'Emalani Kaleleoa'āini | (Akana and Gonzalez 2015:191-192) |
| <i>Ō mai'ō 'Emalani, ke ali'i nana ia inoa</i> | Emalani responds, the chiefess for whom is the name |
| <i>la ho'onu'anu'a i uka, ka uahi o Kula</i> | That conflagration in the uplands, the smoke of Kula |
| <i>Ua ho'onu'anu'a i uka, ka uahi o Kula</i> | The watery mat of the Nāulu rain has been spread out |
| <i>Ua hāli'i ke kūmoena wai a ka Nāulu</i> | There's no action by the 'Ūkiu rain, now peaceful |
| <i>'A'ohē hana a ka ua 'Ūkiu e la'i nei</i> | It shall be carried out by the golden-red rain 'Ualena |
| <i>E ho'okō'ia ana e ka ua 'Ualena</i> | O rain that adorns the kukui trees of Līlīko'i, here you are, oh. |
| <i>E ka ua kāhīkko kukui o Līlīko'i ē, eia 'oe ē</i> | (Akana and Gonzalez 2015:192) |

The smoke of Kula is also referenced in an *ōlelo no'ēau* (Hawaiian proverb). *Ōlelo no'ēau*, were initially passed down through oral tradition and later collected and published in Hawaiian language newspapers and other scholarly sources. These proverbs often have both a literal and metaphorical meaning (called *kaona*), which is given where applicable. *Ōlelo no'ēau* about geography can help us to understand natural phenomenon, land use, and the history of a place. With regard again to Kula, Pukui has recorded the following *ōlelo no'ēau* that references both the smoke and wind of the *moku*:

| | |
|---|--|
| <i>'Ōlelo No'ēau: 1824</i> | |
| <i>Kokolo ka uahi o Kula, he Kēhau</i> | The smoke of Kula creeps along when the Kēhau breeze blows. |
| <i>Kaona: Where there is smoke there is fire (Pukui 1983:197)</i> | |
| <i>'Ōlelo No'ēau: 2120</i> | |
| <i>Moe kokolo ka uahi o Kula, he Hau</i> | The smoke of Kula traveled low and swift, borne by the Hau wind. |
| <i>Kaona: Said of one who is swift in movement. Also, in love and war much depends on swiftness and subtlety (Pukui 1983:236)</i> | |

The above references to smoke at Kula might suggest that fire was a common occurrence on the plains of Kula. Alternatively, the references to smoke could also metaphorically refer to low

clouds or clouds of dust that may be thrown up by harsh winds (*kōkōloliʻi* [a thick black cloud], *kokolōlilo* [sharp, swift wind gust], *kokolowini* [sharp, penetrating, of wind, gust]) (Pukui and Elbert 1986:161).

3.1.1 He Moʻolelo no Pumaia – A Story of Pumaia

In his anthology of Hawaiian Antiquities and Folklore, Fornander (1919) recounts a story of Kamaʻomaʻo and the spirits and *ʻaumakua* that reside there in his translation of *He Moʻolelo no Pumaia*. In this story, Pumaia travels from Kōloa, Kauaʻi, to the place of his grandmother at the house of Kiha (Maui). Upon his arrival, he proceeds to go *holoholo* (travel about) with Wakaina who find themselves confronted by Puukolea and goaded into a fight. Puukolea, however, had a dual body while Pumaia and Wakaina had ordinary bodies, a fact that led to Pumaia and Wakaina losing the fight and returning to their parents as spirits. Unfortunately, they could not be seen by their parents and wandered off until they met up with the prophet Pupuilima. Pupuilima chased them toward the plain of Kamaʻomaʻo where they caught up with the *ʻaumakua* Pueonuiokona. Here the two prophets Pupuilima and Pueonuiokona engaged in a race where if Pupuilima wins, then the spirits of Pumaia and Wakaina die, if Pueonuiokona wins, the two could carry on to their parents. When Pupuilima catches up with Pueonuiokona and tugs at his arm, Pueonuiokona states:

If you excel in strength you can obtain them (the spirits of Pumaia and Wakaina), but if you are weak you cannot have them; because I, even I, am an old resident of this plain (Kamaʻomaʻo). When spirits from the dead arrive I cause them to revive. Also no prophet comes to this plain; this is the first time that I have seen a prophet on this plain, and that is yourself. Because you complained of my desire to give life to those spirits, so be it! By a test of strength will [we know] whether you obtain them or I do. (Fornander 1919:554)

The two proceeded to fight and Pueonuiokona won, killing Pupuilima and spreading his entrails on the *akolea* near Kalepolepo, located just south of Kīhei.

3.1.2 Huakaʻi Po and The Plains of Kamaʻomaʻo

In keeping with the *kuleana* of Pueonuiokona, other *moʻolelo* tell of Kamaʻomaʻo as a place where the spirits roam:

The worst fate that can befall a soul is to be abandoned by its *aumakua* and left to stray, a wandering spirit (*kuewa*) in some barren and desolate place, feeding upon spiders and night moths. Such spirits are believed to be malicious and to take delight in leading travelers astray; hence the wild places which they haunt on each island are feared and avoided. Such are the plains of **Kamaʻomaʻo** on the island of Maui, the rough country of Kaupēa at Puʻuloa on Oahu, Uhana on Lanai, Maohelaia on Molokai, Mana on Kauai, Halalīʻi on Niʻihau. In these desolate places lost spirits wander until some friendly *aumakua* takes pity upon them. (Beckwith 1970:154 bold emphasis added)

In her book on the *Huakaʻi Po*, Night Marchers, Helen Hoyt (1976) notes that Kamaʻomaʻo is also a place in which *Ka Huakaʻi Po* have also been seen and heard. Hawaiian scholar Mary Kawena Pukui noted that to see the Night Marchers is fatal unless there is a relative among the spirits who walk:

The time for the march is between half after seven when the sun has actually set and about two in the morning before the dawn breaks. It may occur on one of the four nights of the gods, on Kū, Akua, Lono, Kāne or on the nights of Kōloa. Those who took part in the march were the chiefs and warriors who had died, the *ʻaumakua*, and the gods, each of whom had their own march....

If a living person met these marchers, it behooved him to get out of the way as quickly as possible. Otherwise he might be killed, unless he had an ancestor or *ʻaumakua* in the procession to plead for his life.... (Pukui 1997:82-83)

3.1.3 Nā Loko ʻa o Kula Kai – Construction of the Fishponds of Kula Makai

A *moʻolelo* about the construction of the *loko ʻaʻa* (fishponds) of Kula Makai was included in an article about Kalepolepo written by Charles Wilcox for the magazine *Paradise of the Pacific* (Wilcox 1905). In the article, Wilcox attributes the construction of the fishponds of Keokea-kai, Waiahuli-kai (Waiohuli), and Kaonoulu-kai to Umi, the *moʻi* (King) of Hawaiʻi Island. The events that occurred during the course of construction of the *loko ʻaʻa*, Kaonoulu-kai in particular, is also important for understanding the lands and environment of the section of Pūlehuunui that encompasses the lands of the central isthmus.

When the *konohiki* (landlord) for Umi summoned the people of Maui to construct the fishponds, a *Kilo* (seer or reader of omens) by the name of Kikau protested and said that the work could not be completed without the help of the *Menehune*. For his protest, the *konohiki* declared that Kikau would be killed when all of the ponds of Kula Makai were complete. At the completion of Keokea-kai and Waiahuli-kai (Waiohuli), the *konohiki* would ride in procession upon the final capstone for the fishpond wall that was carried upon the shoulders of the men who constructed the ponds. The capstone was placed with great ceremony by the *konohiki*, who summoned Kikau each time to ask what he thought. At the last pond at Kaonoulu however, the litter carrying the capstone and *konohiki* broke, causing both the stone and *konohiki* to fall to the ground in the dust of Kalepolepo. This was followed by a raging storm that brought “wind, rain, hail, thunder and lightning, and earthquake and a heavy sea with a flood of red waters form the uplands” (Wilcox 1905:67). Under the cover of this storm, the brothers of Kikau, the *eʻépa*, or elves as Wilcox refers to them, gathered and were seen tearing down the *pā pāhaku* (sea walls) and undoing the work of the *konohiki* to save Kikau from death and taking the capstone. This happened one more night until the *konohiki* had acknowledged that he had been wrong and requested help to complete his *kuleana* (responsibility, task) to the Umi. Kikau advised that food should be brought from Koʻolau and Wailuku to bring the *Menehune* who would perform the task. That evening, the *Menehune* came across the plains of the central isthmus to Kalepolepo:

That evening the signs of the coming of the hosts or *menehunes* were seen by the rising of far-off spirals of red dust in the uplands, growing in numbers as they neared the lowlands until swirling clouds of red dust filled the air above Kalepolepo. But not until the evening star had set did their clamor break the silence of the tabued [sic] night, and the *menehunes* appeared in swarms and in great numbers, so that the hum of their voices drowned the sound of the surf breaking on the reefs, as they quickly fell to work by companies. (Wilcox 1905:67)

In no time at all, the pond walls were reconstructed and the capstone, named “Kikaupahaku” for their brother Kikau, was laid upon the unfinished gap and the work was complete. The *Menehune* feasted on the prepared food and when the Morning Star rose, the *Menehune* left for the uplands and forests. Kikau was from then on known as a *kilo* who could summon *Menehune* and lived for a time at the court of Umi in Waipio, Hawai’i.

3.1.4 Ka ‘Āina o Pūlehuunui i ka Wa Kahiko – The Traditional Landscape of Pūlehuunui

While it may be a difficult task to reconstruct the weather patterns and traditional landscape of the lands of Pūlehuunui due to the passage of time, indeed even the witnesses who provided testimony to establish the boundaries of Pūlehuunui indicated that they were the only remaining *kama ‘āina* who knew the lands of Pūlehuunui (Harris et al. 1879), it may be possible to look to the writings of early foreign visitors to understand traditional land use of this *wahi* (place). In the *mo‘olelo* of the fishponds of Kula Makai, Wilcox references the swirling dust clouds that are often seen on the central Maui isthmus and across the lands of Pūlehuunui. These dust clouds were also poetically described by Charles Warren Stoddard during a visit to Maui in the late 19th Century:

Why, speaking of dust! I’ve seen from that very balcony of the Maison Rouge (in Waiehe’e), away off in that strip of desert yonder, the meeting of two winds. When two winds meet, they wait for a season before parting. In the giddy whirl of this waltz of the elements, their invisible skirts swept up so great a dust that the red-powdered earth spun itself into a long, slender, tapering column, that swayed and pirouetted in airy curves. ‘Twas like the body of a serpent that is about to strike its adversary. Sometimes a pair of these would uncoil in midair, and soar serenely across the low, dusty isthmus that connects the two mountainous districts of Maui. Were they to come my way, it would behoove me to fly into some cave for shelter. And they are not to be trifled with. On land we call them dust chimneys. Happily, they are neither numerous nor long-lived. They are the only animated features in the landscape, —the only really animated features. Of course the clouds are ever with us, and the storm-cloud is one of these; but we fear the cloud less than the whirlwind with that exclamation point, the whirling chimney of red dust. (Stoddard 1894:182-183)

Another reference to the strength of the winds that come through the central isthmus and across the plain of Kama‘oma‘o at Pūlehuunui can be found in a recollection of Vancouver’s visit to Ma‘ālea Bay in 1793 as well as mention of the coral reef off of the shoreline of Ma‘ālea and Kīhei:

Vancouver ... worked up into the large bay on the S.W. side of Maui, lying before the low isthmus, and anchored in 39 fathoms towards the eastern side, distant 2 miles from the nearest shore. Here the Trade-wind from N.E. came at intervals in furious squalls over the lowland, and a strong current set to S.E.; the large bay lying before the isthmus has its western side formed by high rocky precipices rising perpendicularly from the sea; ... and the mountains, at some distance from the shore, form two remarkable valleys, separated from each other by a high rugged mountain, seemingly detached from the rest, and approaching nearer to the beach than those to the right and left of it; the anchorage of Patoa is abreast of the easternmost of these valleys. Proceeding along shore to the eastward, the same soundings were found until abreast the rocky precipices; here there was no ground, but closer to the shore the bottom, which is rocky, was reached at 20 fathoms. These precipices extend about a league from Patoa, in the line of the shore, then trend more northerly, and at the distance of about 4 miles join the low land of the isthmus; before this lies a reef or rather detached patches of rocks, at the distance of near 1/4 mile from the shore, outside which the soundings are regular and good. The western side of the large bay is formed by these precipices or cliffs; its opposite shore, about 4 miles distant, takes a

north direction from Volcano hill ; the depth of the bay is here somewhat increased; the soundings on the eastern side are regular but very rocky. This is the Kamalea (sic) bay of the charts. (Rosser 1870:26-27)

In 1848 and 1858, Edward Perkins traveled through Hawai’i and Polynesia, compiling descriptions of his travels in the book *Na Motu: Or, Reef-Rovings in the South Seas, A Narrative of Adventures at the Hawaiian, Georgian and Society Islands* (1854). In the book, Perkins details the environment of the central isthmus during his descent following an excursion to the summit of Haleakalā:

...the difference between this (the central isthmus) and our previous labors was perceptible in the intense heat and absence of water, for the land below this forest belt is open, or scantily covered with shrubbery, while the soil becomes more arid and stony, and the sinuous course of rocky ravines may be traced, until, like dark threads, their windings are lost upon the broad isthmus or common. The sterility of the soil increases with the descent, until near the base of this portion of the mountain, a distance of seven or eight miles from the cultivated tracts, the reddish earth is covered only with coarse grass and the low ilima bushes, and dark ferruginous rocks are scattered thickly around. Our road lay for more than twelve miles through this description of country, unenlivened by either house or tree that could afford a shelter. (Perkins 1854:152)

The winds and dust of the central isthmus notwithstanding, early descriptions also show that the soils, resources, and micro-climates of Kula Moku and, more specifically Pūlehuunui Ahupua‘a, varied by elevation while land productivity varied by season:

The district of Kula, on East Maui, although extremely rough and rocky, has a loamy, rich, and productive soil: it produces the finest Irish potatoes, turnips, corn, melons, and wheat. The latter, of an excellent quality, is found growing wild. It was introduced about twenty years before our visit, planted, and not the least attention paid to it; instead, however, of “running out,” it has increased.

