LINDA LINGLE
GOVERNOR

CARLITO P. CALIBOSO
CHAIRMAN

WAYNE H. KIMURA
COMMISSIONER

JANET E. KAWELO
COMMISSIONER

STATE OF HAWAII
PUBLIC UTILITIES COMMISSION
DEPARTMENT OF BUDGET AND FINANCE
465 S. KING STREET, #103
HONOLULU, HAWAII 96813

April 8, 2005

RECEIVED
'05 APR -8 P12:12
OFC. OF ENVIRONMENTAL QUALITY CONTROL

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Re: East Oahu Transmission Project 46kV Phased Project Draft Environmental Assessment, TMK Zone 2 (various plats and parcels), Honolulu, Oahu

The State of Hawaii Public Utilities Commission ("Commission") reviewed the final environmental assessment ("EA") for the East Oahu Transmission Project 46kV Phased Project being proposed by Hawaiian Electric Company, Inc. and the comments received during the 30-day public comment period, which began on September 8, 2004. Based upon a review of the EA and the comments received, the Commission has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish notice of availability for this project in the next *Environmental Notice.*

We enclose a completed OEQC Bulletin Publication Form, four copies of the EA, and a diskette containing the project summary. Please contact Ms. Catherine Awakuni, Commission Counsel, at 586-2017 or Ms. Lesley Matsumoto of Belt Collins Hawaii Ltd. at 521-5361, if you have any questions.

Sincerely,

Carlito P. Caliboso
Chairman

Wayne H. Kimura
Commissioner

Janet E. Kawelo
Commissioner

CPC:CPA:eh

Enclosures

c: Division of Consumer Advocacy (w/o enc.)
William A. Bonnet, Hawaiian Electric Company, Inc. (w/o enc.)
Darcy Endo-Omoto, Hawaiian Electric Company, Inc. (w/o enc.)
Thomas W. Williams, Jr., Esq./Peter Y. Kikuta, Esq. (w/o enc.)
Henry Q Curtis, Life of the Land (w/o enc.)
Scott K. Saiki (w/o enc.)
Karen H. Iwamoto, President, Palolo Community Council (w/o enc.)
Traver Carroll, President, Hoolaulima O Palolo (w/o enc.)
Corey Y. S. Park, Esq./Pamela W. Bunn, Esq. (w/o enc.)
Dr. Jeremy Lam, President, Malama O Manoa (w/o enc.)
Daisy M. Murai, Kapahulu Neighbors (w/o enc.)

2004-04-23 FONSI
EAST O'AHU TRANSMISSION PROJECT, 46KV PHASED PROJECT VOL 1 OF 2
REPORT

APR 2 3 2005

Hawaiian Electric Company, Inc.

East O'ahu Transmission Project
46kV Phased Project

FINAL ENVIRONMENTAL ASSESSMENT

Volume 1 of 2
REPORT

FILED
2005 JAN -7 P 3:15
PUBLIC UTILITIES COMMISSION

RECEIVED
'05 APR -8 P12:14

January 2005

Hawaiian Electric Company, Inc.

East O'ahu Transmission Project
46kV Phased Project

FINAL ENVIRONMENTAL ASSESSMENT

Volume 1 of 2
REPORT

Prepared by Belt Collins Hawaii Ltd.

January 2005

Executive Summary

EXECUTIVE SUMMARY

Proposed Action

Hawaiian Electric Company, Inc. (HECO) is proposing to reconfigure and connect existing 46 kilovolt (kV) circuits from Pūkele Substation at the end of HECO's Northern 138kV Transmission Corridor with existing and new 46kV circuits at Archer Substation and Kamoku Substation in HECO's Southern 138kV Transmission Corridor. This action is planned in two independent phases. The estimated completion dates are mid-2007 for Phase 1 and early 2009 for Phase 2.

Phase 1 involves the installation of 0.5 mile of new underground ductline[1] for 46kV subtransmission lines and related work at eight existing substations. Underground 46kV lines would be installed in the Ala Moana, McCully, Mō'ili'ili, and Kapahulu areas in the new ductline and in approximately 0.4 mile of existing underground ductline. Existing 46kV and 12kV lines would be removed from the existing ductline. Phase 2 involves the installation of 1.9 miles of new underground ductline for 46kV subtransmission lines and related work at one substation. Three underground 46kV lines would be installed in the new ductline in the Kaka'ako, Makiki, and McCully areas, predominantly along King Street.

Along various sections of the Phase 1 and Phase 2 alignments, construction activities would include trenching, installation of new underground ductline and circuits, removal of existing circuits and installation of new circuits using existing underground ductlines, and repaving of trenched areas. For Phase 2, directional drilling is an optional installation method along the segment of King Street between the intersection of King and Cooke Streets and Punahou Street. Open trenching would still be required in conjunction with the directional drilling option.

Purpose and Need

The Proposed Action would allow electrical loads in the East O'ahu Service Area (from downtown to Hawaii Kai and from Makapu'u Point to Kahuku), currently being served exclusively via Ko'olau Substation and Pūkele Substation at the end of the Northern 138kV Transmission Corridor, to be augmented from Kamoku and Archer Substations in the Southern 138kV Transmission Corridor. For the western part of O'ahu, the two corridors are linked by transmission lines between power plants and substations, but no similar connection exists to provide reliable power to

[1] A ductline is an underground corridor that houses multiple ducts or pipes encased in concrete. One duct could be used to contain one cable or multiple cables, depending on the size of the ducts and cables.

the eastern part of the island, which represents 55 percent of HECO's total load. The purpose of the Proposed Action is to address four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation.

The line overload situations increase the risk of catastrophic power outages. A catastrophic outage has the potential to take down the entire island system for many hours. Restarting generation facilities is a very complex and time-consuming process; therefore, a significant number of customers could be without power for many hours until the system can be restored. The substation reliability concerns could be characterized as localized outage problems. Although the latter are limited to a certain area, certain localized power outages are of significant concern because of the number and critical nature of the customers affected and the potential duration of the outages.

Alternatives Evaluated

In addition to the Proposed Action, HECO considered alternative alignments that would route the two new 46kV circuits away from certain residential areas as much as practical by using Kapi'olani Boulevard. The two alternative alignments are variations of Phase 1 of the Proposed Action, each involving installation of new ductline. Using Kapi'olani, a major thoroughfare, would result in more inconvenience for a greater number of residents and others, at a substantially higher cost to all HECO customers on O'ahu. Compared to the Proposed Action, the alternative alignments would eliminate the opportunity to use existing ductlines for about half the length. The number of days that traffic would be affected would be substantially less with the use of existing ductlines.

This Environmental Assessment also evaluated the No Action Alternative, which assumes that the improvements described to address the potential substation reliability and transmission line overload problems would not be implemented and the problems described above would not be addressed.

Potential Impacts and Actions Taken to Avoid or Minimize Impacts

No significant construction-related or operational impacts would be associated with the Proposed Action or the alternative alignments. Impacts during construction would be temporary, with no area affected longer than two months and, in most cases, less than a month. Appropriate management actions will be implemented during construction to minimize impacts relating to traffic, noise, air quality, emergency response, and potential loss of revenue by businesses in the project area. Actions to minimize impacts may include conducting work during specific hours, for example, at night when possible in commercial areas, and during non-peak traffic hours; providing special-duty police officers and/or flagmen and signs to

help direct traffic and to assure pedestrian and vehicular access to businesses, and communicating with residents and businesses prior to and during construction.

At the request of the City and County of Honolulu, horizontal directional drilling technology was evaluated as a construction option to minimize impacts. While temporary impacts of directional drilling would not be significant, noise levels and particularly traffic disruption would be greater than those under the open trenching option. Because directional drilling equipment needs to remain in the road 24 hours a day until work is completed (approximately three to four weeks per drill segment), unlike open trenching, peak hour traffic would be affected. During the afternoon commuting period at Kalākaua Avenue and King Street, directional drilling could result in the formation of traffic queues, long delays, and diversion of several hundred vehicles per hour to parallel routes such as Kapi'olani Boulevard and the H-1 Freeway. For these reasons, horizontal directional drilling is not a preferred option.

Unrecorded human burial sites may be inadvertently encountered during excavation in the King Street right-of-way fronting the Catholic Cemetery between Cooke Street and Ward Avenue. Generally, any subsurface archaeological features encountered during construction, and any inadvertent burials found, will be treated in accordance with the law.

There is no evidence of traditional cultural practices in the project area. Properties listed on the State and National Register of Historic Places would not be affected by construction activities.