At Maalea Bay there is good anchorage for vessels of any size, and a fine fishery. The isthmus is too dry to be fit for cultivation: it is in extent about twenty by fifteen miles. During nine months of the year it is a fine grazing country, and feeds large herds of cattle, that are mostly owned by foreigners. (Wilkes 1844:268)

And finally, as a result of their travels around Maui, the missionaries Bingham and Richardson provided the following description of the Pūlehuunui Makai and their impression of the winds through the central isthmus:

the large bay called Maalea, (Mah-ah-lah-a-ah,) and landed two or three miles from the cape, on the north-west. We had a light sea breeze from the west, till we doubled the cape, when suddenly the north-east trades struck us with violence, which we continued to feel till (sic) night; during our walk across the isthmus, which was about 10 miles, though the distance between the bays on the south and north is, at their nearest points, but about seven. At the place of our landing are about forty houses occupied chiefly by the fishermen. (Bingham and Richards 1824:158)

3.1.4.1 Ka ‘Oihana Mahi ‘Ai no Pūlehuunui – Traditional Agriculture of Pūlehuunui

As noted above, the growing environment of the *mauka* lands of Kula Moku, which lies seven or eight miles from the base of Haleakalā (Perkins 1854:152), is characterized by a loamy, rich, and productive soil (Wilkes 1844:268). This distance from the coastline and focus on agriculture for the residents of the upper elevations may have fostered specialization in the region where marine resource expertise may not have been common for those residing in Kula Mauka and

upland Pūlehunui. The following *‘ōiēlo no‘eau* appear to support this possibility for agricultural specialization of those who lived in Kula Mauka, or the uplands of Kula:

‘ōiēlo No‘eau: 2447

O ka wai kau no ia o Ke‘ānae; o ka ‘ūiēi ho‘owali ‘uwala ia o Kula

It is the pool on the height of Ke‘ānae; it is the ‘ūiēi digging stick of the potato [patch] of Kula.

Kaana: A handsome young man of Kula and a beautiful young woman of Ke‘ānae, on Maui, were attracted to each other. She boasted of her own womanly perfection by referring to her body as the pool on the heights of Ke‘ānae. Not to be outdone, he looked down at himself and boasted of his manhood as the digging stick of Kula (Pukui 1983:266-267)

‘ōiēlo No‘eau: 1911

Kula unahi pīkapika he‘e

Kula people, scalars of the suckers on the tentacles of the octopus.

Kaana: Said in fun of the people of Kula, Maui. A Kula chiefess who lived inland did not know what the suckers on an octopus were and tried to scale them as one scales a fish. (Pukui 1983:205)

‘ōiēlo No‘eau: 2473

O Kula I ka hoe hewa

Kula of the ignorant canoe-paddlers.

Kaana: Said of Kula, Maui, whose people did not know how to paddle canoes because they were uplanders. (Pukui 1983:270)

In their ethnographic survey of traditional Hawaiian agricultural practices, Handy and others (1991) note that:

All the country below the west and south slopes of Haleakala, specifically Kula, Honua‘ūla, Kahikinui, and Kaupo, in old Hawaiian times depended on the sweet potato. The leeward flanks of Haleakala were not as favorable for dry or upland taro culture, as were the lower forest zones on the island of Hawaii. (Handy et al. 1991:276)

....
So far as we could learn Kula supported no Hawaiian taro, and the fishermen in this section must have depended for vegetable food mainly on poi brought from the wet lands of Waikapu and Wailuku to westward across the plain to supplement their usual sweet-potato diet (Handy et al. 1991:511)

Claims for traditional resources and agricultural areas at the time of the Māhele may also offer insight into the traditional agricultural practices of Pūlehunui Ahupua‘a (see also section 3.2.1 1848-1851 – The Great Mahele). Nearly all of the native tenant claims for *kuleana* lands within Pūlehunui consist of claims for *kula*, or sections of pasture. It is of interest that there was only one claim for *mahina ‘uala maoli* (native potato gardens, Poonui Land Commission Award [LCA] 4672, Figure 3-4) while the remaining potato land claims (Poonui LCA 4672, Kahalea LCA 4956, Anakalea LCA 5513, Kamakea LCA 8886) were for *mahina ‘uala haole* or *mala ‘uala haole* (Irish potato). It is likely that the lands that were claimed for *‘uala haole* were once planted in *‘uala maoli* and turned over to the foreign potato with the Irish Potato Boom that followed the shift from a subsistence economy to a commercial economy in the mid-1800s. Other noted resources included one reference to a *pā pu‘a* (pig enclosure) as a part of the registered claim by Kaniho

and Pakeau (LCA 8866), thereby verifying animal husbandry practices in the *mauka* reaches, as well as three *punawai* (springs) and a mention of a *hale* (house) on the lands of the claimant Anakalea (LCA 5513).

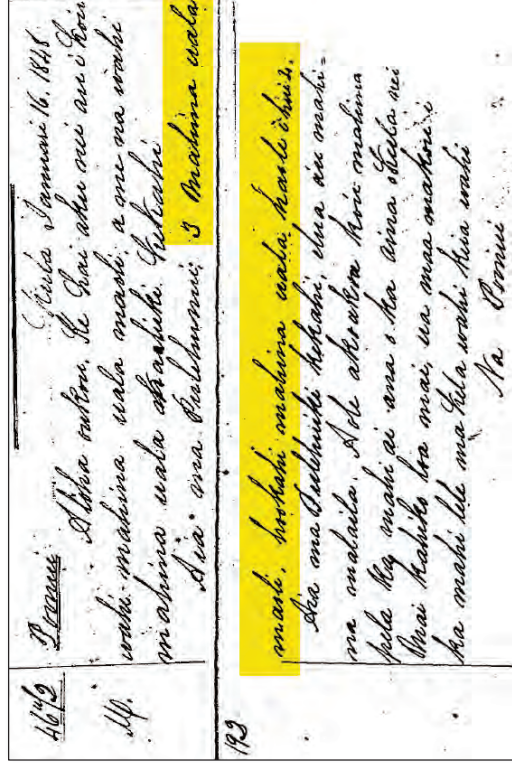


Figure 3-4. Native claim of Poonui (LCA 4672) highlighting claims for mahina ‘uala and mahina ‘uala haole at Pūlehunui (Office of Hawaiian Affairs 2011)

3.1.4.2 Ka ‘Ōihana Lawai‘a Pūlehunui – Traditional Fishing at Pūlehunui

The fishing grounds of Pūlehunui have been noted as being between the Muliwai o Pūlehunui near Kīhei and Kalepohaku within the bay of Ma‘ālea, the rights to which were also noted in the claim of Kahalea (LCA 4956). The descriptions of the fishery of Pūlehunui given in native testimony in the *Matter of the Boundaries of Pūlehunui* were also integral in determining that Pūlehunui Ahupua‘a extended to the shoreline and was not cut-off by Waikapū as claimed by Cornwall (Harris et al. 1879:255). *Maomao* is a type of fishing that sought to procure fish like ‘ōpule (pearl wrasse [*Anampses cuvier*]), *kole* (spotted sturgeonfish [*Ctenochaetus strigosus*]), and *mā‘ī‘ī* (also called *palapala* on Maui, [*Hepatus elongatus*]) because of its tenderness. This type of fish occurred in the deep waters off of the reef of nearby Kalepoho that was noted by Hawaiian scholar Daniel Kahā‘ūlelio (Kahā‘ūlelio 2006:221). Kahā‘ūlelio writes that only expert divers, with the ability to hold their breath for a long period of time, could undertake this type of fishing using a net with a mesh that was two fingers in width.

Finally, the communal fishing practice of *hukilau*, where large schools of *ōkūle* (Big Eyed Scad [*Selar crumenophthalmus*]) would be surrounded by a community laid net has been practiced along the shoreline of Pūlehuani in recent memory. Mr. Vernon Kalanikau recalls participating in *hukilau* between Kīhei Landing and Kalaeopohaku, with communities of Kīhei; as well as Wailuku and Waikapū areas, participating and lending hands to help with the catch (see also Section 5.2). It is likely that this type communal fishing extended back into antiquity and fostered trade between the residents of Kula Mauka and Kula Makai, as well as the well-watered regions of Na Wai 'Ehā.

3.1.5 Anuluu ka Pi'ipi'i i Kakanilua (Slaughter-of-the-Pi'ipi'i-at-Kakanilua) and the Retreat of Kalaniopu'u to Kīheipuko'a

During the time of Kahekilli of Maui and Kalaniopu'u of Hawai'i, the two chiefs engaged in a rivalry that resulted in many battles that were carried out in the territory of both chiefs. Historians note that the most sanguinary battle between the rival chiefs occurred on the central isthmus of Maui around the year 1776 when the army of Kalaniopu'u landed on the shores of Pūlehuani and Waikapū after ravaging the countryside of Honua'ula. An account of the battle was published in the Hawaiian language newspapers by the Hawaiian scholar Samuel Kamakau and compiled together in the book *Ruling Chiefs* (Kamakau 1992). Because the battle took place within the central isthmus of Maui, and as the several places within and adjacent to lower section of Pūlehuani are included in Kamakau's account, the story of the battle of Kakanilua is presented below (Kamakau 1992:84-89):

Ka-lani-opu'u landed his forces before noon, a great multitude filling the land from Kīheipuko'a at Kealia to Kapa ahu, all eager with the thought that the Alapa were to drink of the waters of Wailuku. The Alapa were led by Inaina, Kua ana, Kane-ha'i-lua, and Keawe-hano. There were 800 of them, all expert spear-point breakers, every one of whose spears went straight to the mark, like arrows shot from a bow, to drink the blood of a victim. Across the plains of Pu'u'ainako (Cane-trash-hill) and Kama'oma'o shone the feather cloaks of the soldiers, woven in the ancient pattern and colored like the hues of the rainbow in red, yellow, and green, with helmets on their heads whose arcs shone like a night in summer when the crescent lies within the moon.

Ka-hekilli was at Kalanihale just below Kīhahale and above the plateau of Ka'ilipoe at Pohakuokahi. Said Ka-leo-pu'u-pu'u to Ka-hekilli, "The fish have entered the sluice; draw in the net." Like a dark cloud hovering over the Alapa, rose the destroying host of Ka-hekilli seaward of the sandhills of Kahulu'u, the "smoke head" (*pa'ouaha*) and the "red coconut" (*niu'ula*) divisions. They slew the Alapa on the sandhills at the southeast of Kālua. There the dead lay in heaps strewn like *kukui* branches; the corpses lay heaped in death; they were slain like fish enclosed in a net. This great slaughter was called *Ahulau ka Pi'ipi'i i Kakanilua* (Slaughter-of-the-Pi'ipi'i-at-Kaka-nilua). Keawe-hano, the governing chief of Hilo, was discovered by Ka-po-lua almost dead among the heap of corpses, and he alone was taken alive before Ka-hekilli, because of an agreement between Ka-po-lua and Keawe-hano [that each should spare the other in battle]; but it was too late to save him for he was fatally injured....

Ka-lani-opu'u turned to his defenders, the chiefs of Hawai'i—to Keawe-mā'u-hili, the Keawe whose tabu was doubly twisted, twisted into knots, woven in and out, broken from the topmost branch of the expanding family with the Māhi and the Ahu under his feet; to Ka-lani-mano-o-ka-ho owatia-a-heulu, the highest on both sides of the Pālea, that is of the Leapa; to I-maka-koloa, the dark awa among the hala blossoms of Puna; to Nu'u-anu-pā-ahu, tearer-up of the cutworms of Na'alehu, the hillside that

withstands the winds of Ka-'u; to Nae-'ole, growler of Kohala at Wāhiani; to Kane-koa also, like the big cold raindrops of Waimea; to Nanue Ka-lei-opu, the sandpiper of Hamakua; to Ka-me'e-ia-moku and Kamanawa, the twins of the burning tabu of Ke-kau-like; to Ke-ku-hau-pi'o, the grandchild of Holo-'ae, the teacher who trained Kamehameha I in warfare; and to the royal sons and cousins of Ka-lani-opu'u, his friends and favorites, the warrior chiefs of Hawai'i and the fighting men, and asked, "What about fighting Ka-hekilli?" Everyone answered, "Tomorrow we will drink the waters of Wailuku and rest in the shade of Hekuawa." Thus encouraged, Kalani'opu'u prepared for an attack on the day following.

Ka-hekilli was the younger brother of Kamehameha-nui, both being sons of Ke-kau-like whose family were ruling chiefs on Maui at that time. He prepared for the battle and Ka-hahana, the ruling chief of Oahu (sic) and Molokai (sic), came to his aid. The great battle took place between Waikapu and Wailuku. Kalani'opu'u expected to enter Wailuku at Kakanilua, but Ka-hekilli's men rose at dawn and occupied the sandhills of kama'oma'o, and a portion of them took their stand on the side toward Waikapu turn, so that the forces of Ka-lani-opu'u, who had supposed that the battle would be at Kakanilua, found a divided front from which spears, javelins, and other missiles poured like water. Death-dealing weapons poured down like a swift rainstorm beating the sides of the fisherman's canoe and agitating the surface of the sea like a cloudburst over the deep ocean. The terrified soldiers were surrounded and took to flight; they were driven by Ka-hekilli's men like leaves before a whirlwind. The plains of Kama'oma'o became like a fishpond through whose sluice gate the sea flooded, Kalani'opu'u's men [became] like the mullet driven by the sound of beating into the sluice gate of 'Uko'a; and the sea rose up to the walls. Like the fiery petals of the lehua blossoms of Pi'iholo were the soldiers of Ka-hekilli, red among the leaves of the *koa* trees of Līlīko'i or as one glimpses them through the *kukui* trees of Ha'iku. Like the creeping branches of the *'ulei*, so moved the cloaked warriors, young and middle-aged, over the *'i'ima*-covered plain of Paholei. A chill seized Kalani'opu'u as he crouched in the canoe, mourning the dead who lay like fish stupefied by the poison spread by the great fisherman, Ka-hekilli....

When Ka-lani-opu'u saw that the forces of Hawai'i were surrounded by Ka-hekilli's men he said to Ka-lola his chiefess, "O Hono-ka-wai-lani! we shall all be killed. Do go up to your brother Kahekilli to sue for peace," Ka-lola answered, "It will not do any good for me to go, for we came to deal death. If we had come offering love we should have been received with affection. I can do nothing. Our only hope lies in Ka-lani-kau-i-ke-ouli Kiwala'o," "perhaps Kahekilli will kill my child," said Ka-lani-opu'u, "Kahekilli will not kill him. We will send Ka-hekilli's half brothers with him, Ka-me'e-ia-moku and Ka-manawa." So Kiwala'o was dressed in the garments of a chief and attended by Ka-me'e-ia-moku bearing the spittoon and Ka-manawa carrying the kahili. As Kiwala'o advanced, splendidly arrayed, endowed with the tabu of a god and covered with the colors of the rainbow, down fell the fighting men of both sides prostrate to the ground because of his divine rank as a *ri'auipi'o* and the severe tabu which demanded prostration to avoid facing the sacred back of a chief. The soldiers of Maui wished to ignore the tabu, regretting the cessation of the fighting, but Kiwala'o continued on to Wailuku.

Ka-hekilli had not come to the battle in person but was at the chief's house in Wailuku where he had gathered together the old men and women, the children, and a great host. When the twins and Kiwala'o saw the multitude they said, "We imagined that he was in the midst of a school of fish, but it is only red sea moss." When, at the arrival of Kiwala'o, Ka-hekilli heard the words, "Here is your child," he turned his face upward [as a sign of a favorable reception]. Kiwala'o entered and sat on his chest, and they kissed each other and walked. Afterward the twins crawled forward and kissed the hands of Ka-hekilli. Kiwala'o, being tabu, could not be addressed directly. Kahekilli accordingly asked them, "Why do you two bring the chief here? If you are in trouble you should have come up here yourselves, lest without my knowledge your chief be killed." The twins answered, "We do not believe that the chief will be killed. It is we who would have been killed had we left the chief at the shore. The chief has been sent to ask for life. Grant us our lives. If the chief dies, we two will die with him (*moe-pu'u*)." So our royal brother commanded." Kahekilli replied, "There is no death to be dealt out here. Let live! Let the battle cease!" and he asked, "Where is your sister [referring to Ka-lola]?" "At the shore, at Kīheipuko'a, and it was she who sent us to the chief," answered Ka-manawa. Then Kahekilli said to his followers, "Take the fish of

Kanaha and Mau'oni and the vegetable food of Nawai'eha down to Kiheipuko'a." So the two chiefs became reconciled, but Ka-lani-'opu'u's was a feigned friendship.

3.2 WESTERN CONTACT AND 19TH CENTURY CULTURE CHANGE

The nineteenth century brought a multitude of commercial, demographic, social, and religious changes to nearby Kālepolepo, as well as the surrounding lands, that were encouraged by the burgeoning foreign influx on Maui. During the year 1819, the first whaling ships arrived in Hawaiian waters (Richards and Spaulding 1834) and the bays of Maui would soon become popular ports of call. Following the establishment of the Kālepolepo Store around 1849 on the shores of the fishpond of Kaonoulu-kai, now known by its ancient name of Kō'ie'ie, nearby Kālepolepo would become a center of commerce for the district of Kūla during the heyday of the whaling trade and Irish Potato boom (Wilcox 1905). These new arrivals and concepts of commercial enterprise would begin the shift from a traditional subsistence economy, toward a Western style commercial economy and fee simple land tenure model.

3.2.1 1848-1851 – The Great Mahele

In 1848, King Kamehameha III and 245 *alii'i* (royalty) and *konohiki* (landlord) came together to divide the lands of the kingdom into three classifications and begin the process of altering land tenure and management practices within the Kingdom from traditional Hawaiian concepts to that of Western ownership. The Crown and the *alii'i* received their land titles and awards for both whole *ahupua'a* and individual parcels within an *ahupua'a* which were then subsequently formally granted in 1850 (Alexander 1890:114). The lands given to the *alii'i* and *konohiki* were referred to as *Konohiki* Lands and lands retained by the King as *Crown* Lands. The distinction of *Crown* land is important and defined as:

...private lands of His Majesty Kamehameha III., to have and to hold for himself, his heirs and successors forever, and said lands shall be regulated and disposed of according to his royal will and pleasure subject only to the rights of tenants. (Kingdom of Hawaii 1848)

At the death of Kamehameha IV and with lack of a clear heir some confusion as to the inheritance of *Crown* lands and whether or not it followed the family line or the throne. It was decided by the Supreme Court that under the confirmatory Act of June 7th, 1848, "the inheritance is limited to the *successors* to the *throne*," "the wearers of the crown which the conqueror had won," and that at the same time "each successive possessor may regulate and dispose of the same according to his will and pleasure as private property, in the manner as was done by Kamehameha III" (Alexander 1890:121).

The third classification of lands that were partitioned out was termed *Government* lands and were defined and set aside for management in the following manner:

... those lands to be set apart as the lands of the Hawaiian Government, subject always to the rights of tenants. And we do hereby appoint the Minister of the Interior and his successors in office, to direct, superintend, and dispose of said lands, as provided in the Act ... (p)rovided, however, that the Minister ... shall have the power, upon the approval of the King in Privy Council, to dispose of the government lands to Hawaiian subject, upon such other terms and conditions as to him and the King in Privy Council,

may seem best for the promotion of agriculture, and the best interests for the Hawaiian Kingdom ... (Kingdom of Hawaii 1848)

In 1850, most of the chiefs ceded a third of their lands to Kamehameha III in order to obtain an *alodial* title for the remainder. The majority of these lands were then placed into the *Government* land base (Alexander 1890:114). The designation of lands to be set aside as *Government* lands, paved the way for land sales to foreigners and in 1850 the legislature granted resident aliens the right to acquire fee simple land rights (Moffat and Fitzpatrick 1995:41-51). The *ahupua'a* of Pūlehuunui was received by *alii'i* Emelia Keaweamahele and later formalized through Land Commission Award (LCA) 5230 (Figure 3-5).

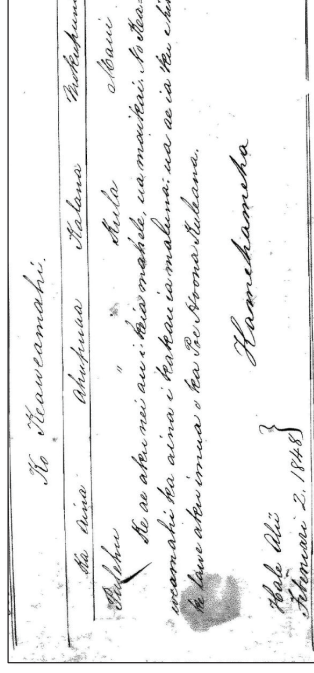


Figure 3-5. Mahele record showing Pūlehuunui, or Pūlehu, going to Keaweamahele (Buhe Mahele 1848).

In designations of lands as either *Crown* or *Government*, and through all awards of whole *ahupua'a*, *alii*, and later land sales to foreigners classified as *Land* Grants, the rights of the native tenants were expressly reserved, "Koe na *Kuleana* o *Kanaka*" (Reserving the Rights of Native Tenants) (Alexander 1890:114). In an Act ratified on August 6th, 1850, the gathering rights of the common people for personal use, which included the gathering of both terrestrial and marine resources, in addition to the right to water and the right of way on the lands of the *Konohiki*, were guaranteed and embodied in Section 10477 of the Civil Code (Alexander 1890:114-115). By this same act, resolutions passed by the Privy Council granted fee simple titles, free of all commutation, with the exception of awards granted within the towns of Honolulu, Lāhaina, and Hilo, to all native tenants for their cultivated lands and house lots (hereafter referred to as *kuleana* land) (Alexander 1890:115). Claims of the native tenants, or *kuleana* land claims, were presented to and heard by the Land Commission whose duty was to:

...ascertain the nature and extent to each claimant's rights in land, and to issue an Award for the same which is *prima facie* evidence of title "and shall furnish as good and sufficient a ground upon which to maintain an action for trespass, ejectment or other real action against any other person or persons whatsoever, as if the claimant, his heirs or assigns had received a Royal Patent for the same." (Alexander 1890:110)

Table 3-1. Summary of Land Commission Awards for Pūlehunui Ahupua'a (Office of Hawaiian Affairs 2011, 2014)

| Helu | Claimant | Ili | Land Claim | Notes | Acreage |
|------|------------|--|--|--|--|
| 4672 | Poonui | Kukuineenee, Hiolua (Aiolua), Keaku, Keeakai, Kawiha | Claimant: three native potato gardens (<i>mahina 'uala maoli</i>), one irish potato garden (<i>mahina 'uala haole</i>), four clusters (?) (<i>hui</i>) Kaili Sworn: I know the land of Poonui, six parcels. | | Ap. 1: 'Ili (1.45 acres) Ap. 2: 'Ili (0.66 acres) Ap. 3: 'Ili (2.38 acres) Ap. 4: 'Ili (0.98 acres) Ap. 5: 'Ili (1.47 acres) Ap. 6: 'Ili (1.88 acres) |
| 4956 | Kahaule | | Claimant: <i>Wahi ma uala haole</i> (place for Irish potato) given by Kekoo in 1844. Makaiwa, a small piece in the road fence (<i>pa</i>). The right was from my father, he gave up the fishery reserving this. On his death it was abandoned to the <i>konohiki</i> . | | Not Awarded |
| 5230 | Keaweamahi | | Claimant: Pūlehu is the name of the land at Kula Z. Kaauwai Sworn: I know Keaweamahi's land at Pūlehu in East Maui, I have always understood that the claimant received this from the King in 1843. There are a great many natives on this land. | It is bounded <i>mauka</i> by the Haleakala mountains, Honua'ula by Pulehuiki, Makai by the seashore, Makawao by Oma'opio. | 1668.78 acres |

Testimony for *kuleana* lands often included claims for multiple 'ili, or *apana*, located both *mauka* and *makai*. These claims were recorded under a single *helu*, or case number, and brought before the Land Commission for consideration. *Kuleana* land awards, or *kuleana* claims that were approved by the Land Commission, were granted to tenants of the land, native Hawaiians, naturalized foreigners, non-Hawaiians born in the islands, or long-term resident foreigners, who could prove occupancy on the parcels prior to 1845 (hereafter referred to as Land Commission Awards [LCA]).

3.2.1.1 Land Commission Awards within Pūlehunui Ahupua'a

A total of 10 claims, including that of Keaweamahi, were presented to the Land Commission, of which only four were awarded. The following table summarizes information and testimony for *kuleana* claims recorded in the Native Register, volumes of Native and Foreign Testimonies, and final LCA documents and survey notes for Pūlehunui Ahupua'a (Table 3-1).

Table 3-1 (continued). Summary of Land Commission Awards for Pūlehunui Ahupua'a (Office of Hawaiian Affairs 2011, 2014)

| Helu | Claimant | Ili | Land Claim | Notes | Acreage |
|------|-------------------|--|--|---|---|
| 8866 | Kaniho and Pakeau | Kukuinaena, Haleokane, Kawiha (Kaawiha), | <p>Claimant: The name is Poonahoahoa. On the east is Pohaku o Kane, on the north is a ravine. The second is Hapuuale, on the west is the spring (<i>punawai</i>) of Kane, the third is a <i>mala 'uala kahiki</i> (Irish potato), the fourth is a piece in Kukuineenee, it is an 'ili named Wahuka, to the east is a road, to the north there is a cliff ledge and the house of Wahine, to the south is a pig enclosure (<i>pa pua'a</i>) and house.</p> <p>Kapono Sworn: I know the land of Kaniho; Ap. 1 <i>kula 'ili</i> o Kukuinaena, Ap. 2 <i>kula 'ili</i> o Kaawiha, Ap. 3 and 4 <i>kula 'ili</i> o Haleokane</p> | Ap. 1 -3 bound on the Honua'ula side by Kahawai o Pūlehu (Pūlehu Stream). | <p>Ap. 1: <i>kula</i> (4 acres)</p> <p>Ap. 2: <i>kula</i> (0.9 acres)</p> <p>Ap. 3: <i>kula</i> (8.9 acres)</p> <p>Ap. 4: <i>kula</i> (3 acres)</p> |
| 8866 | Kamakea | Haleokane, Kaluanui | <p>Claimant: 'ili no Puehuhunui Kaluanui is the name of my 'ili; at Haleokane there are three <i>kuleana</i> -- at Kukuiewene there is one, at Keapu there is one <i>mala 'uala haole</i> (Irish potato plot).</p> <p>Kapono Sworn: I know of Kamakea's land, Ap. 1 <i>kula 'ili</i> o Haleokane Pūlehu Ahupua'a, Ap. 2 <i>kula 'ili</i> o Kaluanui Pūlehu Ahupua'a, both given by Keaweamahi in 1838.</p> | Ap. 2 bound on the Honua'ula side by Kahawai o Pūlehu (Pūlehu Stream). | Not Awarded |
| 9671 | Kekahuna | Keaku | <p>Claimant: Two places at Pūlehunui</p> <p>Upailai (?) Sworn: I know the land of Kekahuna, Ap. 3 <i>kula</i> at Keaku</p> | | Ap. 3: <i>kula</i> (2.9 acres) |