No threatened or endangered species or their habitats are known to exist in the project area.

Management actions would minimize impacts on other infrastructure. HECO would research available records and conduct surveys to verify that the proposed alignment of the subtransmission lines would not conflict with existing and planned utilities.

With regard to solid waste, the construction and demolition landfill serving O'ahu has the capacity to accommodate excavated material not recycled or reused. Hazardous waste is not anticipated; any excavated material found to contain contaminants would be handled in accordance with applicable government requirements.

If required, HECO will obtain an NPDES construction stormwater permit and will implement best management practices to prevent runoff of pollutants from the construction site to surface waters. Dewatering may be required during trenching but would have only localized and temporary effects on groundwater levels.

No significant adverse socioeconomic impacts would be associated with the Proposed Action or alternative alignments. Positive effects would include

construction-related jobs and income, and state revenues associated with construction. Management measures would assure access to businesses in the project area during construction and minimize loss of revenue. Upon completion of the project, if the Public Utilities Commission approves the costs as part of a separate, future rate case, a rate increase for HECO averaging about $1 a month for a typical residential electric bill, can be expected as a result of the Proposed Action. If the City and County of Honolulu's former curb-to-curb repaving policy were followed, the overall cost of the Proposed Action is estimated to increase by approximately $5.3 million.

Regarding electric and magnetic fields (EMF) associated with transmission lines and other electrical facilities; the difference in projected magnetic field levels between the existing and proposed power line configurations under 2009 forecasted loading can decrease slightly, remain unchanged, or increase depending upon the project area. In addition, if the project is implemented, the proposed underground circuits would have little effect on EMF near the project area, and EMF would be in the range of common everyday levels. Scientific studies conducted on the health impacts of exposure to EMF have been inconclusive. Because of this, HECO looks to the State of Hawai'i Department of Health's position of "prudent avoidance" for guidance. Prudent avoidance consists of taking reasonable, practical, simple, and relatively inexpensive actions to reduce exposure to EMF around low-frequency sources such as electrical appliances and power lines. Reduction in EMF can be achieved for multiple circuit power lines with similar loads by optimizing cable placement and phasing arrangement within the cable ducts. HECO studied a variety of cable placement and phasing arrangements and considered the routing of the proposed lines as well as engineering design of the ductlines to reduce EMF. HECO will continue to identify and implement actions to reduce EMF wherever possible, including analyzing selected segments of proposed alignments where circuits may be configured to achieve magnetic field cancellation with new underground circuits.

No significant cumulative impacts have been identified for any of the resource or issue areas evaluated. New underground subtransmission lines may constrain the availability of underground space for future utility lines. With respect to other utilities, HECO would coordinate scheduling with those agencies to minimize construction in the same area at the same time. Likewise, HECO would coordinate with the City and County of Honolulu and implement management measures to reduce cumulative project impacts. Cumulative impacts on noise, air quality, soils, and water resources due to multiple construction projects in the same area would be managed through coordination and compliance with applicable permit requirements. Most of the excavated material would be reused or recycled, minimizing cumulative solid waste generation impacts. No cumulative socioeconomic impacts are expected during construction or operations. No significant changes to EMF are anticipated, nor will there be any significant cumulative impacts from EMF.

Table of Contents

Table of Contents

Volume 1: Report

EXECUTIVE SUMMARY ES-1

TABLE OF CONTENTS i

ACRONYMS AND ABBREVIATIONS vii

CHAPTER 1
INTRODUCTION

1.1 Proposed Action 1-1
1.2 Background 1-2
1.2.1 Kamoku–Pūkele 138kV Transmission Line (via Wa'ahila Ridge) 1-5
1.2.2 46kV Phased Project 1-5
1.3 Purpose of This Document 1-6

CHAPTER 2
PURPOSE AND NEED

2.1 Pūkele Substation Reliability Concern 2-5
2.2 Ko'olau/Pūkele Overload Situation 2-8
2.3 Downtown Substation Reliability Concern 2-11
2.4 Downtown Overload Situation 2-13
2.5 East O'ahu Service Area Loads 2-15

CHAPTER 3
PROPOSED ACTION AND ALTERNATIVES

3.1 Description of Proposed Action 3-1
3.1.1 Phase 1 Construction Activities 3-3
3.1.2 Phase 2 Construction Activities 3-21
3.1.3 Operational Activities 3-35
3.2 Description of Alternatives 3-44
3.2.1 Background 3-44
3.2.2 Alternatives Evaluated In This EA 3-45
3.2.3 Alternatives Considered and Eliminated from Further Analysis 3-47

CHAPTER 4
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 Introduction 4-1
4.2 Land Use 4-1
4.2.1 Existing Conditions 4-1
4.2.2 Potential Impacts and Actions to Minimize Impacts 4-2
4.3 Infrastructure 4-8
4.3.1 Electrical 4-8
4.3.2 Potable Water 4-11
4.3.3 Wastewater 4-13
4.3.4 Drainage 4-14
4.3.5 Communications 4-16
4.3.6 Solid Waste 4-18
4.4 Roads and Traffic 4-20
4.4.1 Existing Conditions 4-20
4.4.2 Potential Impacts and Actions to Minimize Impacts 4-29
4.5 Public Health and Safety 4-42
4.5.1 Noise Environment 4-42
4.5.2 Emergency Response 4-48
4.5.3 Schools 4-50
4.6 Soils and Topography 4-52
4.6.1 Existing Conditions 4-52
4.6.2 Potential Impacts and Actions to Minimize Impacts 4-55
4.7 Water Resources 4-56
4.7.1 Existing Conditions 4-56
4.7.2 Potential Impacts and Actions to Minimize Impacts 4-58
4.8 Air Quality 4-60
4.8.1 Existing Conditions 4-60
4.8.2 Potential Impacts and Actions to Minimize Impacts 4-61
4.9 Cultural Resources 4-61
4.9.1 Archaeological Resources 4-61
4.9.2 Traditional Cultural Practices 4-63
4.9.3 Historic Resources 4-65
4.10 Visual and Aesthetic Resources 4-66
4.10.1 Existing Conditions 4-66
4.10.2 Potential Impacts and Actions to Minimize Impacts 4-67

4.11 Biological Resources 4-68
4.11.1 Existing Conditions 4-68
4.11.2 Potential Impacts and Actions to Minimize Impacts 4-69
4.12 Socioeconomic Environment 4-69
4.12.1 Existing Conditions 4-70
4.12.2 Potential Impacts and Actions to Minimize Impacts 4-73
4.13 Electric and Magnetic Fields (EMF) 4-78
4.13.1 Introduction 4-78
4.13.2 EMF Overview 4-79
4.13.3 Magnetic Field Evaluation for the Proposed Action 4-94
4.13.4 Prudent Avoidance 4-97

CHAPTER 5
OTHER CONSIDERATIONS

5.1 Secondary and Cumulative Impacts 5-1
5.1.1 Secondary Impacts 5-1
5.1.2 Cumulative Impacts 5-1
5.2 Irretrievable and Irreversible Commitment of Resources 5-12
5.3 Summary of Permits and Approvals 5-12
5.4 Summary of Potential Impacts and Management and Design Constraints 5-14
5.5 Finding Of No Significant Impact Determination 5-27
5.5.1 Applicant 5-27
5.5.2 Approving Agency 5-27
5.5.3 Brief Description of the Proposed Action 5-27
5.5.4 Determination and Reasons Supporting Determination 5-27
5.5.5 Name, Address, and Phone Number of Contact Person for Further Information 5-31

CHAPTER 6
PUBLIC PARTICIPATION

6.1 Pre-Assessment Consultation 6-1
6.2 Draft EA Comments and Responses 6-3
6.2.1 Comments Received Within the 30-day Comment Period 6-7
6.2.2 Comments Received After Close of 30-day Comment Period 6-215