Table 3-1 (continued). Summary of Land Commission Awards for Pūlehunui Ahupua'a (Office of Hawaiian Affairs 2011, 2014)

| Helu | Claimant | Ili | Land Claim | Notes | Acreage |
|------|-----------|-----------------------|---|--|-------------|
| 5513 | Anakalea | Punaalana, Keaku | <p>Claimant: Within the boundary there are numerous places for <i>mahi 'uala</i> (potato farming), in this boundary there is a house there, there are three <i>punawai</i> (springs) there. There are three <i>kihapai 'uala haole ma kuahiwi</i> (Irish potato plots on the mountain) and <i>uala haole malalo</i> (Irish potato below), there is forest above. This is my <i>kuleana</i> at Punaalana upper Pūlehunui (<i>maluna ma Pūlehunui</i>).</p> <p>Kaili Sworn: I know the land of Anakalea, four <i>apana</i> (pieces); Ap. 1-4 <i>kula 'ili</i> o Keaku Pūlehu Ahupua'a</p> | | Not Awarded |
| 8073 | Hoeu | Kaawiha, Haleokane | <p>Claimant: Five <i>kuleana</i> at Pūlehunui, in the rainy season (<i>hooilo</i>)</p> <p>Kapono Sworn: I know of Hoeu's land three <i>apana 'aina</i> (pieces of land); Ap. 1. <i>kula 'ili</i> o Kaawiha, Ap. 2 and 3 <i>kula 'ili</i> o Haleokane</p> | Ap. 1 and 2 bound on the Honua'ula side by Kahawai o Pūlehu (Pūlehu Stream). | Not Awarded |
| 8630 | Koolau | | Claimant: Three <i>kuleana</i> at Pūlehunui | | Not Awarded |
| 8816 | Kalalaula | Kukuinaena, Haleokane | <p>Claimant: At Pūlehunui there is one <i>kuleana</i>, Nau is this place.</p> <p>Kapono Sworn: I know of Kalalaula's land; Ap. 1. <i>kula 'ili</i> Kukuineenee, Pūlehu Ahupuaa, Ap. 2. <i>kula 'ili</i> Haleokane, Pūlehu Ahupuaa</p> | | Not Awarded |

3.2.2 1850-1900 – Foreign Influence and Changing Economies

By 1865, the large landholdings of Keaweamahi at Pūlehuunui had passed to W.L. Moehonua who served as Minister of the Interior for the Kingdom of Hawai‘i and governor of Maui, Moloka‘i, and Lāna‘i at that time. Upon his passing in 1878, the LCA of Keaweamahi was split into two parcels, *mauka* and *makai*, and sold to Charles Alexander in 1880 (*mauka*) and Henry Cornwell in 1881 (*makai*). This split between the *mauka* and *makai* portions would ultimately set the stage for the development of sugar operations within Pūlehuunui (Tomonari-Tuggle et al. 2001:15). On the heels of the waning Irish Potato boom and close of Kalepolepo store in 1876 (Clark 1989:48), sugar cane would become the base for commercial agriculture ventures in lower Pūlehuunui with cattle ranching taking hold in the mid-elevations and *mauka* regions. Water resource development and the construction of irrigation infrastructure would ultimately reshape the landscape of the central isthmus and present study area.

While the lands of the central isthmus were naturally arid with limited water resources, the soils were deep and as a result retained a high potential for a successful commercial agriculture venture with the development of proper irrigation infrastructure. Sugarcane would be the primary crop grown in the lower region of Pūlehuunui that could withstand the winds of the central isthmus

The soil of this isthmus is fine and deep, but the climate is arid. In its original condition it was hardly to be expected that this soil could ever prove very fertile, and for two reasons. In the first place, it has the appearance of a red ochre, and contains from 30 to 40 percent (f) of red oxide of iron. In the second place, the climate is very dry throughout the greater part of the year, and there are very few crops which demand nearly so much moisture as the sugar-cane. Arid lands, however, usually become extremely fertile when irrigated, but there was no running water in the neighborhood, excepting a few small streams at distances varying from 3 to 10 miles which were already utilized for the same purpose. The nearest available supply was found in a stream flowing down the eastern flank of Haleakaala, about 25 miles distant. To bring the water to the plantation it was necessary for the aqueduct to cross or circumvent many cañon-like gorges and rugged spurs similar to those in the Hamakua district of Hawaii. The engineering difficulties were unique and of so grave a character that they perplexed very sorely the engineers who constructed the canals which supply the hydraulic mines of the Sierra Nevada.

But the work, though enormously expensive, was successful, and a supply of water was obtained capable of irrigating about 2,700 acres. The crop of sugar obtained from this land was 9,000 tons. (Powell 1884:200-201)

3.2.2.1 Water Development and the Early Years of Commercial Sugar in Pūlehuunui

The process of getting a constant and reliable source of water to the sugar cane fields of the central isthmus was a long and arduous task. Water development for the central isthmus included the development of the existing ground water resources of the central isthmus, as well as, the construction of irrigation infrastructure to bring water from the windward *moku* of Hamakualoa and Ko‘olau within the East Maui Watershed. The construction of the Lowrie Ditch was integral to the success of early sugar operations within Pūlehuunui Makai. Completed in September of the year 1900, this ditch extended for 22 miles with its ditch head at Kailua, where it intersects with Haiku Ditch, and delivers water to Pūlehuunui at an altitude of 457 ft. above sea

level. The Lowrie Ditch, at full capacity, had a holding capability of 60 million gallons of water that could irrigate approximately 6,000 acres within the central isthmus (Newell 1909:20-21).

At about the same time that HC&S and the Maui Agricultural Company extended the Koolau Ditch to Nahiku in 1903, the Hamakua Ditch was extended to meet it and the old ditch enlarged. Thus bringing the length of the Hamakua Ditch approximately 55 miles which extended from Nahiku to the Kīhei with 2/9ths of the water going toward watering the fields of the central isthmus and fields of the Kīhei Plantation Company (Dean 1950:96; Thurston 1906).

3.2.2.2 The Kīhei Plantation Company (1898-1908)

The Kīhei Plantation Company was established in 1899 with discovery of ample groundwater and capitalization of 60,000 shares (Lee-Greig et al. 2011:35). The expense of the construction of this first “Maui Type” well in 1900, as well as the engineering difficulties inherent in the development of this unique well were costly, the results of which were said to have led to its bankruptcy in 1908 (Stearns and MacDonald 1942:126). Though only in operation for roughly 10 years, the Kīhei Plantation Company was able to establish the infrastructure needed for the cultivation and transport of sugar cane with Kīhei as its business center. In its short-lived operation, the company was able to construct bridges that spanned the streams and gulches which flowed through the plantation fields, a railway system to move their cane for processing and shipment, a stone wharf for shipping, a small mill in Kīhei for processing, and Kīhei Camp One for field labor housing directly adjacent to the mill (Lee-Greig et al. 2011:36). In the beginning of the 20th century, a large Kona, or southern exposure storm, would hit the south facing shores of Haleakaia and cause large scale damage to the fields and facilities of the Kīhei Plantation Company, the expenses of repairing the damage and low sugar yields potentially due to limited water supply would ultimately result in the sale of its assets (Dean 1950:98; Lee-Greig et al. 2011:36). On July 1st, 1908, Hawaiian Commercial and Sugar Company (HC&S) purchased the personal property and leased lands of the Kīhei Plantation Company outright and folded the crop yields and field acreage into their expansive operation across the central isthmus (Baldwin 1909).

3.3 PŪLEHUUNUI AHUPU‘A AND THE CURRENT PROJECT AREA IN THE 20TH CENTURY

Beginning in 1912, after the acquisition of the Kīhei Plantation Company and HC&S would modernize their existing plantation camps to accommodate the influx of immigrant labor that was needed to work their expanding field system. Following the close of World War I (WWI) HC&S would add electricity to some of its plantation camps, expand their water system, and influence an increase industry on the central isthmus that would lead to a recommendation for an airport at Pu‘unēnē to accommodate the growth of commercial services (Lee-Greig et al. 2011:21-22). In the 1930’s, the site of a new airport within lower Pūlehuunui, and at the location of the current project area (Figure 3-6 and Figure 3-7), was approved by the U.S. Army, Inter-Island Airways (predecessor to Hawaiian Airlines), HC&S, the Kahului Railroad Company, and the Civil Aeronautics Authority (CAA), and flights officially began running out of the Maui Airport in 1939 (Cotten 1945).

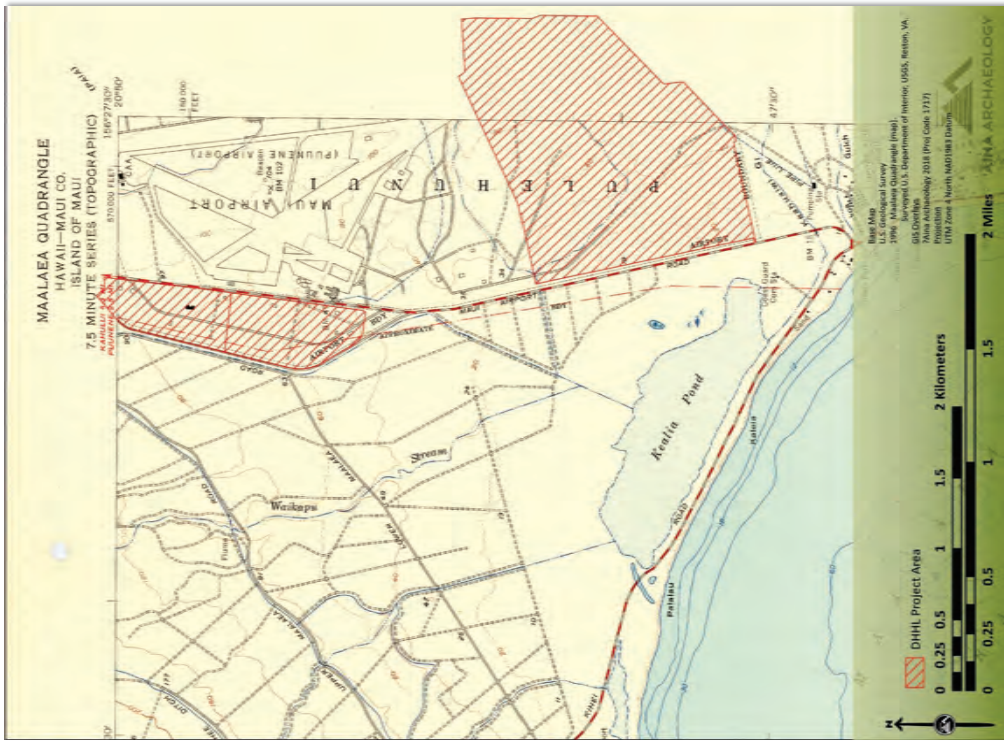


Figure 3-6. Portion of the 1954 USGS 7.5 minute Topographic Quadrangles for Maalaea showing the current project area (hatched in red) in relation to the location of the Maui Airport footprint.

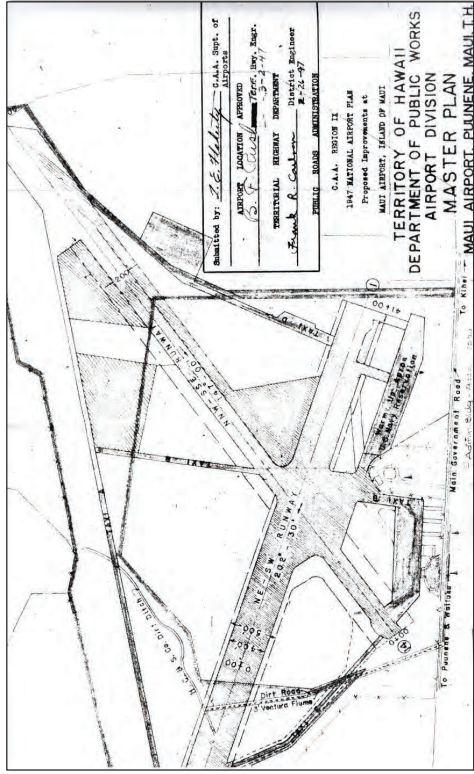


Figure 3-7. Maui Airport, Puunene, Maui, T.H. (Territory of Hawaii Department of Public Works 1947)

3.3.1 Military Aviation on Maui and World War II

In early 1940, the U.S. Navy sent Lt. T.W. South to Hawai'i to choose a location for the operation of Utility Squadron Three (VJ-3) which resulted in the identification of the Maui Airport as the best suited field for the operations (Cotten 1945). VJ-3 would arrive on Maui and soon maintain control of air traffic at Maui Airport, at first from a truck and later from a tower, while also administering all Navy activities on Maui at that time.

On December 11, 1941, following the attack on Pearl Harbor by Japan on December 7th, the USN Commander Utility Wing Base Force came to Maui to prepare for the basing on Maui of personnel and equipment of one Naval Aircraft Carrier Group and one Army Air Corps Heavy Bombardment Group to expand the airport facilities. This expansion included the extension of the runways, additional housing facilities, increased fuel storage, an oxygen plant and preparation for the maintenance of planes to be based at what would become Naval Air Station (NAS) Puunene. The dispersion of the facilities across the central isthmus, an area of over 2500 acres, was derived through an intentional plan to minimize or eliminate the possibility of destruction of all of one type of facility or personnel by a single bomb hit (Figure 3-8 and Figure 3-9) (Cotten 1945). A month before the time of commissioning, the personnel at the station consisted of 7 officers, 150 enlisted men. In contrast, by July 1945, the station personnel count had grown to 565 officers, 2,795 enlisted personnel, seven Navy nurses, eight officers with Women Accepted for Volunteer Emergency Service (WAVE), and 92 WAVE enlisted personnel along with 271 total onboard aircraft (Cotten 1945).



Figure 3-8. Facilities of NAS Puunene circa 1945 (State of Hawaii and Hawaii Aviation Archive of Historic Photos and Facts 2018).



Figure 3-9. NAS Puunene (State of Hawaii and Hawaii Aviation Archive of Historic Photos and Facts 2018).

Following the surrender of Japan in August 1945, facilities deemed essential to the operation of nearby NAS Kahului were removed from NAS Puunene and in 1946, residents of Maui were allowed to rent residential structures in Housing Area “A” closest to Airport Village. By the end of 1948, NAS at Kahului had been chosen to replace NAS Puunene for future civilian flight operations and in December of that same year, the lands NAS Puunene were transferred from the United States back to the Territory of Hawai‘i by quitclaim deed (Lee-Greig et al. 2011:29).

3.3.2 Pūlehuunui Ahupua‘a in the Mid-20th Century to the Modern Era

Shortly after the transfer of lands back to the Territory of Hawai‘i, the County of Maui established a network of Civil Defense fallout shelters, with six (MO5 A-F) located at the former site of NAS Puunene. By the mid-1970, commercial sugar cultivation had resumed to full capacity and, with the exception of the immediate area of the landing strip which was sanctioned for drag racing, would reclaim the formerly built out lands surrounding the airstrip for cultivation and either demolish or plant around the former Navy facilities (Lee-Greig et al. 2011:32). The lands of the current project area would remain under commercial sugar cultivation until December 2016 when, after 146 years of operation, HC&S ended sugar operations on Maui and closed Puunene Mill. The lands of the current project area currently consist of the former sugar cane fields of the HC&S sugar plantation and the remaining facilities of NAS Puunene.

4.0 PREVIOUS ARCHAEOLOGICAL STUDIES AND CULTURAL IMPACT ASSESSMENTS WITHIN THE ISTHMUS LANDS OF PŪLEHUNUI AHUPUAʻA

4.1 PREVIOUS ARCHAEOLOGICAL STUDIES OF PŪLEHUNUI MAKAI

The first systematic archaeological survey of Maui Island occurred between 1928 and 1929 by Winslow Walker of the Bishop Museum. The primary focus of the Walker Survey, was on the identification of monumental architecture and ceremonial structures in the form of heiau (temples) and *koʻa* (shrines). For Pūlehunui Ahupuaʻa, Walker was told of two *heiau*, both of which were located in the *mauka* region and greater than 150 yards from the main County road (MHS Archive, AR7 2-15, Winslow Walker Papers Archaeological Survey of West Maui Lahaina and Wailuku Districts). Since then, archaeological study within Pūlehunui Ahupuaʻa, the lower region in particular, has had very little study. Following the shift of lands from agricultural use to urban, the region saw a surge in archaeological studies associated with infrastructure projects and residential subdivisions and development. All of the known archaeological studies conducted in the vicinity of the project and study area are briefly summarized and presented in Table 4-1 and graphically presented in Figure 4-1. The results of the archaeological studies completed thus far are consistent with the cultural history of Pūlehunui Makai where historic properties associated with either historic ranching, historic to modern commercial sugar operations, and facilities of NAS Air Station Puʻunene (SIHP 50-50-09-04164) were identified on the inland lands of the central isthmus while historic properties consistent with possible traditional Hawaiian or plantation camp gardens consisting of stone alignments and an earthen mound were identified in the vicinity of Kihei Camp One.

Table 4-1. Summary of Previous Archaeological Studies Completed within Pūlehunui Makai

| Reference | Type of Study |
|-------------|---|
| Walker 1931 | Island Wide Archaeological Survey: Documented the existence or previous existence of two <i>heiau</i> in the <i>mauka</i> region of Pūlehunui near the County road. Nininiwai Heiau – <i>mauka</i> of the County road, destroyed; Haleokane Heiau – 150 yards above the County road, small, overgrown platform |
| Cox 1976 | Archaeological Inventory Survey: Identification of six historic properties |
| Cordy 1977 | Archaeological Reconnaissance: Identified a total of 38 historic properties, however none of the identified historic properties were located in Pūlehunui (30 historic properties recorded in Waiohulu Ahupuaʻa and eight historic properties in Keokea Ahupuaʻa) |

Table 4-1 (continued). Summary of Previous Archaeological Studies Completed within Pūlehunui Makai

| Reference | Type of Study |
|-----------------------------------|--|
| Kennedy 1987 | Archaeological Inventory Survey: Identified a series of remnant stone alignments, two <i>dhū</i> , one possible <i>kuʻula</i> (upright) stone, and one earthen mound. |
| Bordner 1980 | Archaeological Inventory Survey: Recorded historic era markers, remnant alignments, a stone wall, and a mound with an upright slab |
| Hommon 1981 | Archaeological Reconnaissance: No historic properties identified. |
| Kennedy 1988 | Archaeological Monitoring: No historic properties identified. |
| Sinoto and Pantaleo 1992 | Archaeological Inventory Survey: Recorded one historic property consisting of a historic bridge foundation |
| Burgette and Spear 1996 | Archaeological Inventory Survey: Pedestrian survey of an approximate 10-mile wide corridor. No historic properties identified. |
| Drolet and Sinoto 1998 | Archaeological Inventory Survey: Identification of structures associated with NAS Puunene consisting of over 15 concrete foundations, a recreational area that included swimming pool complex and handball courts, intact bunkers, and asphalt runways. |
| Chaffee et al. 1999 | Archaeological Inventory Survey: No historic properties identified. |
| Tomonari-Tuggle, M.J. et al. 2001 | Archaeological Inventory Survey: Identification and recording of the entire footprint of NAS Puunene (SIHP 50-50-09-04164), the remains of mid-20 th century cattle ranching operations, a pre-WWII plantation camp (Camp Six), features of HC&S sugar operations, and the remains of the Puunene Mill to Kihei Railroad Line. No historic properties associated with traditional Hawaiian use of the lands or culturally sensitive remains were identified. |
| Lee-Greig et al. 2006 | Archaeological Inventory Survey: Identification and documentation of a remnant crossing for Kihei Railroad at Waiakoa Gulch that had been repurposed as a water flume and a probable historic era water well. |
| Frey and Frederickson 2008 | Archaeological Inventory Survey: Reconfirmed the location of NAS Puunene Facility 100 originally documented by Tomonari-Tuggle et al. (2001). While scattered marine shell and coral was noted on the surface in the southern portion of their project area, mechanical subsurface exploration, consisting of 32 backhoe trenches, did not encounter any historically significant cultural deposits. |

Table 4-1 (continued), Summary of Previous Archaeological Studies Completed within Pūlehuunui Makai

| Reference | Type of Study |
|------------------------|---|
| Bassford and Dega 2010 | Archaeological Inventory Survey: Pedestrian survey and mechanical subsurface exploration, consisting of eight backhoe trenches, confirmed a history of extensive ground disturbance on the parcel. Stratigraphic profiles show natural sand deposits situated beneath approximately one-meter of alluvium and fill. No historic properties identified. |
| Lee-Greig et al. 2011 | Archaeological Inventory Survey: A total of 90 historic properties were documented. While no historic properties associated with traditional Hawaiian use of the lands or culturally sensitive remains were identified, historic plantation, ranch, and residential areas were recorded, along with features associated with military use during WWII. Mechanical subsurface exploration, consisting of 31 backhoe trenches, situated along the edges of gulches, gullies, and other water sources did not encounter any historically significant cultural deposits. |
| Tome and Dega 2012 | Archaeological Inventory Survey: Reconfirmed the locations of NAS Puunene Facility 100 originally documented by Tomonari-Tuggle et al. (2001) |

4.2 PREVIOUS ETHNOGRAPHIC INTERVIEWS AND CULTURAL IMPACT ASSESSMENTS COMPLETED FOR PŪLEHUUNUI MAKAI

As a result of the reduction of lands under sugar cultivation in the early 2000s, and with the relatively recent closure of sugar operations on the central isthmus, an increase in cultural impact assessment studies for land areas within Pūlehuunui Makai have been conducted, as agencies and other developers seek to repurpose the former sugar cane land use to new diversified agricultural ventures, expansion of base yard and light industrial facilities, and construction of affordable housing units.

In 2006, Cultural Surveys Hawai'i (CSH) completed an ethnographic interviews and analysis of potential cultural resources and traditional cultural practices of Pūlehuunui Makai in advance of an affordable housing project within a 100-acre parcel (Lee-Greig and Hammatt 2006). Kama'āina interviews included the verification of fishing traditions in coastal Pūlehuunui and cultivation of dry-land taro in the area of HC&S's Japanese Camp, or Kihei Camp One (Mr. Kimo Kenolio in Lee-Greig and Hammatt 2006:41). Garden agriculture was also noted as a successful venture by Mrs. Paula Kalanikau (in Lee-Greig and Hammatt 2006:45). With regard to traditional history, Kumu Hōkūlani Holt-Padilla (in Lee-Greig and Hammatt 2006:41) noted the battle of Ahulau ka Pi'ipi'i Kakanilia and the fact that Kīheipuko'a played a role in the battle as the landing area for the *nā Koa* (soldiers) of Kalaniopu'u. While shoreline fishing was identified as the primary traditional cultural practice for Pūlehuunui Makai in general, respondents noted that the lands of Pūlehuunui Makai were dry and arid and years of heavy commercial sugar cultivation had since precluded contemporary traditional cultural practices.

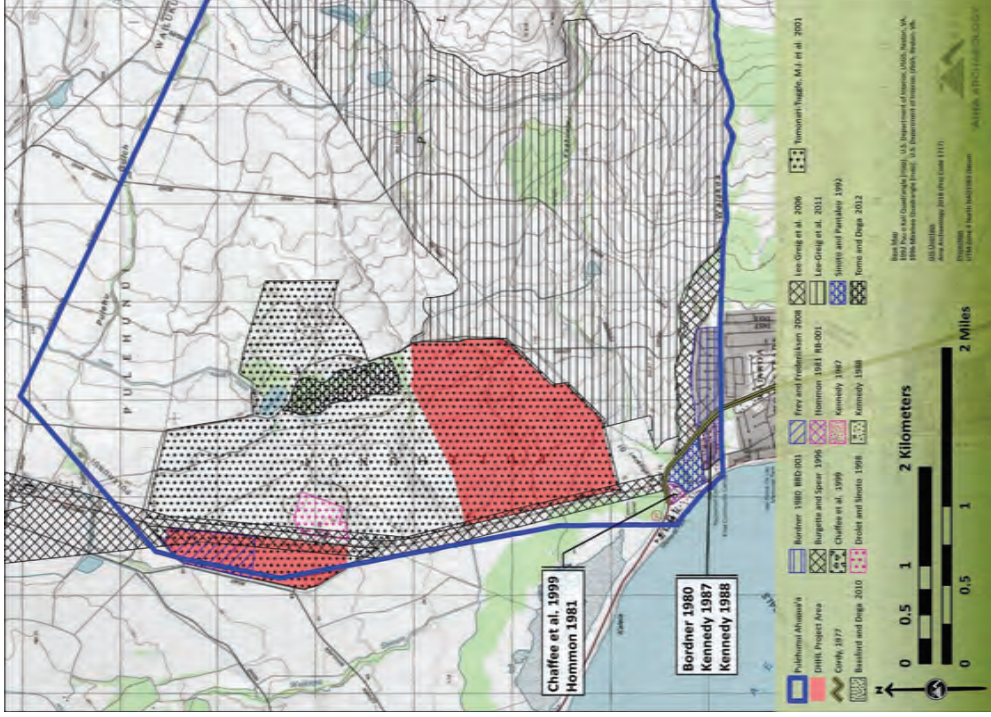


Figure 4-1. Portions of the USGS 7.5 minute Topographic Quadrangles for Puu o Kaili (1992), and Maialaea (1996) showing the current study area (outline in blue) and current project area (shaded in red) in relation to previous archaeological work in the lower section of Pūlehuunui Ahupua'a.

Hawaiian Cement sought to develop a non-potable well at the location of the Pu'unēnē Quarry site in Pūlehuui Makai in 2008. As a part of the analysis of potential impacts to traditional cultural practices, Munekiyo Hiraga completed interviews with individuals who had either worked on the lands of Pūlehuui Makai or were raised around Pūlehuui and the Pu'unene plantation camps (Munekiyo & Hiraga 2008). While the participants noted they do not doubt that traditional Hawaiian cultural practices could have occurred within the area of the Hawaiian Cement Quarry given the long history of Hawaiian settlement prior to the establishment of the plantation, they were un-familiar with any practices occurring in their time (Munekiyo & Hiraga 2008:21, 27)

In 2010, Scientific Consultant Services (SCS) completed a cultural impact assessment for a proposed heavy industrial subdivision located on 86-acres within the central isthmus lands of Pūlehuui Makai (McGerty and Spear 2011) with the Office of Hawaiian Affairs (OHA) as the only respondent. While OHA provided a letter recommending that the CIA comprehensively discuss how project infrastructure and best management practices will keep chemicals and other materials from entering the irrigation water systems or adversely impact the overall quality of the South Maui groundwater resources and Keālia Pond, no traditional cultural practices were noted within the project area and lower region of Pūlehuui (McGerty and Spear 2011:C1).

Most recent, SCS completed a cultural impact assessment in advance of a proposed Department of Land and Natural Resources Industrial and Business Park also situated on the central isthmus lands of Pūlehuui Ahupua'a, and just east of the DHHL North Project Parcel and directly north of the DHHL South Project Parcel (Dagher 2017). Concerns regarding traditional Hawaiian burials and historic properties, as well as concerns regard potential environmental impacts resulting in impacts on traditional shoreline resources were noted as a part of the 2017 study. Ms. P. Kaanohi Kaleikini, a descendant of Keaweamahele and W.L. Moehonua noted the documentation of human remains identified during an archaeological inventory survey of 1800-acres located in the *mauka* elevations of Pūlehuui Ahupua'a and cautioned that there are more human remains and cultural sites in undisturbed contexts which should remain undisturbed (Dagher 2017:31-32). Mr. Basil Oshiro, then *makai pa'o* for Kula Moku with Aha Moku o Maui, Inc. shared concerns on impacts to air quality in relation the strong winds, water sources, hazardous materials from the military use of the area, and waste and refuse management, along with increases in ambient temperatures of the already dry and hot environment of the central isthmus due to hardscaping and development of the area (Dagher 2017:33).