CHAPTER 7
REFERENCES 7-1

List of Figures

Figure 1-1 Proposed Action–46kV Ductlines and Affected Substations 1-3
Figure 2-1 138kV Transmission Line System and Power Plants 2-2
Figure 2-2 Proposed 46kV Subtransmission Connections 2-3
Figure 2-3 East O'ahu Service Area 2-4
Figure 2-4 Pūkele Substation Reliability Concern 2-7
Figure 2-5 Ko'olau/Pūkele Overload Situation 2-9
Figure 2-6 Downtown Substation Reliability Concern 2-12
Figure 2-7 Downtown Overload Situation 2-14
Figure 3-1 Project Area and Neighborhoods 3-2
Figure 3-2 Proposed Construction Activities–Phase 1 3-5
Figure 3-3 Typical Ductline with Circuits and Typical Manhole 3-12
Figure 3-4 Phase 1 Construction Schedule 3-22
Figure 3-5 Proposed Construction Activities–Phase 2 3-23
Figure 3-6 Typical Ductline and Circuits for Directional Drilling Option 3-32
Figure 3-7 Phase 2 Construction Schedule 3-36
Figure 3-8 Diagram of Operational Capability–Phase 1 3-41
Figure 3-9 Diagram of Operational Capability–Phase 2 3-42
Figure 3-10 Alternative Alignments 3-46
Figure 4-1 Special Districts 4-3
Figure 4-2 Land Uses in Kaka'ako Community Development District 4-4
Figure 4-3 City and County Zoning Map 4-5
Figure 4-4 Makaloa Corridor 4-21
Figure 4-5 Vehicular Volumes by Time of Day–Phase 1 4-23
Figure 4-6 King Street Corridor 4-26
Figure 4-7 Vehicular Volumes by Time of Day–Phase 2 4-27
Figure 4-8 Census Tracts 4-71
Figure 4-9 Electromagnetic Spectrum 4-81
Figure 4-10 Diagram of Cable and Current Configurations For Magnetic Field Cancellation 4-99

List of Tables

Table 3-1 Phase 1 Construction Activities 3-7
Table 3-2 Typical Equipment for Phase 1 Construction Activities 3-16
Table 3-3 Phase 2 Construction Activities 3-25
Table 3-4 Typical Equipment for Phase 2 Construction Activities 3-29
Table 3-5 Summary of Operational Activities 3-38
Table 3-6 Operational Impacts Under Pūkele Substation Reliability Concern 3-39
Table 4-1 Summary of Special Districts and Associated Zoning 4-2
Table 4-2 Major Drainage Features 4-15
Table 4-3. 2004 Traffic Conditions Makaloa Street–Kapi'olani Boulevard Area 4-24
Table 4-4 2004 Traffic Conditions King Street Corridor 4-28
Table 4-5 Potential Traffic Impacts and Actions to Minimize Impacts Makaloa Corridor 4-30
Table 4-6 Potential Traffic Impacts and Actions to Minimize Impacts Pumehana Street Area 4-32
Table 4-7 Potential Traffic Impacts and Actions to Minimize Impacts Date Street Area 4-33
Table 4-8 Potential Traffic Impacts and Actions to Minimize Impacts Winam Avenue Area 4-35
Table 4-9 Potential Traffic Impacts and Actions to Minimize Impacts King Street Corridor (Open Trenching Option) 4-36
Table 4-10 Potential Traffic Impacts and Actions to Minimize Impacts King Street Corridor (Partial Directional Drilling Option) 4-37
Table 4-11 Comparison of Alternatives Based on Number of Days/Nights Traffic Impacted 4-39
Table 4-12 Potential Traffic Impacts and Actions to Minimize Impacts Alternative Alignment 1 (Kāheka–Kapi'olani) 4-40
Table 4-13 Potential Impacts and Actions to Minimize Impacts Alternative Alignment 2 (Kalauokalani–Kapi'olani) 4-41
Table 4-14 Maximum Permissible Sound Levels in dBA 4-43
Table 4-15 Construction Noise Sources and Actions to Minimize Impacts 4-45
Table 4-16 Soil Types 4-53
Table 4-17 Business Inventory 4-72
Table 4-18 Construction-related Employment and Incomes 4-74
Table 4-19 State Revenues Associated With Construction (Millions of 2004 Dollars) 4-76
Table 4-20 Typical Magnetic Field Values for Household Appliances 4-83

Table 4-21 Guidelines on Limits of Exposure to 50/60-Hz Electric and Magnetic Fields 4-86
Table 4-22 State Regulations that Limit Field Strengths on Transmission Line Rights-of-Way (ROW) 4-87
Table 5-1 Additional Traffic Impacts and Actions to Minimize Impacts with BRT 5-8
Table 5-2 Summary of Government Permits and Approvals 5-13
Table 5-3 Summary of Potential Impacts and Management and Design Constraints 5-14
Table 6-1 Pre-Assessment Consultations 6-1
Table 6-2 Distribution List 6-3

Volume 2: Appendices

Appendix A Horizontal Directional Drilling Feasibility Study
Appendix B Traffic Impact Study Final
Appendix C Cultural Resource Studies
C1 Archaeological Assessment
C2 Cultural Impact Assessment
Appendix D Magnetic Field Evaluation
D1 Magnetic Field Evaluation
D2 Addendum Magnetic Field Evaluation

Acronyms and Abbreviations

AAQS	Ambient Air Quality Standards
ADPV	average delay per vehicle
bgs	below ground surface
BLNR	Board of Land and Natural Resources
BMP	best management practices
BOE	Board of Education
BRT	Bus Rapid Transit
BWS	Board of Water Supply
CDP	Census Defined Place
CDUP	Conservation District Use Permit
CEIP	Campbell Estate Industrial Park
CFR	Code of Federal Regulations
CHP	combined heat and power
CIA	Cultural Impact Assessment
CIP	Campbell Industrial Park
circuits	underground subtransmission lines
CMU	concrete masonry units
dB	decibel
dBA	A-weighted sound level in decibels
DG	distributed generation
DOE	Department of Education
DOH	Department of Health
DOT	Department of Transportation
DP	City and County of Honolulu's Development Plan
DPP	Department of Planning and Permitting
DPR	Department of Parks and Recreation
DSM	demand side management
DTS	Department of Transportation Services
EA	Environmental Assessment
EIS	environmental impact statement
ELF	extremely low frequency
EMF	Electric and Magnetic Fields
EMS	Energy Management System
EOTP	East O'ahu Transmission Project
EPA	United States Environmental Protection Agency
F	Fahrenheit

FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GIS	gas insulated switchgear
HAR	Hawai'i Administrative Rules
HCDA	Hawai'i Community Development Authority
HDD	horizontal directional drilling
HECO	Hawaiian Electric Company, Inc.
HFD	Honolulu Fire Department
HIOSH	Hawai'i Occupational Safety & Health Administration
hp	horsepower
HPD	Honolulu Police Department
HPFF	high pressure fluid filled
HPP	Honolulu Power Plant
HRS	Hawai'i Revised Statutes
Hz	Hertz
IARC	International Agency for Research on Cancer
kcmil	A unit of measure where one kcmil is equal to 1,000 circular mils. A circular mil is the area of a circle with a diameter of one thousandth (0.001) of an inch.
kV	kilovolt
LM	load management
LOS	levels of service
LUO	Land Use Ordinance
LW	live working
mg	milligram
mG	milligauss
MS4	municipal separate storm sewer system
msl	mean sea level
MSW	municipal solid waste
MTBE	methyl tertiary butyl ether
MUZ-c	mixed-use zone commercial emphasis
MVA	megavolt ampere
MW	megawatts
NA	not available
NAAQS	National Ambient Air Quality Standards
NERC	North American Electric Reliability Council
NIEHS	National Institute of Environmental Health Sciences
NIH	National Institutes of Health

NPDES	National Pollutant Discharge Elimination System
NRC	National Academy of Sciences National Research Center
NTP	National Toxicology Program
OEQC	Office of Environmental Quality Control
OSHA	Occupational Safety and Health Administration
PCBs	polychlorinated biphenyls
Proposed Action	46kV Phased Project
PUC	Public Utilities Commission
RAPID	Research and Public Information Dissemination
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act
ROH	Revised Ordinances of Honolulu
ROW	right-of-way
SOP	standard operating procedure
TCLP	Toxicity Characteristic Leaching Procedure
TCP	Traditional Cultural Practices
TPC	transmission planning criteria
TPH	total petroleum hydrocarbons
UIC	underground injection control
USC	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
V/C	volume-to-capacity
VPD	vehicles per day
WWTP	wastewater treatment plant
XLPE	cross-linked polyethylene

Chapter 1

Introduction

CHAPTER 1
INTRODUCTION

1.1 PROPOSED ACTION

Hawaiian Electric Company, Inc. (HECO) is proposing to reconfigure and connect existing 46 kilovolt (kV) circuits from Pūkele Substation at the end of HECO's Northern 138kV Transmission Corridor with existing and new 46kV circuits at Archer Substation and Kamoku Substation in HECO's Southern 138kV Transmission Corridor. This action is planned in two independent phases. Because the project would be implemented in two phases, the Proposed Action is referred to as the East O'ahu Transmission Project (EOTP) 46kV Phased Project. Figure 1-1 shows the locations of the proposed subtransmission lines and affected substations.