5.0 CULTURAL INPUT RECEIVED

5.1 RESULTS OF SURVEY OF HAWAIIAN HOMES BENEFICIARIES

As a part of the consultation process for the Pūlehuui Regional Infrastructure Master Plan DHHL sent out a survey to DHHL beneficiaries with a request to "...document and honor the history of this place by sharing any stories or mo'olelo about Pūlehuui" in an effort to document the mo'olelo of Pūlehuui. There were a total of 21 respondents to the inquiry, the majority of which recalled the ranching and commercial sugar operations in the area, along with the brief military use of the land during WWII (see also Section 3.3.1 Military Aviation on Maui and World War II). With regard to traditional Hawaiian *mo'olelo*, some information on the traditional Hawaiian farming of *'uala* was shared and one respondent referred to the area around the former Puunene Sugar Mill and sugarcane fields of the central isthmus as *ao Kuewa*, or realm of the homeless spirits. The following table summarizes the anonymous responses to the inquiry:

Table 5-1. Summary of Responses Provided to Survey about Traditional Mo'olelo of Pūlehuui Ahupua'a (provided courtesy of PBR HAWAII & Associates, Inc.)

| Respondent Number | Response |
|-------------------|---|
| 1 | ... it is an <i>ahupua'a</i> in the central area which extends from Kula. If it is history, like any land resource, it was use for cultivating. Back in the old days, the Hawaiians were wise and knowledgeable people who learned how to live off the land and use the resources available for survival such as plants, trees, ocean, land, mountain etc. |
| 2 | Don't know |
| 3 | My grandpa used to work as a heavy equipment operator for Kaonoulu Ranch and he was also a paniolo. My mom said he worked on these lands with the ranch back in the early 1950's. |
| 4 | I was born and raised up country Maui. At the age of 3, I was riding dirt bike happy as can be. At 5 years of age I placed 3rd in my first 50 race at Puunene track. Now known as MMA. I currently train kids starting at the age of 3 to now even 40 year olds on moto skills and bikes set up. DFZ racing believes in a safe designated riding area because there simply has yet to be any legal place for all our keiki to ride. So we see them riding on the streets instead with no helmets. To keep it short we all come from great families that have been riding all of Maui for many generations. We hope to bring our manao to help with designated land. Mahalo for your time. Aloha |
| 5 | I hope to get one of the residential parcel, I am excited on this plan. |

Table 5-1 (continued). Summary of Responses Provided to Survey about Traditional Mo'olelo of Pūlehuui Ahupua'a (provided courtesy of PBR HAWAII & Associates, Inc.)

| Respondent Number | Response |
|-------------------|--|
| 6 | Prior to western contact Pūlehuui was a thriving farming area that was known for its 'uala. The ahupua'a extended mauka near the Haleakalā National Park and extended makai from just before Kealia to Ohukai Street. It was also known as a turtle nursery. Unfortunately, like most of the lands back then, sugar took over and the lands went fallow and became sugar lands. There was a land court case in the late 1800's that resulted in a boundary amendment that separated Waikapū, Makawao and Pūlehuui. Kihei as it is known today was only a "spit of land" in the larger ahupua'a. In the 40's, the US navy established their naval air station there in Pūlehuui. Eventually the navy moved to Kahului and the NAS Puunene was abandoned. It eventually became a racetrack you see there today. |
| 7 | N/A |
| 8 | I do not have any historical information to share about Pūlehuui. |
| 9 | I don't know much about the area but just a little history. I know it was once a tiny landing strip for planes coming into Maui. There's a tower still sitting there a small remnant as proof of it. Not sure how it became sugar cane land. My only concern is that we try and turn this acreage into a viable financial resource to bank roll a lot of other projects needing to be implemented. I pray for wisdom on behalf of our leadership, courage on the side of our people, and insight to move forward. |
| 10 | I don't know much about the area. I only know sugarcane property. |
| 11 | Beautiful area |
| 12 | None |
| 13 | Place was used by the military in the 40s. |
| 14 | Previous sugar use by HC&S and historical use by the military. Not sure of traditional use in the area. |
| 15 | Cane fields as long as I can remember |
| 16 | No Comment |
| 17 | No information on history of this place. |
| 18 | Past knowledge that is the most relevant concerning Pūlehuui is not some mo'olelo from some distant ancestral archive of a local kanaka, but is a story hardly one generation removed. This story is one of stagnated rhetoric and action that goes unresolved, but this is just the main theme, there are more chapters to this story. MAUI REGIONAL PLAN 2010, PAUKUKALO/WAIEHU KOU PRIORITY PROJECTS, Kaulana H.R. Park, Chairman Hawaiian Homes Commission <ol style="list-style-type: none"> 1. Identify Community Economic Development at Pu'unēhē (outside of Central Maui Regional project area to focus on Commercial land development to support all Maui Homestead). 2. Land Use Between Waiehu Kou III and Waiehu Kou IV 3. Identify Sites for Waiehu Kou Community Center 4. Address Traffic Congestion and Transportation Needs 5. Paukūkalo Armory Site Development 6. Address Drainage Issue at Paukūkalo |

Table 5-1 (continued). Summary of Responses Provided to Survey about Traditional Mo'olelo of Pūlehuui Ahupua'a (provided courtesy of PBR HAWAII & Associates, Inc.)

| Respondent Number | Response |
|-------------------|--|
| 19 | I know very little about Pūlehuui but I do know that is a ahupua'a (tract of land from Mauka to Makai) that once belonged to the Hawaiian Kingdom. |
| 20 | An area in/around Pu'unene sugar mill/fields is ao kuewa, or a realm of homeless spirits, according to kahu/lia'au lapa'au, Lyons Kapi'iohookalani Naone, of Kīpahulu. Site of DHHL Kapolei is also ao kuewa, I've heard. It's like purgatory and susceptible to untoward happenings, I believe. There should be purposeful blessings w/salt/oli. My husband spent his early childhood at Hawaiian Camp in that vicinity. I understand there were lo'i kalo at the camp in those days, circa 1951. |
| 21 | None |

5.2 ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE CONSULTATION

During the public comment period for the Environmental Impact Statement Preparation Notice (EISP/N) for the Proposed Action, concerns were shared by Mr. Basil Oshiro, a representative of Kula Makai with Aha Moku o Maui, Inc., as well as Ms. Blossom Feiteira, a member of the Mokupuni Council of Hawaiian Homesteads of Maui and Association of Hawaiians for Homestead Lands. While a large part of the concerns that were shared revolved around the former military use of the land and the possibility of associated hazards affecting the use of the area (e.g. unexploded ordnance [UXO] and other pollutants), concerns with regard to water sources for the project were also expressed. Mr. Oshiro questioned what the anticipated water use per day would be and whether there was enough water to move the project forward. In his correspondence, Mr. Oshiro noted that the Mokuhaui well was showing signs of higher salinity and expressed concerns about pulling water from other aquifers and ground water resources of Na Wai 'Ehā. Finally, Mr. Oshiro recalled that Mokulele Highway, now Maui Veterans Highway, used to flood before it was raised and expanded, and that the former airstrip that is now used as a drag racing strip continues to experience flooding during heavy rains. He points out that the lands of the project area are within or near wetlands, which likely plays a factor in the tendency for flooding.

Ms. Blossom Feiteira also expressed concerns about the water sources that would be needed to support use of the area. In her comments, Ms. Feiteira requested a detailed study on where the water might come from and any possible affects that tapping into the water sources might have on South Maui.

5.3 SUMMARY OF CONSULTATION WITH MR. VERNON KALANIKAU – PO'O, KULA MAKAI

Consultation Dates: September 26 and October 5, 2016

Location: Maui Office of Āina Archaeology and Ma'ālaea Small Boat Harbor

Mr. Vernon Kalanikau was born on Maui and raised in Kahakuloa until the age of two when his ohana moved to Happy Valley in Paukūkalo where they lived for another two years before moving

to North Kihei in 1966. Mr. Kalanikau was 4 years old when his *ohana* settled permanently in Kihei, where he continues to live and raise his *ohana* on their family lands along Kenolio Road. Having lived his formative years in what is today referred to as North Kihei, Mr. Kalanikau remembers a time before the Menehune Shores Hotel at Kalepolepo and Kō'ie'ie Fishpond was constructed, when Dekalb corn was on the corner of then Mokuleie Highway (Maui Veteran's Highway) and North Kihei Road where the Monsanto field operation is currently located, when folks lived at Makai Heights by Ohukai and Kihei Heights by the Seventh Day Adventist Church, and when the Kihei School was in operation at the location of the current Kihei Youth Center, across from old Suda Store (ABC Store) and Kihei Landing. Mr. Kalanikau proudly attended the old Kihei School, from Kindergarten during the 1967-1968 academic year through the 8th grade, after which he entered Baldwin High School in Wailuku. Currently, Mr. Kalanikau works for the Department of Education at Lokelani Intermediate, owns a graphic printing business, and serves as the *Po'o* for Kula Makai, the shoreline region of Kula Moku, as a part of Aha Moku o Maui, Inc.

The southern shoreline of Maui is where Mr. Kalanikau is most connected to the traditional cultural practices of his *kūpuna* (elders and ancestors). He shared that his father would fish the entire shoreline of Kula Makai and include Papalaua at Ukumehame and Makena in Honua'ula in the fishing areas that his father knew best. Along with helping his father fish for their family, Mr. Kalanikau had also participated in the communal fishing practice of *hukilau* across from the old Kihei School, between Kihei Landing and Kalaepohaku. This method of fishing required the participation of several people to be able to lay the net that was tied with *lau kī* (ti leaf). The *lau* was important for scaring the fish into the center of the net, and when the school of fish was finally corralled toward the center, participants in the *hukilau* would pull the net in toward the shore while simultaneously shortening the net. Those who were on shore would help to gather the fish and the final catch, which was generally a large catch, would be divided amongst those who participated. Mr. Kalanikau also shared that he had accompanied the *akule* spotters of the Akina Ohana in their airplane which was used to track these large schools of fish for the *akule* surrounds and *hukilau*.

With regard to the lower section of Pūlehuunui and the vicinity of the proposed DHHL project, Mr. Kalanikau shared that he was not familiar with traditional practices that may have been carried out within the lower region of Pūlehuunui. He notes that there were some places that likely just weren't settled, or used for gathering, further noting that the winds that come through the central valley of Maui and across the plain of Pūlehuunui would make it a very difficult area to live.

This wind, and the potential for an increase in dust in the air as a result of modernized agricultural practices is a concern for Mr. Kalanikau. He shared that he was surprised that there was no increase in dust after sugar cane ended, since many predicted that without the cover of cane the winds would kick up the dust clouds similar to the dust clouds that would happen after harvest. Mr. Kalanikau remarked that it was well known that North Kihei would get slammed by smoke and dust during and just after the sugar cane harvest. He observed that the ground cover of the currently fallow fields have, for the most part, held the dust back and relieved some of the apprehension related to an increase in dust in North Kihei following the close of sugar operations.

Mr. Kalanikau notes that a possible mitigation measure that could minimize dust pollution from farming practices could be to incorporate native ground cover into farm plans in between cultivation areas and depending on what is being grown.

Mr. Kalanikau notes that some of the shoreline and coastal problems have been a result of debris and water runoff in the gulches during heavy rains. This runoff and flooding has affected the reef and resources in the shallow water which is a concern for Mr. Kalanikau, who has documented flooding in Kulanihakoī Gulch. During heavy rains in the beginning of the year (2018), water from *mauka* rains exceeded the banks, flooded parking lots, and ran over South Kihei Road resulting in pooling on either side of the Kulanihakoī Bridge and brown water plumbing out from the *muliwai* (river mouth). His concern for the proposed project is the possible potential for increased runoff and debris washing into the near shore waters that might result from increased activities on the *mauka* lands of Pūlehuunui. There is apprehension that runoff from the *mauka* lands would be directed into Keahuaiwi Gulch after hitting the raised road bed of the Maui Veteran's Highway and ultimately end up in the waters off of North Kihei. Mr. Kalanikau is concerned about the maintenance of the lands and gulches within the project area once awards are granted and is seeking assurances that good land management practices would be in place, with some form of repercussions if shoreline damage (e.g. brown water and debris) could be traced activities occurring in the *mauka* areas.

Additionally, Mr. Kalanikau notes that while Waiakoa and Kulanihakoī Gulches have run in recent history, it has been some time since he has seen Keahuaiwi run. He indicates that perhaps research or collection of rain and weather data could help to understand why, while also informing a mitigation plan and preparation for the possibility of a flood off of this gulch. Mr. Kalanikau shared that just because it is not raining in Kihei does not mean that the gulches will not flow. For this he points to the last time that Kulanihakoī Gulch flowed, where a heavy rain of Kula Mauka resulted in flood waters rushing down the gulch before this rain had even reached Kula Makai.

With regard to the DHHL plan itself, Mr. Kalanikau felt that a *kākou* community agricultural project might also be in the interest of community food security. He again warned that the wind of the Central Valley should be considered when choosing crops to plant; as well as where housing would be situated should residential structures become a part of the plan. He stressed that folks that are not from the area may not be *mā'ō* (familiar) to the winds of the Central Valley and, unlike those who currently live in North Kihei, may not truly understand the impacts that this wind could have.

6.0 TRADITIONAL CULTURAL PRACTICES

The arrangement of a typical Hawaiian *ahupua'a* extended from several fathoms out from the coastline to the upland forested areas. Depending on the location within this broad *makai* to *mauka* context, and guided by knowledge of the natural environment, a wide variety of cultural practices and resources within the *ahupua'a* could be found. Such resources and rights would include marine resources and fishing rights in the coastal area, arable lands for crop cultivation, as well as, water rights in the planting zones, and valuable bird catching along with plant and timber harvesting privileges at the higher elevations and toward the valley headwater (Handy et al. 1991:48). Based on the land commission award distribution in the *mauka* reaches of Pūlehuui; and in addition to the stories and information gathered during the background research and consultation completed for this study about the *makai* regions, it is apparent that settlement and land use within Pūlehuui Ahupua'a functioned in the typical traditional sense, with a focus marine resources gathering within the fishery of Pūlehuui and use of *kula* 'uala (potato land) for agricultural pursuits in the *mauka* lands. Discussions on specific aspects of traditional Hawaiian cultural resources and practices that may relate to the current study area, as identified through a thorough cultural historical background research process, a review of previous cultural impact assessment interviews and results for directly adjacent areas, and community consultation are presented below.