Phase 1 involves the installation of 0.5 mile of new underground ductline for 46kV subtransmission lines, and related work at eight substations, to interconnect three 46kV circuits out of the Pūkele Substation, at the end of HECO's Northern 138kV Transmission Corridor, to four 46kV lines connected to HECO's Southern 138kV Transmission Corridor. Phase 1 includes: (1) the installation of underground 46kV lines in the Ala Moana, McCully, Mō'ili'ili, and Kapahulu areas, (2) a 138kV/46kV transformer installation at the existing Kamoku Substation with associated protective relaying, (3) a 46kV/12kV transformer installation at the existing Makaloa Substation with associated switchgear, (4) various switching and reconnections on the existing 46kV and 12kV systems near Makaloa and McCully Substations, (5) the removal of existing 46kV and 12kV cables between Makaloa and McCully Substations, (6) the removal of an existing 46kV/12kV transformer and associated switchgear from the McCully Substation, and (7) modifications of various existing distribution substations in the Honolulu area.

Phase 2 involves the installation of 1.9 miles of underground ductline for 46kV subtransmission lines, and related work at one substation, to interconnect four out of the five remaining 46kV circuits out of the Pūkele Substation to three other 46kV lines connected to HECO's Southern 138kV Transmission Corridor. Phase 2 includes: (1) the installation of three underground 46kV lines in the new ductline in the Kaka'ako, Makiki, and McCully areas, predominantly along King Street, and (2) a 138kV/46kV transformer installation at the existing Archer Substation with associated protective relaying.

The estimated project completion dates are mid-2007 for Phase 1 and early 2009 for Phase 2. Implementing the proposed project in two phases has been proposed to address near-term transmission problems, such as Ko'olau/Pūkele Overload Situation (discussed in Chapter 2), and part of the Pūkele Substation Reliability Concern (discussed in Chapter 2) which includes Waikīkī, in a more timely manner.

The timely implementation of Phase 1 is particularly important, as it addresses in substantial part the on-going Pūkele Substation Reliability Concern, and fully addresses the Ko'olau/Pūkele Overload Situation (which is expected to start in 2005). The importance of the implementation of Phase 1 was re-emphasized by the outage of Pūkele Substation on March 3, 2004, which could have been significantly mitigated if Phase 1 were in place.

1.2 BACKGROUND

Various studies have identified several problems with HECO's 138kV transmission system in the eastern part of O'ahu. The purpose of the EOTP is to address several transmission problems that can affect system reliability, including the following:

- **Pūkele Substation Reliability Concern.** This involves the reliability of the Pūkele Substation located at the end of HECO's Northern 138kV Transmission Corridor. Pūkele Substation serves 16 percent of O'ahu's power demand, which includes critical loads such as Waikīkī, State Civil Defense, the Hawai'i Army and Air National Guard Headquarters, and University of Hawai'i.
- **Ko'olau/Pūkele Overload Situation.** This involves potential transmission line overloads in HECO's Northern 138kV Transmission Corridor starting in 2005.
- **Downtown Substation Reliability Concern.** This involves the reliability of Archer Substation, Kewalo Substation and Kamoku Substation located at the end of HECO's Southern 138kV Transmission Corridor. These substations serve critical loads such as the Honolulu Police Department (HPD) Headquarters, and Hawai'i Convention Center.
- **Downtown Overload Situation.** This involves potential transmission line overloads in HECO's Southern 138kV Transmission Corridor starting after 2024.

HECO has considered a number of alternatives to address these problems. A few of the alternatives are summarized below.

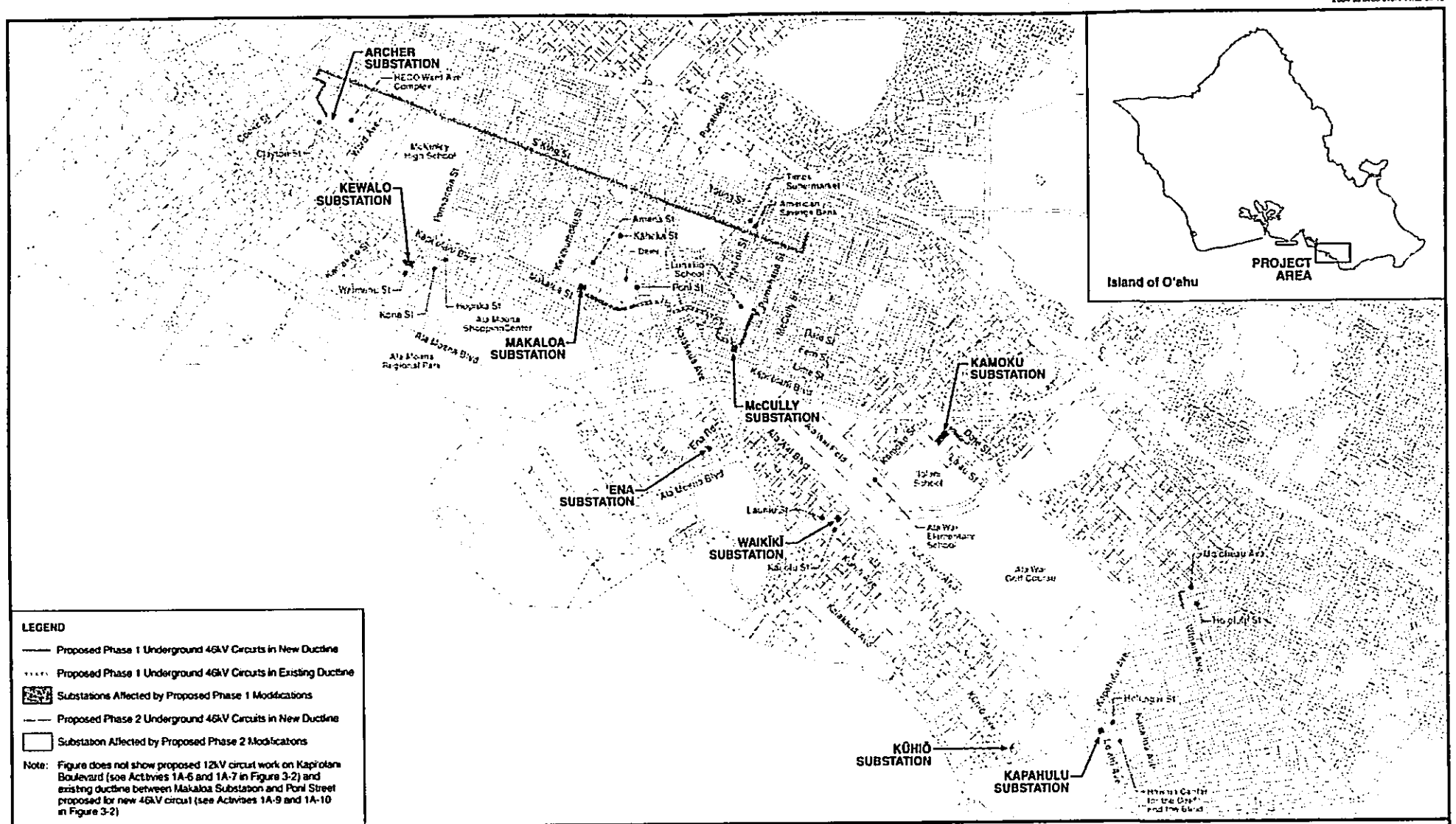


Figure 1-1
PROPOSED ACTION—
46kV DUCTLINES AND AFFECTED SUBSTATIONS
Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

1.2.1 Kamoku–Pūkele 138kV Transmission Line (via Wa'ahila Ridge)

HECO's preferred alternative to address the transmission problems was a partial underground, partial overhead 138kV transmission line connecting Kamoku Substation to Pūkele Substation via Wa'ahila Ridge, called the Kamoku–Pūkele 138kV Transmission Line. After an extensive public input process, environmental impact statement (EIS) process and contested case hearing to secure a Conservation District Use Permit (CDUP) for the project, the State Board of Land and Natural Resources (BLNR) denied HECO's permit request in June 2002. Therefore, the Kamoku–Pūkele 138kV Transmission Line was no longer a viable option.

1.2.2 46kV Phased Project

After the Kamoku–Pūkele 138kV Transmission Line was no longer a viable option, past alternatives considered during the EIS process were reevaluated and new alternatives were identified to address the transmission problems. A number of alternatives were evaluated and screened out for various reasons. Subsequently, HECO identified three transmission system alternatives that could address the transmission problems in varying degrees: (1) Kamoku–Pūkele 138kV Underground Alternative (an all-underground 138kV transmission line connecting Kamoku Substation to Pūkele Substation using existing public right-of-ways); (2) Kamoku 46kV Underground Alternative (this alternative is equivalent to Phase 1 of the EOTP); and (3) Kamoku 46kV Underground Alternative–Expanded (this alternative is equivalent to Phases 1 and 2 of the EOTP, assuming both phases are implemented at the same time). These alternatives were presented to the community as part of an extensive public input process. The findings of the public input process are detailed in a report entitled *East O'ahu Transmission Project: A Report on Public Input Collected in June and July 2003* (3Point September 2003).

These alternatives were evaluated based on considerations such as effectiveness, timeliness, cost, and public sentiment. Balancing all the issues, the Kamoku 46kV Underground Alternative–Expanded was selected over the other alternatives. It was also recommended that the selected alternative be implemented in two independent phases (currently referred to as the 46kV Phased Project or the Proposed Action).

1.3 PURPOSE OF THIS DOCUMENT

The purpose of this environmental assessment (EA) is to inform decision makers and the public of environmental effects of the Proposed Action. HECO's decision to prepare this EA was in response to requests made at the McCully/ Mō'ili'ili neighborhood board meeting, continued public interest in HECO's Proposed Action, and the history of events leading up to this proposal, as discussed in Section 1.2.

Chapter 2

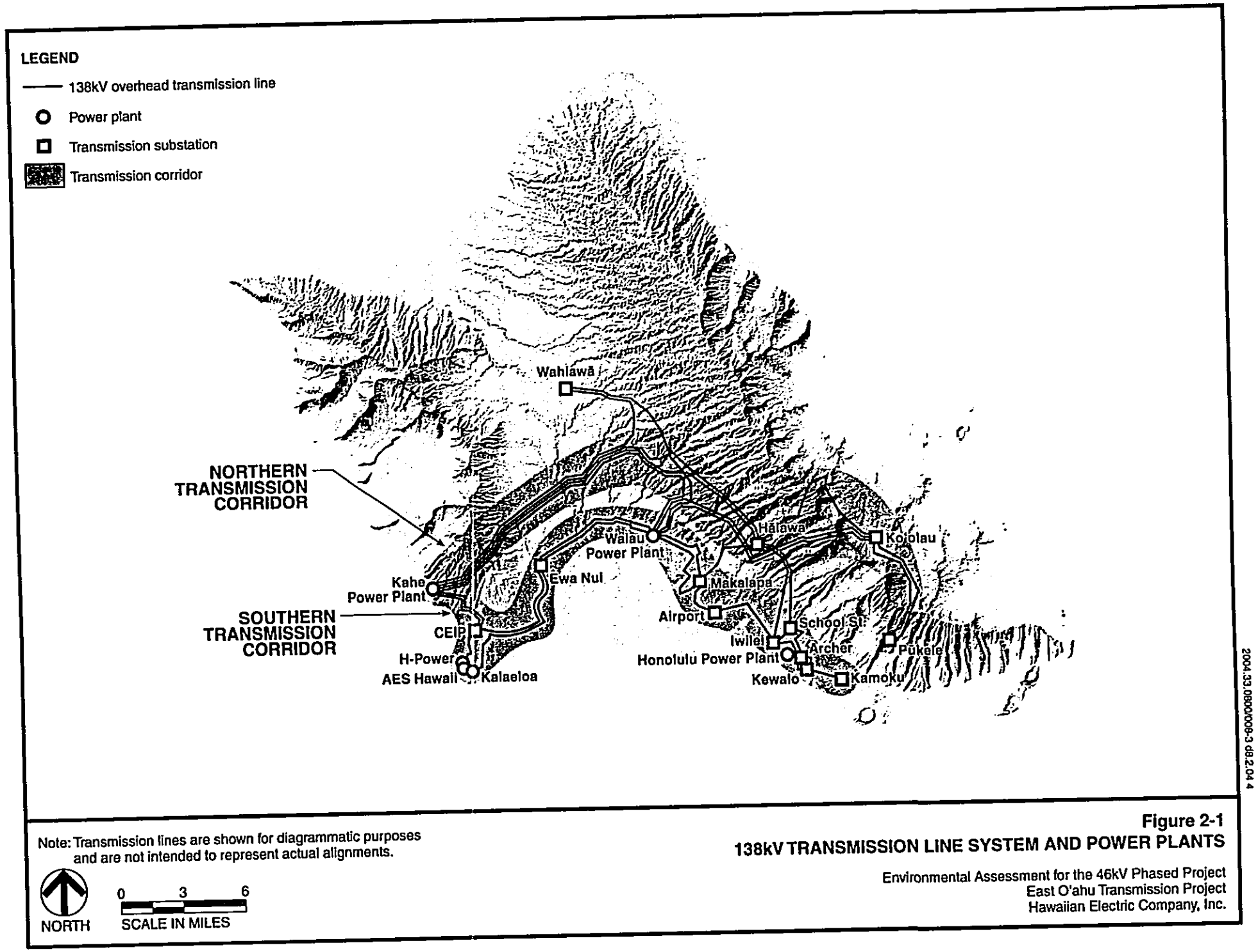
Purpose and Need

CHAPTER 2
PURPOSE AND NEED

HECO is proposing to reconfigure and connect existing 46kV circuits from Pūkele Substation at the end of HECO's Northern 138kV Transmission Corridor with existing and new 46kV circuits to Archer Substation and Kamoku Substation in HECO's Southern 138kV Transmission Corridor (Figures 2-1 and 2-2). As background, bulk power from leeward O'ahu power plants is transmitted to the East O'ahu Service Area (Figure 2-3) over two major transmission corridors. HECO's Northern 138kV Transmission Corridor extends from Kahe Power Plant to the Hālawa Substation, Ko'olau Substation, and the Pūkele Substation where it currently ends (Figure 2-1). With the completion of the two Waiau-Campbell Industrial Park (CIP) 138kV transmission lines in 1995, HECO's Southern 138kV Transmission Corridor was extended from the Kahe Power Plant to the Waiau Power Plant and Iwilei, School Street, and Archer Substations. HECO's Southern 138kV Transmission Corridor was recently extended to the Kamoku Substation through the installation of two 138kV transmission lines from Archer Substation to Kewalo Substation and the installation of a 138kV transmission line from Kewalo Substation to Kamoku Substation (Figure 2-1).

In West O'ahu, the two corridors are linked together by transmission lines between power plants and substations connected to the Northern and Southern Corridors (Figure 2-1). However, no similar connection exists to provide reliable power to the East O'ahu Service Area. HECO's plan has been to build upon existing facilities installed to serve the local load growth through the Archer–Kewalo and Kewalo–Kamoku projects and close the existing gap between the Northern 138kV Transmission Corridor and the Southern 138kV Transmission Corridor on the east side of O'ahu, providing added reliability to the eastern and windward parts of O'ahu, which represent 55 percent of HECO's total load.

The purpose of the Proposed Action is to address the following transmission problems concerning O'ahu's 138kV transmission system in the East O'ahu Service Area: (1) Pūkele Substation Reliability Concern; (2) Ko'olau/Pūkele Overload Situation; (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation.