6.1 PŪLEHUUI MAUKA RESOURCES AND THE TRADITIONAL HAWAIIAN AGRICULTURAL AND GATHERING PRACTICES

Based on the testimony for *kuleana* claims during the Great Māhele, the writings of Handy and others (1991), poetic descriptions, and historical accounts, it is clear that traditional Hawaiian agricultural practices were focused in the *mauka* elevations of Pūlehuui Ahupua'a. Testimony of the Māhele Aina and L.C.A awards within Pūlehuui shows that by the mid-19th Century, *mahi* 'uala (potato agriculture) was the main agricultural pursuit, along with use of areas for *kula*, or pasture (see also 3.1.4.1). Archaeological studies in the *mauka* elevations have also resulted in the identification of archaeological sites and features consistent with traditional Hawaiian agricultural along with traditional Hawaiian burial practices. As a part of consultation for the DLNR Industrial Business Park cultural impact assessment conducted by SCS, Ms. P. Kaanohi Kaleikini (in Dagher 2017:31-32) noted that human remains had been documented within a project area situated in Pūlehuui Ahupua'a and stated that *kama'āina* cultivated heavily and lived where they were buried. This is consistent with historically documented traditional Hawaiian land use of the upland regions, as the area in which the traditional burials were found is situated between the 1040 and 1700 foot contours of Pūlehuui Mauka.

6.2 PŪLEHUUI WAENA – TRADITIONAL CULTURAL RESOURCES OF THE PLAINS OF KAMA'OMA'O AND THE CENTRAL ISTHMUS OF MAUI

With regard to the plains of Kama'oma'o, H. Kuihelani, in testimony before the Boundary Commission on the boundary of Kaliaiui Ahupua'a, noted that while he did not know the land of Kaliaiui, was familiar with Kama'oma'o as a place were *ma'o* (*Gossypium sp.*) was gathered for the chiefs to scent their *kapā* clothing with (Maly and Maly 2003:357-358). *Ma'o* is a native cotton shrub that is low growing, and primarily found in arid coastal areas (Krauss 1993:232). Isabella Abbott, in *La'au Hawai'i Traditional Hawaiian Uses of Plants* (Abbott 1992:57), writes that the different parts of the *ma'o* plant were also used to produce dyes for *kapā*. For a traditional yellow dye, the flowers of the *ma'o* were used while a bright green dye was derived from the *ma'o* leaves in the era following Western arrival. With regard to the longevity of the green dye, Abbott further notes that the color was fleeting and would fade within days of coloring the *kapā*. Historic narratives note that the resources of the Plains of Kama'oma'o generally consisted of coarse grasses and low '*ʻilima* (*Sida fallax*) bushes (Perkins 1854:152) and by 1844, the grasslands of Kama'oma'o were generally used for cattle grazing (Wilkes 1844:268).

Specific to the project area, the botanical survey completed for the proposed project notes that the native plant community on the Kama'oma'o Plain would have likely included '*ʻaʻaliʻi* (*Dodonaea viscosa*), *ma'o hauhele* (*Hibiscus brackenridgei*), *naio* (*Mvoporum sandwicense*), *Bonania menziesii*, *pa'u o Hi'iaka* (*Jacquemontia ovalifolia* subsp. *sandwicense*) and scattered *wiliwili* trees (*Erythrina sandwicensis*) (Hobby 2011:2). While traditional uses of *ma'o hauhele* and *Bonania menziesii* could not be identified at this time, the uses of *naio*, '*ʻaʻaliʻi*, *pa'u o Hi'iaka*, and *wiliwili* have been documented.

Traditionally, the hardwoods of *naio* and '*ʻaʻaliʻi* were used in house building, where the trunks or main branches were primarily used for posts (Abbott 1992:68). The heavy wood of the '*ʻaʻaliʻi* was also used for fishing tools as bait sticks to attract fish or *he'e* and fashioned into fishing spears specifically for *he'e* (http://hawaii.plants.hawaii.edu/plant/view/Dodonaea_viscosa). The woody portions of the *wiliwili* tree was suited for canoe building and surfboard shaping, while the seeds of the tree were used in *lei* making. The wood of the *wiliwili* is considered a soft wood, the light properties of which allow for buoyancy in water craft. Thus, *wiliwili* wood was often used to construct the '*iaiko* (boom) and '*ama* (float) for the *wa'a* (canoe) and specifically used to shape long boards for surfing (Abbott 1992:82, 129).

For *lei* making, the bright red seeds of the *wiliwili* were used to make *lei wiliwili*, the making of which had to coincide with the opening of the pods when the seeds were still soft enough to be pierced with traditional tools such as a sturdy fish bone or fine twig (Abbott 1992:125). '*ʻilima* was also used in *lei puu* and made in the *lei kui* style where the flowers were strung through the center. This style of *lei* required several hundreds of '*ilima* flowers to complete a single *lei* (Abbott 1992:127). While traditionally the wood of the '*ʻaʻaliʻi* was important for house construction, the leaves and capsuls of the '*ʻaʻaliʻi* are also used in *lei* making in the *lei wili* style where the flowers are tied or bound, using leaf stalks or *hau* bark.

Finally, the name of the Morning glory plant, *Pā'u o Hi'iaka*, or skirt of *Hi'iaka*, is derived from the story where Hi'iaka was waiting on the beach for her older sister Pele who was out surfing. While waiting, Hi'iaka fell asleep and when Pele is finished surfing, she finds that the vines of the morning glory plant had grown over Hi'iaka to protect her from the sun (<http://www.hawaiiannativeplants.com/ourplants/pau-o-hiiaaka/>). In *Io'au Iga'au* (traditional Hawaiian medicine), the leaves and stems of Pā'u o Hi'iaka were dried and made into a tea or eaten when mixed with *niiu* (coconut). The plant was also used to treat babies with *'ea* (thrush), as laxative, for babies suffering from *pā'ao'ao* (general weakness), for adults and babies suffering from aches or pains, and mixed with *lū'ou* leaves and salt to apply to cuts (http://nativeplants.hawaii.edu/plant/view/iacqueomontia_sandwicensis). *'A'ali'i* was also a plant used for medicinal purposes where the leaves were crushed to apply to rashes, ringworm, and staff and the flowers used as a tonic (http://nativeplants.hawaii.edu/plant/view/Dodonaea_viscosa).

6.3 6-2 PŪLEHUNUI MAKAI AND THE TRADITIONAL CULTURAL RESOURCES OF THE SHORELINE AND OFFSHORE AREA

The shoreline extent of the fishery of Pūlehuunui is well documented as extending across the shoreline from the sand spit of Kīhei to the rocks at Kalaepohaku (Harris et al. 1879). In a description of the sounding measurements and coastline of Ma'āleā Bay, Rosser (1870:27) notes the presence of the reef, or a detached patches of rocks at a ¼ of a mile from the coast of the western shoreline of the central isthmus of Maui. Previous reef studies of nearby Ma'āleā Small Harbor showed that the corals contributed the bulk of the material that formed the structural framework of the reef fronting the coastline that was home to the Hawksbill sea turtles, various sponges, and other small juvenile fish (United States. Army. Corps of Engineers and Recreation 1980:9). At the time of the study, hook and line fishing, spear fishing on the slope, and harvest of edible algae and other reef fish were also common in the harbor (United States. Army. Corps of Engineers and Recreation 1980:9), the extent of which likely extends to Kalaepohaku.

As a part of consultation for the present study, Mr. Vernon Kalanikau has shared that he has accompanied the *kilo*, or spotters, of the Akina family in their airplane where they would track large schools of *akule* off of the Kula Makai coastline and across the Pūlehuunui fishery (see also Sections 3.1.4.2 and 5.2). Prior to Western contact and into the historic era, *akule* fishing would require at least two manned canoes and a *kilo* (spotter), who was either stationed on the prominent headland or in a canoe, to guide the fishermen toward the grounds where they would surround the fish with curtain nets and draw them toward the shore to those who waited to help with the catch (Kahā'ūiello 2006:201). In addition to accompanying the Akina Ohana, Mr. Kalanikau also shared that he had participated in the communal practice of *hukū'ilaui* within the fishery of Pūlehuunui and across from the old Kīhei School, between Kīhei Landing and Kalaepohaku. *Hukū'ilaui*, as noted previously, is a method of fishing that required the participation of several people to be able to lay the net that was tied with *lau kī* (ti leaf) which was important for scaring the fish into the center of the net. When the net was full, the participants in the *hukū'ilaui* would then pull the net in toward the shore while simultaneously shortening the net. The

fish from the catch would then be distributed to the families of those who participated, as well as the larger community.

As a part of a cultural impact assessment in advance of the North Kīhei Affordable Housing Project, Mr. Kimokeo Kapahulehua (in Lee-Greig and Hammatt 2006:A-6) shared that, with the presence of a large reef just off-shore, it is likely that the coastal area of Pūlehuunui also had an established fishing village prior to the development of the central isthmus for commercial sugar. In his interview with CSH, he shared that the *kūpuna* would talk about the variety of fish and other marine resources that they would get from the area. At the time of the interview, some of those resources were still present like *loli* (*Actinopyga* sp. and *Holothura* sp.), *ōpēlu* (*Decapterus macarellus*), *halalū* (*Selar crumenophthalmus*), *'ina* (*Echinometra* sp.), *ha'ūke'ūke* (*Colobocentrotus atratus*), *wana* (*Echinothrix*), and *he'e* (*Octopus* sp.) (in Lee-Greig and Hammatt 2006:A-6).

6.4 6-3 PŪ'ĀLI O MAUI –TRADITIONAL ACCESS AND TRAILS ALONG THE CENTRAL ISTHMUS AND LOWER PŪLEHUNUI

The strong winds and aridity of the lands of the central isthmus figure prominently in both *mō'olelo i ka wa kahiko* and contemporary accounts. So much so, that Mr. Vernon Kalinikau reflects that perhaps some places were not farmed or permanently settled (see also Section 5.2). Historic and contemporary accounts describe the plains of Kama'ōma'ō and the central isthmus as an area that is prone to dust devils (Basil Oshiro in Dagher 2017:33-34; Stoddard 1894:182-183; Wilcox 1905) and generally covered in coarse grass and low *'iilima* (*Sida fallax*) (Perkins 1854:152). In the case of the central isthmus lands of Pūlehuunui, given the position of the lands between the watered valley of Waikapū, the uplands of Kula Moku, and the marine rich resources of Kula Makai, it appears that the region in which the proposed DHH project parcels are located were more likely used for transit between Maui Komohana (West Maui) and the west facing flank of Halekaalā rather than settlement.

Prior to the documented arrival of Western vessels in the Hawaiian archipelago, foot trails served to connect various settlements and access to resource gathering areas both within and between the *ahupua'a* and *moku* of Maui. Consultation with *kama'āina* and traditional cultural practitioners have noted that traditionally, there would have been overland foot trails in Kula Moku that connected the *makai* reaches to the *mauka* agricultural lands (Lee-Greig and Hammatt 2006:47). Most pertinent to the use of the central isthmus as an area of transit is the witness testimony provided to the Hawaii Supreme Court to settle the boundary between Waikapū and Pūlehuunui just after the Mahele. Every witness with the exception of Opunui, who favored the boundary that would remove the coastline from Pūlehuunui, mentioned the *pōhaku* named Pohakī'iki'i as a resting place for travelers along the natural boundary formed by the *kahawai* (stream) between Ōma'opio and Pūlehuunui Ahupua'a (Harris et al. 1879).

6.5 6-4 TRADITIONAL HAWAIIAN SPIRITUALITY

While Winslow Walker noted the presence of three *heiau* within the *mauka* elevations of Pūlehuui (see Table 4-1), according to previous archaeological studies conducted within and adjacent to the present project area (see Section 4.1), as well as the results of the intensive background research conducted for this study (Section 3.0), there are no extant *heiau* or traditional ceremonial structures currently known within the footprint of either the DHHL Project Area or situated on the isthmus lands of Pūlehuui Ahupua'a. Lack of ceremonial structures notwithstanding, *mo'olelo* recorded in Hawaiian academic literature, cultural consultations from previous cultural impact assessments conducted in the immediately surrounding area, and at least one respondent in the survey of DHHL beneficiaries for the current project all state that the central isthmus and plains of Kama'oma'o is a place in which the spirits dwell and the night marchers walk (see also Sections 3.1.2 and 5.1). Also important in understanding the lower region of Pūlehuui in the context of the spiritual realm is the *mo'olelo* of Pumaia. As recorded by Fornander, the story of Pumaia also tells us that the area along the plains of Kama'oma'o and across the shoreline to Kalepolepo at Kaonoulu was the home of *'aumakua* Pueonuiokona, an owl guardian spirit and prophet with the capability of guiding spirits who found their way to Kama'oma'o back to life.

7.0 SUMMARY AND RECOMMENDATIONS

Traditional *mo'olelo* (stories) and *wahi inoa* (place names), as well as historic maps, accounts given to the boundary commission suggests that while inland Pūlehuui appears to have been fairly dry and barren with regard to traditional agriculture and agricultural practices, the lands of Pūlehuui along the central Maui isthmus were well travelled. The position of these lands in relation to the agriculturally prosperous areas of Na Wai 'Ehā and upland Kula likely served as a transit area not only between the two agricultural areas, but also as a transit area to the rich marine resources of the coastline.

The central isthmus in general is also said to be an area inhabited by *'aumakua* (guardian spirits) and traversed by *huaka'i pō* (night marchers) on the nights that honor Kāne, Kū, Lono, or Kamaloa. This general area has also been specifically noted as the place in which the souls of those who lost their lives in the Battle of Kakanilua would dwell.

While small scale traditional cultivation of sweet potato and other dry land crops may have been possible ~~with~~ on the central isthmus, there is currently no known traditional recollection or archaeological site remains to indicate that this was carried out prior to the arrival of Western vessels in the archipelago. Nonetheless, a review of the botanical survey for the proposed project indicates that the central Maui isthmus was once vegetated with hardy, low growing native plants (Hobdy 2011:2), the plant species and uses of which are discussed in Section 6.2. Over the past 200 years however, most of these plants have either become rare across the isthmus or disappeared entirely from the area due to the effects of long-term industrial agriculture, fires, and grazing animals.