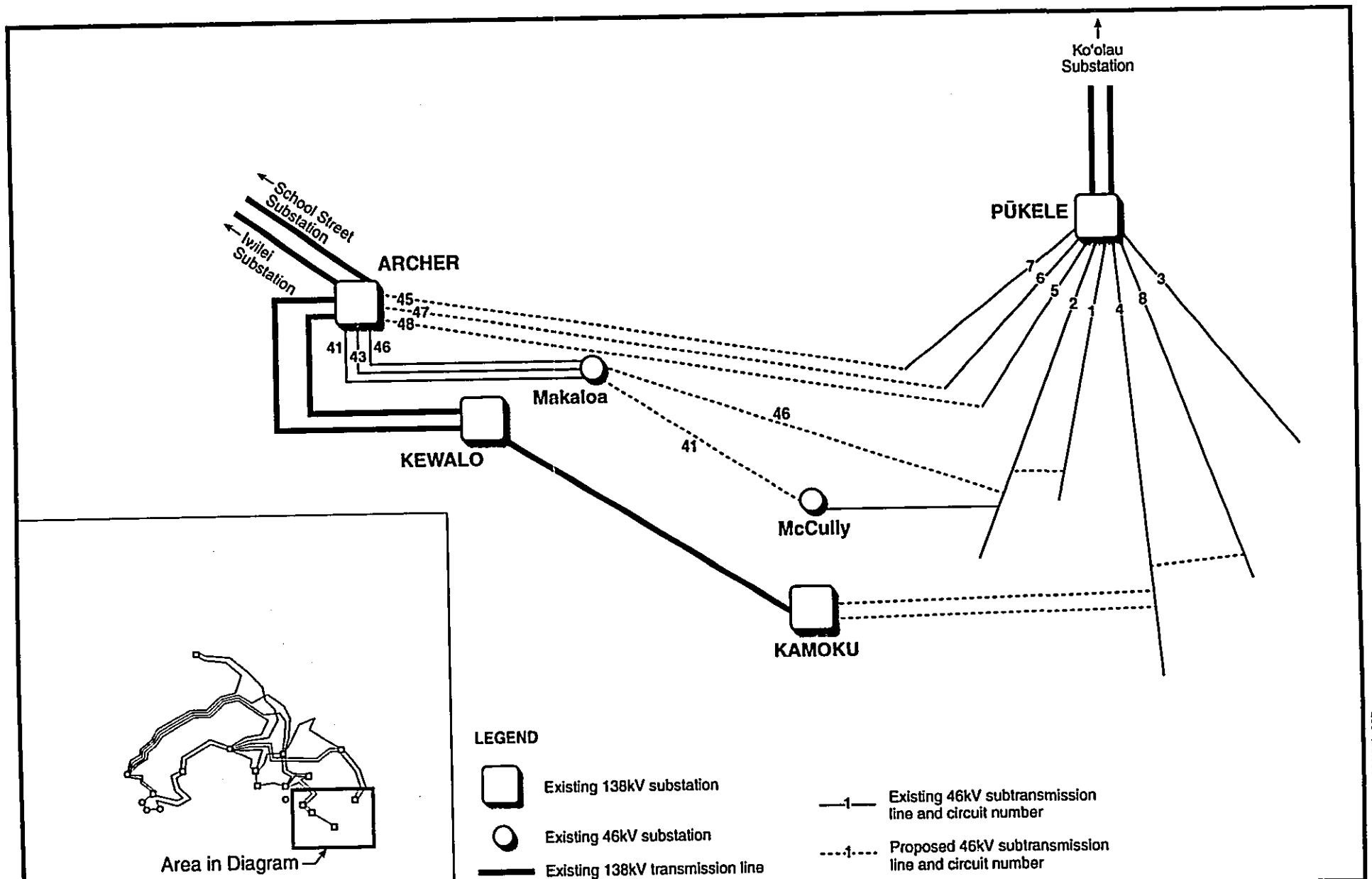


Note: Transmission lines are shown for diagrammatic purposes and are not intended to represent actual alignments.

Figure 2-1
138kV TRANSMISSION LINE SYSTEM AND POWER PLANTS

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

2004.33.0800008-3 d8.2.04 4

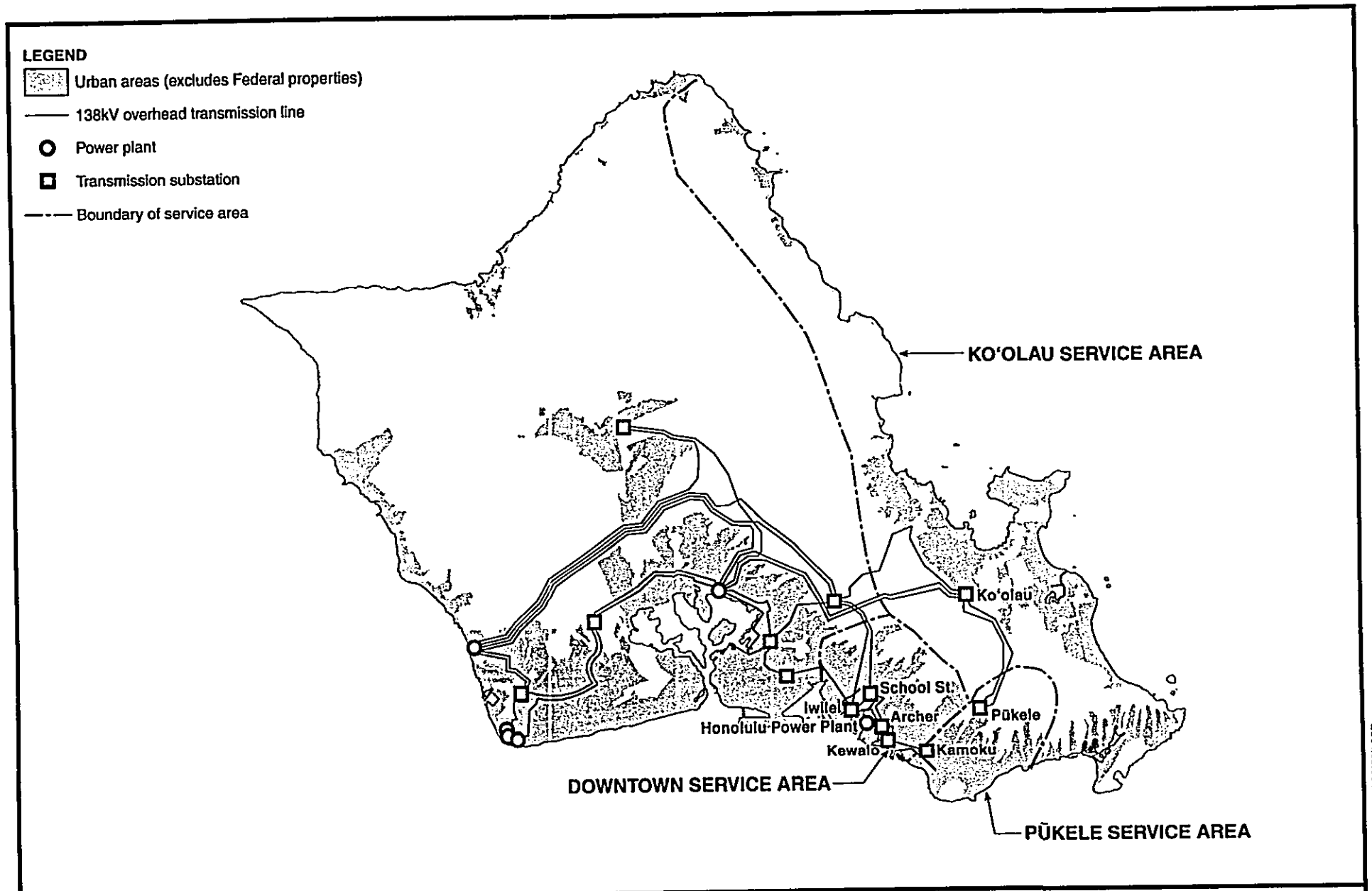


2004.33.0800/011-1 d8.11.04 13

Figure 2-2
PROPOSED 46kV SUBTRANSMISSION CONNECTIONS

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

DIAGRAM NOT TO SCALE



Source: State of Hawaii Land Use Commission

NORTH

0 3 6
SCALE IN MILES

Figure 2-3
EAST O'AHU SERVICE AREA

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

2004.03.0300/008-2 dB 9.04 6

The East O'ahu Service Area includes (1) the Downtown area, served by power generated from leeward O'ahu power plants which is transmitted to and through HECO's Iwilei and School Street Substations, as well as by power generated from the Honolulu Power Plant (HPP) in downtown Honolulu, and (2) the Ko'olau/ Pūkele area, served by power generated from the leeward O'ahu power plants which is transmitted to the Ko'olau and Pūkele Substations (Figure 2-3).

The four transmission problems identified can be categorized as either (1) problems that increase the risks for catastrophic power outages or (2) localized outage problems. A catastrophic power outage has the potential for taking down the entire system for many hours. If the entire system becomes too unstable after system disturbances, generation facilities will eventually shut down, as designed, to protect vital equipment from long-term or permanent damage. The restart of generation facilities is a very involved, complex, and time consuming process. Therefore, a significant number of customers could be without power for many hours until the system can be restored.

A localized outage is limited to a certain area and is unlikely to cause the entire system to become unstable and cause loss of generation. Certain localized power outages are of significant concern because of the number and critical nature of customers affected and the potential duration of the outages.