In the landmark case *Ka Pa'akai O Ka'Aina v. Land Use Com'n, State of Hawai'i* (94 Hawai'i 31, 7P.3d 1068), the Supreme Court of Hawai'i reaffirmed special protections for the rights of native Hawaiians to carry-out their traditional and customary practices to the extent feasible under the Hawai'i State Constitution, Article XII, Section 7, when it ruled that the State Land Use Commission (LUC) failed to satisfy its statutory and constitutional obligations to preserve and protect customary and traditional rights of Native Hawaiians (Belatti 2003). At issue was the LUC grant of a petition to reclassify approximately 1,009.086 acres of land in the *ahupua'a* of Ka'upulehu on the Big Island of Hawai'i from a State Land Use "Conservation District" to a State Land Use "Urban District" in order to facilitate resort expansion in the area. The members of Ka Pa'akai clearly demonstrated that they, their ancestors, friends, and families have crossed the 1800-1801 lava flow to gather salt for subsistence and religious purposes on and around the petition area over a long period of time. They further asserted that "the petition area is associated with important personages and events in Hawaiian history, contains well-known physical entities (such as the shoreline, Ka Lae Māno and the 1800-1801 lava flow) and remnants of the native tenants' lateral shoreline and *mauka-makai* trail system, living areas and burials.

Ka Pa'akai successfully argued that its members' interests as native Hawaiians, and as tenants of the *ahupua'a* of Ka'upulehu, would be impaired by the proposed development in relation to the

use of ancient trails and the shoreline area to practice traditional and customary gathering rights. The group generally contended that its members rely on the cultural resources within the petition area for fishing, gathering salt, gathering marine resource from the intertidal zone, Pele's Tears, and ha'uke'uke, the further argued that the 1800-1801 lava flow held special religious significance for Hawaiians. More specifically, Ka Pa'akai argued that the LUC illegally delegated the *kuleana* (responsibility) for the protection and preservation of cultural resources and native Hawaiian rights to the developer, endangered its members' gathering activities, and negatively impacted their access rights. The Court ultimately ruled in favor of Kapa'akai, and as a part of the decision of the Court, they recognized that, in order to adequately perform their duties, a set of guidelines or rules would be necessary. As a result, the Court offered the following analytical framework in effort to effectuate the State's obligation to protect native Hawaiian customary and traditional practice where the LUC must, at a minimum, make specific findings and conclusions to the following (94-Hawai'i 31, 7P.3d 1068):

- (1) the identity and scope of "valued cultural, historical, or natural resources" in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;
- (2) the extent to which those resources-including traditional and customary native Hawaiian rights-will be affected or impaired by the proposed action; and
- (3) the feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist.

The following sections provide and analysis of potential effect to on-going traditional and customary practices within and adjacent to the proposed project footprint and recommendations for managing either potential impacts or measures that could be taken to bring back possible practices that have not been carried out in over 100 years.

7.1 POTENTIAL EFFECT AND PROPOSED PROJECT RECOMMENDATIONS ANALYSIS OF EFFECT TO TRADITIONAL AND CUSTOMARY PRACTICES AND PROPOSED PROJECT RECOMMENDATIONS

7.1.1 Department of Hawaiian Home Lands' (DHHL) Proposed Pūlehunui North and South Project

Through detailed historical research, a review of previous archaeological studies and cultural impact assessments for Pūlehunui Makai and the Central Isthmus, as well as *mana'o* shared by Hawaiian Homes beneficiaries, respondents during the pre-consultation portion of the EIS process, and Mr. Vernon Kalanikau, there are no known on-going traditional cultural practices or resources identified within the section of Pūlehunui Ahupua'a that covers the central isthmus of Maui. While the biological resources survey completed for the proposed project identified two indigenous native plants, *ʻuhaloa* (*Waltheria indica*) and *ʻilima*, within the project footprint (Hobby 2011-4), there were no on-going traditional and customary practices within the current project area that are reliant on gathering these plants from within the proposed project footprint. Additionally, while the central isthmus, including the section of Pūlehunui Ahupua'a where the

proposed project is located, was once known for trails between the *mauka* reaches and the shoreline, as well as, transit between Waikapū and upland Kula, contemporary pedestrian access across the central isthmus via foot trails were not mentioned by respondents to the DHHL beneficiary survey, participants in Cultural Impact Assessment studies completed for projects directly adjacent to the current project area, or during consultation with Kula Makai Moku representative Mr. Vernon Kalanikau. Given the above, there are no anticipated impacts or adverse effects to either specific traditional cultural resources that are related to on-going traditional and customary practices within the proposed footprint of the current project area, or the ability to carry-out traditional and customary practices via access through the current project area.

7.1.2 Traditional Cultural Resources and Customary Practices Identified within Pūlehunui Ahupua'a and adjacent to the Proposed Project

~~This~~ The above analysis notwithstanding, the Guidelines for Assessing Cultural Impacts, adopted on November 19, 1997 by the Environmental Council, State of Hawai'i also states:

(For) the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place (proposed project area). This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. (State of Hawaii Office of Environmental Quality Control 2012:11)

Therefore, while no physical alteration of cultural resources, practices or beliefs are anticipated either within the footprint of the proposed project area or *mauka* elevations of Pūlehunui as a result of the proposed action, concerns with regard to dust, runoff, and sedimentation of the southern shorelines of Kīhei, or Kīheipuko'a, have been noted as a concern in cultural impact studies for directly adjacent lands (Basil Oshiro in Dagher 2017:33-34), as well as *mana'o* shared by Mr. Vernon Kalanikau (see Section 5.2) and Mr. Basil Oshiro (see Section 5.2) as a part of outreach for the DHHL Project Parcels. Pathways for run-off and flooding may include Keahuaiwi Gulch, which is located adjacent to and south of the southern project foot print drains into the Keālia wetland and Kīhei, while an un-named watercourse runs through the approximate center of the south project footprint and drains into Keālia wetland (Figure 7-1).

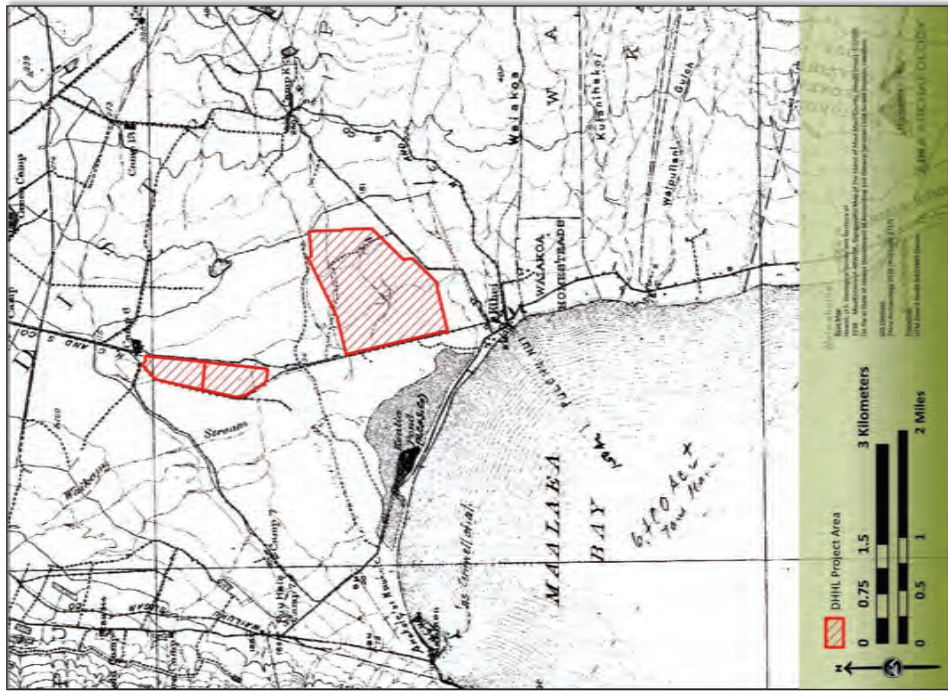


Figure 7-1. A portion of the topographic map of Maui (Hawaii 1938) with the boundaries of the fisheries (inserted in 1938) showing the fishery of Pūlehuunui in relation to the DHHL Project Area.

Finally, concerns regarding potential water sources for projects within the DHHL Project Area were shared by Mr. Basil Oshiro and Ms. Blossom Feiteira (Section 5.2). As noted previously, the lands of the central isthmus were likely primarily grasslands, the general aridity and seasonality of water availability for which appears to have precluded intensive settlement and continuous agriculture (see also Section 3.1.4 and 6.3). The transformation of the central isthmus into arable lands for large scale agriculture was dependent on the development of both the East Maui Irrigation (EMI) system, which diverted surface water from the east Maui watershed, and the Wailuku Agribusiness system, which diverted surface water from the Na Wai ‘Ehā watershed (Powell 1884:200-201). With the closing of the HC&S sugar plantation, and the end of industrial sugar cane agriculture on Maui, fair and adequate management of surface and ground water resources as a public trust resource, as well as, the restoration of the disrupted ecosystems of Na Wai ‘Ehā and entire East Maui Watershed have come to the forefront of community discourse (Department of Land and Natural Resources 2014; Lizzi 2017). In *Ola i ka Wai: A Legal Primer for Water Use and Management in Hawaii*, D. Kapua‘ala Sproat points out that:

... cases and laws from the Kingdom of Hawaii, along with Hawaiian custom and tradition, firmly established the principle that natural resources, including water, were not private property, but were held in trust by the government for the benefit of the people. Today in Hawaii, courtesy of the constitution, Water Code, and common law, the “state water resources trust” applies to “all water resources without exception or distinction.” (Sproat 2009:7)

Sproat goes on to note that “public trust” purposes include environmental protection, traditional and customary Native Hawaiian rights, appurtenant rights, domestic water uses, and reservations for the Department of Hawaiian Home Lands (Sproat 2009:8). Mr. Oshiro expressed concerns with regard to pulling water resources from the ‘Iao Aquifer and surface water sources from the other streams of Na Wai ‘Ehā, while Ms. Feiteira poses a question regarding the effects that water allocation to the DHHL Pūlehuunui lands may have on South Maui.

With the above summary of potential effect in mind, the following sections offer possible mitigation recommendations for the proposed project:

7.2 RECOMMENDATIONS FOR THE PROPOSED PROJECT

7.2.1 7.2.1 Honoring the Traditional Landscape of the Current Project Area while Protecting Shoreline and Wetland Environments and Resources

- Use traditional place names whenever possible in project design, signage, and other project related materials.
- Increase awareness of the connectivity between the *mauka* and *makai* weather patterns of Kula Moku.
- Identify potential runoff and flooding zones within the project area to ensure proper maintenance of water channels in order to help minimize coastal resource degradation that may result from flooding.

- Use appropriate native ground cover in non-cultivated areas to minimize dust pollution that may result from modern agricultural practices and wind across the central isthmus.
- Advocate for the re-introduction and cultivation of native plants suitable to the area to the extent possible as a means to foster and support la'au lapa'au practices and provide resources for traditional woodworking and craftsmanship (see also Section 6.2).

| <u>Resource</u> | <u>Traditional Uses</u> |
|--|---|
| <u>Ma'o (<i>Gossypium</i> sp.)</u> | <u>Kapa dyes and scenting</u> |
| <u>'Ilima (<i>Sida fallax</i>)</u> | <u>Lei making</u> |
| <u>Nāio (<i>Myoporum sandwicense</i>)</u> | <u>Posts for traditional hale construction</u> |
| <u>'A'ilī'i (<i>Dodonaea viscosa</i>)</u> | <u>Wood: Posts for traditional hale construction and fishing implements</u> <u>Capsules and Leaves: Lei making</u> <u>Leaves: La'au lapa'au</u> |
| <u>Wiliwili (<i>Erythrina sandwicensis</i>)</u> | <u>Wood: Canoe building and surf board construction</u> <u>Seeds: Lei making</u> |
| <u>Pa'u o Hī'iaka (<i>Jacquemontia ovalifolia</i> subsp. <i>sandwicense</i>)</u> | <u>La'au lapa'au</u> |

- While traditional trail access has not occurred through the current project area in the last century, consider the traditional trail systems during lot design to accommodate the potential revival of accessing the shoreline through mauka-makai trail systems, as well as transit between Waikapū and upland Kula.
- Prior to the initiation of land development, whether residential, business, or agriculture, ensure that proper protocols are followed, permissions asked, and blessings are carried out as the central isthmus and lower region of Pulehunui Ahupua'a is known as a place in which the spirits reside.
- Foster and encourage a *mālama āina* land stewardship ethic both within and beyond the physical boundaries of the DHHL Project Areas through:
 - o Active enforcement and/or monitoring of established environmental Best Management Practices during and after construction within the DHHL Project Lands

- o Development of waste management plan to manage waste onsite and keep the gulches clear of refuse and green waste;
- o Continued consultation with Keālia Pond National Wildlife Refuge;
- o Environmental education and outreach programs driven by Beneficiary, agency, business, and/or nonprofit organizations.
- o Prospective developers or tenants at Pulehunui North who embrace this land ethic with sustainable business proposals and practices should be favorably considered from a cultural standpoint.

7.2.2 ~~7.1.2~~ Ola i ka Wai – Water is Life

DHHL is currently assessing potential water source alternatives for the Proposed Action of the EIS. Preferred alternatives have yet to be identified. Options for water sources include, but may not be limited to, County water sources which may rely on ground water from the 'Iao Aquifer, surface water resources through the East Maui Irrigation (EMI) system, the development of a ground water well system, and/or treatment of non-potable water. While DHHL's water reservations are a protected public trust use of water, it is noted that a complete and detailed water study is underway in the form of a Preliminary Engineering Report, as suggested by Ms. Feiteira. Additionally, should water resources from either the Na Wai 'Ehā or East Maui Watersheds be identified as possible preferred alternatives for the Proposed Action, continued close consultation with, and input from, Native Hawaiian communities, as well as stakeholders that may hold appurtenant and riparian rights within the originating watershed, and other public trust uses of water is highly recommended.

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