The Ko'olau/Pūkele Overload Situation and Downtown Overload Situation could be characterized as problems that increase the risks for catastrophic type power outages. The Pūkele Substation Reliability Concern and Downtown Substation Reliability Concern could be characterized as localized outage problems. The four transmission problems are discussed below.

2.1 PŪKELE SUBSTATION RELIABILITY CONCERN

Two 138kV transmission lines currently feed the Pūkele Substation from the Ko'olau Substation in Kāne'ohe, on the windward side of O'ahu (Figure 2-2). The two 138kV lines cross the Ko'olau Mountain Range to connect the Pūkele Substation to the rest of the HECO system. The power transported from these two lines is stepped down to the subtransmission voltage (46kV) and transported over eight 46kV feeders that branch out from Pālolo Valley to distribution substations in Kāhala, Kaimukī, Mānoa, Makiki and Waikīkī.

The Pūkele Substation is the most heavily loaded 138kV substation in the HECO system. Based on 2002 Day Peak load conditions, the Pūkele Substation supplied electricity to about 17 percent of the O'ahu load (or approximately 192 megawatts [MW] of the daytime peak load).

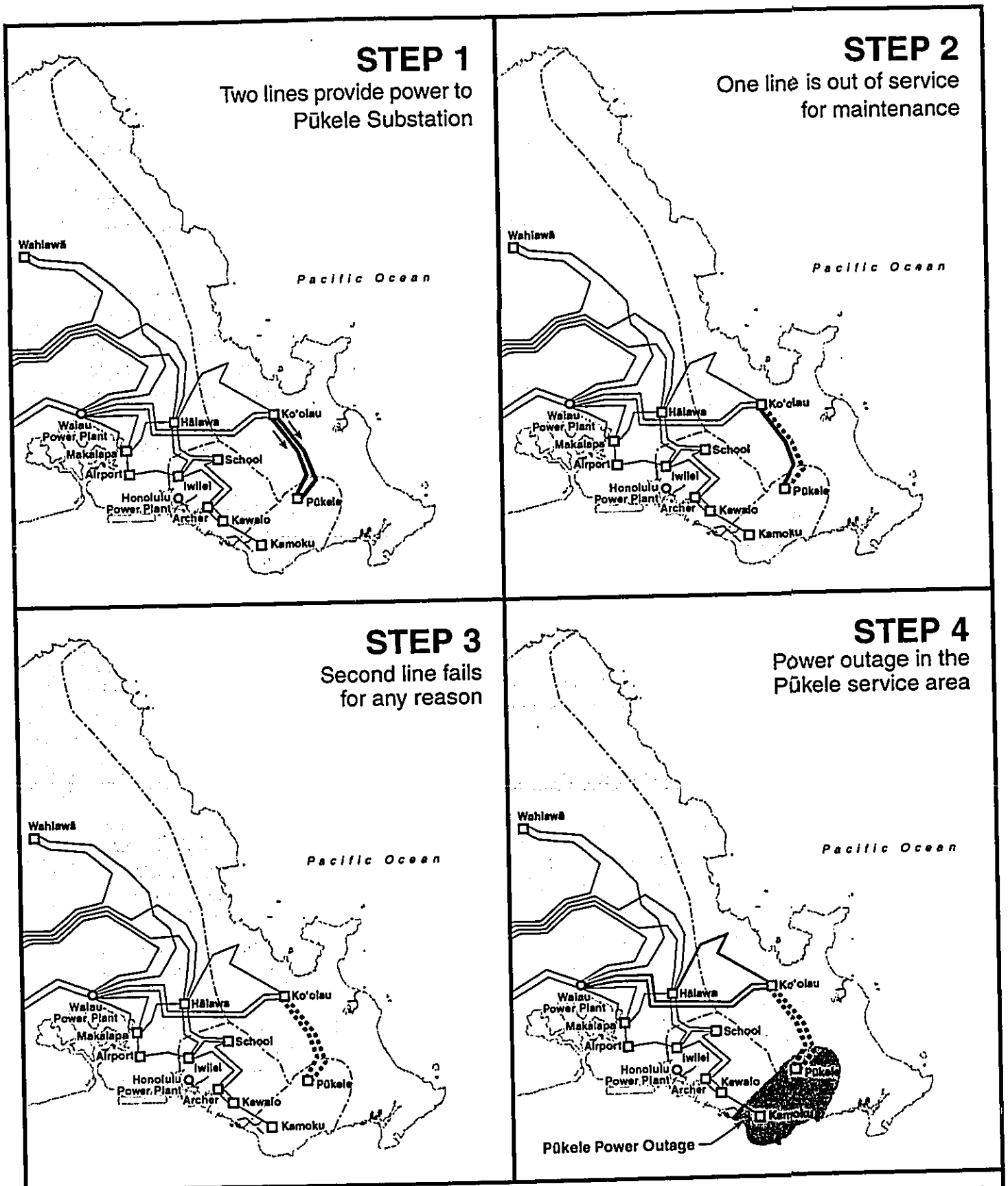
If the two lines providing power to the Pūkele Substation are both out of service, 93 percent of the customers in the area serviced from the substation, which extends

from Makiki to Waikīkī and from Ko'olau to Kaimukī, would be out of power until one of the two 138kV transmission lines could be restored to service (Figure 2-4). (The remaining customers would experience a service interruption of up to six seconds as their service is automatically transferred to Archer and Ko'olau Substations.) While many parts of the two lines have been renewed and upgraded, the two Ko'olau–Pūkele 138kV transmission lines are more than 40 years old. Typically, a transmission line experiences an increase in forced (unplanned) outages as the line ages. Even with visual inspections and maintenance on the Ko'olau–Pūkele 138kV transmission lines, forced outages will occur. These lines are subject to extreme weather conditions due to the high winds, heavy rains, and salt laden marine air that are prevalent in the coastal Ko'olau Mountain Range.

The Pūkele Substation Reliability Concern was heightened earlier this year. On March 3, 2004, one of the two transmission lines serving the Pūkele Substation was out for scheduled maintenance when the second transmission line went out of service and resulted in a power outage. Approximately 40,000 customers in the Honolulu/East O'ahu area, including Waikīkī, lost power. Approximately 39,000 customers were without power for 45 minutes to 2 hours; approximately 1,000 customers were without power for almost 4 hours. (Prior to March 3, 2004, HECO had been fortunate that the second of the two 138kV lines to Pūkele Substation had not tripped out of service while the other line was out for maintenance or out of service due to a forced outage.) The sustained outage would have been prevented if the Proposed Action had been completed. Many of the customers affected on March 3, 2004 would not have seen any interruption in service, while the other affected customers would have experienced a momentary interruption of service lasting only seconds.

The Waikīkī area includes large hotels and commercial shopping areas, and an extended power interruption to these loads could have a major impact on the local and state economies. A prolonged blackout of Waikīkī could be reported around the world creating a "third world" image for Hawai'i's main resort area at a time when Hawai'i is positioning itself as a safe, secure domestic destination for relaxation and rejuvenation. In addition, many facilities essential to Hawai'i's safety and security, such as the State Civil Defense, are in this service area, as well as the University of Hawai'i at Mānoa and Kapi'olani Community College. A blackout at the University of Hawai'i could impact research and experiments involving millions of dollars. A blackout that incapacitates the Hawai'i National Guard and Civil Defense facilities at Diamond Head could have a serious effect on Hawai'i's safety and security.

2004.03.0300/014-1 d8.9.04 8



NORTH

0 5 10
SCALE IN MILES

Figure 2-4
PŪKELE SUBSTATION RELIABILITY CONCERN

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

Some customers with emergency generators on site may be able to meet limited power needs during an area blackout. However, typical emergency generators (at a hotel, for example) serve only critical loads such as elevators and emergency lighting. Ultimately the vast majority of customers within the Pūkele Service Area, including most of Waikīkī, would be without power until at least one of the two 138kV lines to the Pūkele Substation was restored to service.

The duration of a forced outage of the Ko'olau-Pūkele lines would depend on the severity of the damage to the line. The duration could be instantaneous or within a minute as seen with the 1994 flashover incidents on the Ko'olau–Pūkele lines, or could last days as in the case of the April 5, 2003 outage on the Ko'olau-Pūkele Number 1 line. The Ko'olau–Pūkele Number 1 138kV transmission line experienced a continuous outage (including the Evening Peak period) for 4.5 days due to structure damage. Severe weather conditions could also cause a prolonged outage that could take weeks to repair.

In the case of a prolonged interruption of power to the Pūkele Substation, most of the customers served by the substation would continue to experience an outage for the duration of the power interruption. The load in certain segments of the Pūkele Service Area could be manually switched to other 46kV back up circuits receiving power from the Ko'olau Substation. Based on 2002 Day Peak load conditions, about 20 percent of the total electricity demand of the Pūkele Service Area could be restored to service after manual switching operations on the existing 46kV system were implemented. These customers would experience a 2- to 4-hour outage until all the switching could be done to transfer them to these back up circuits.

2.2 KO'OLAU/PŪKELE OVERLOAD SITUATION

There are three 138kV transmission lines providing power to the Ko'olau Substation. There are two 138kV transmission lines from the Ko'olau Substation that provide power to the Pūkele Substation. Together these two substations provide power to 30 percent of the load served by HECO on O'ahu, at the time of the 2002 Day Peak load. HECO typically has two peaks. One peak typically occurs around 1:00 P.M., and is referred to as the "Day Peak." A second peak typically occurs between 6:30 P.M. and 7:00 P.M. in the evening, and is referred to as the "Evening Peak." The Day Peak is used for transmission planning studies, even though it is lower than the Evening Peak. Based on load flow analyses using the load growth projections in HECO's August 2002 load forecast, with one 138kV transmission line to the Ko'olau Substation out of service for maintenance, if a second 138kV Ko'olau transmission line becomes unavailable for any reason, the current flowing through the third 138kV Ko'olau transmission line is projected to exceed its emergency current carrying capacity rating during daytime peak load conditions in the year 2005 (Figure 2-5).

2004.03.0300/014-2 d8.9.04 7

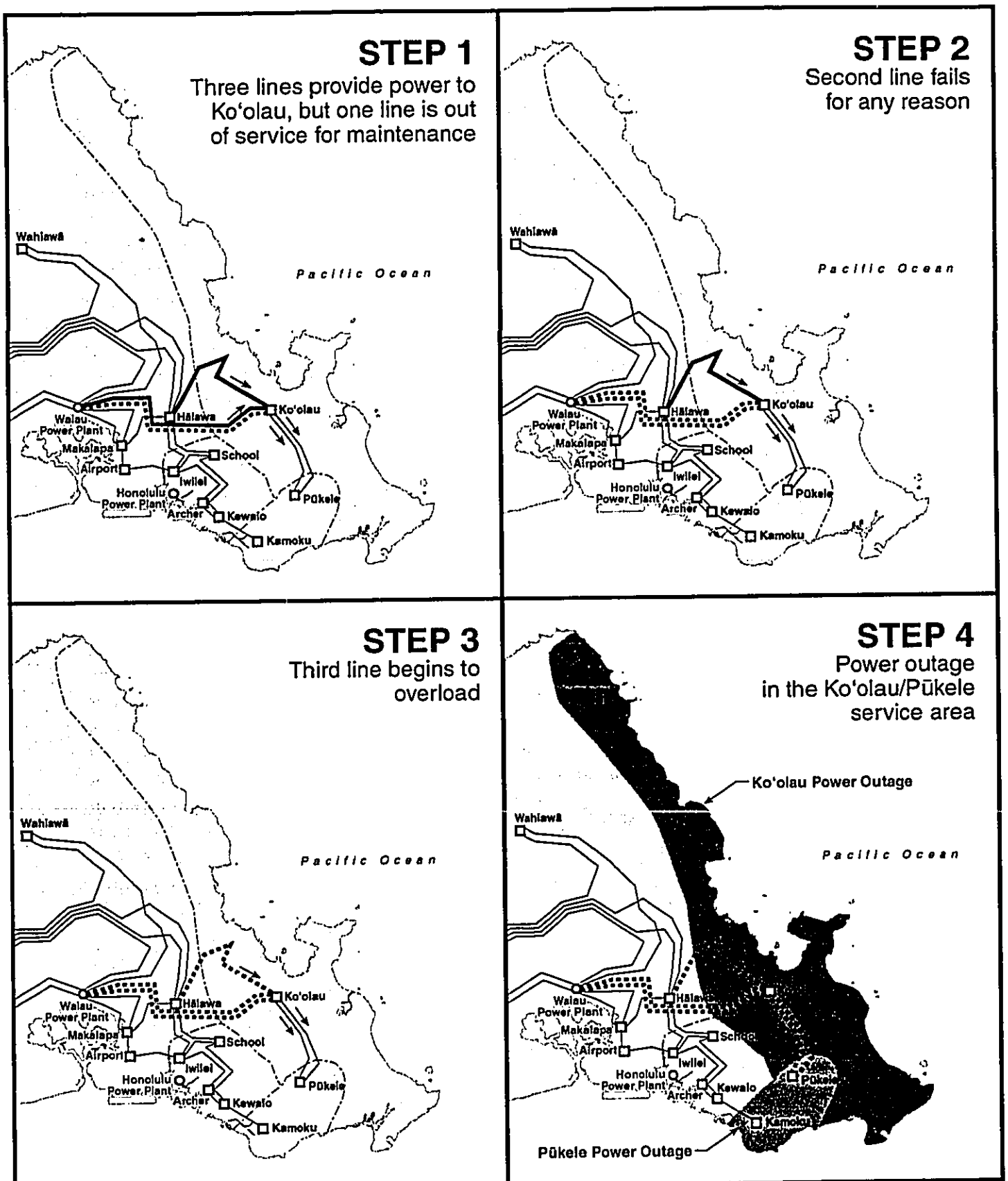


Figure 2-5
KO'OLAU/PŪKELE OVERLOAD SITUATION

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

NORTH

0 5 10
SCALE IN MILES

This would be in violation of HECO's Transmission Planning Criteria (TPC), which provides that no transmission component shall exceed its emergency rating with one generating unit on overhaul, one transmission line out for maintenance and loss of a second transmission line. If the current flowing through the remaining 138kV transmission line exceeds the emergency rating of the line, the conductor will heat up beyond normal operating parameters and could possibly break down and the line could suddenly be lost. Loss of the third 138kV transmission line feeding the Ko'olau/Pūkele area would result in loss of electricity service to 30 percent of HECO's customers, including subtransmission substations that feed communities such as Kailua, Kāne'ohe, Kāhala, McCully and Waikīkī. The damage caused to the failed transmission line from the overload could lead to a continuous prolonged outage of the line in order to perform the repairs, placing HECO at risk of an additional overload situation.

In the event of a possible overload situation, HECO's Energy Management System (EMS) program would automatically shed load at the Ko'olau and Pūkele Substations in pre-selected blocks in a pre-selected order associated with the most overloaded transmission line. The program is activated by an overcurrent protection scheme, which will shed load if the current flowing through the Ko'olau 138kV lines goes above 1,640 amps, the emergency rating of the Ko'olau 138kV transmission lines. Once load is shed, currents are rechecked to see if they have returned to normal, and if the current is still above 1,640 amps, additional circuits will be shed. The amount of load that HECO would have to shed during a line overload situation would vary, since the load in the Ko'olau/Pūkele area varies throughout the day. The emergency rating of the conductor is an engineering value based on conductor size, material, and design wind conditions, but does not account for other factors in the field such as: actual weather conditions, the number of conductor splices, the age and condition of conductors, the accuracy of current transformers in the overcurrent protection scheme, and the terrain where the line is installed. Therefore, designated HECO operational personnel may, at their discretion, take precautionary measures and intervene before the overcurrent protection scheme is activated, to avoid larger outages or maintain system integrity. Designated HECO operational personnel have the ability to shed individual 12kV and 46kV distribution feeders in the Ko'olau/Pūkele area to decrease the current flow until there is no longer an overload situation.

While the load-shedding process can prevent overload conditions, remedial action schemes such as load shedding should not be relied upon as a long-term solution to line overloading conditions, especially on an island utility system where there are no interconnections. In addition, relying on load shedding would not address other issues that are described such as the Pūkele Substation Reliability Concern or the Downtown Substation Reliability Concern. Relying on remedial measures also would increase the risk for more significant transmission events to occur on the system. For example, if a relay were to operate improperly, triggering other

transmission lines to trip and causing a cascading sequence of events (including the shutting down of generating facilities, as designed, to protect vital equipment from long-term or permanent damage), this could lead to major outages and possibly an island-wide blackout. HECO has experienced several instances where multiple line outages occurred that resulted in island-wide blackouts or loss of service to nearly the entire island.

2.3 DOWNTOWN SUBSTATION RELIABILITY CONCERN

There are three Downtown area substations with only two 138kV transmission feeds including the Archer and the Kewalo Substations; the Kamoku Substation has only one 138kV transmission feed (Figure 2-6).

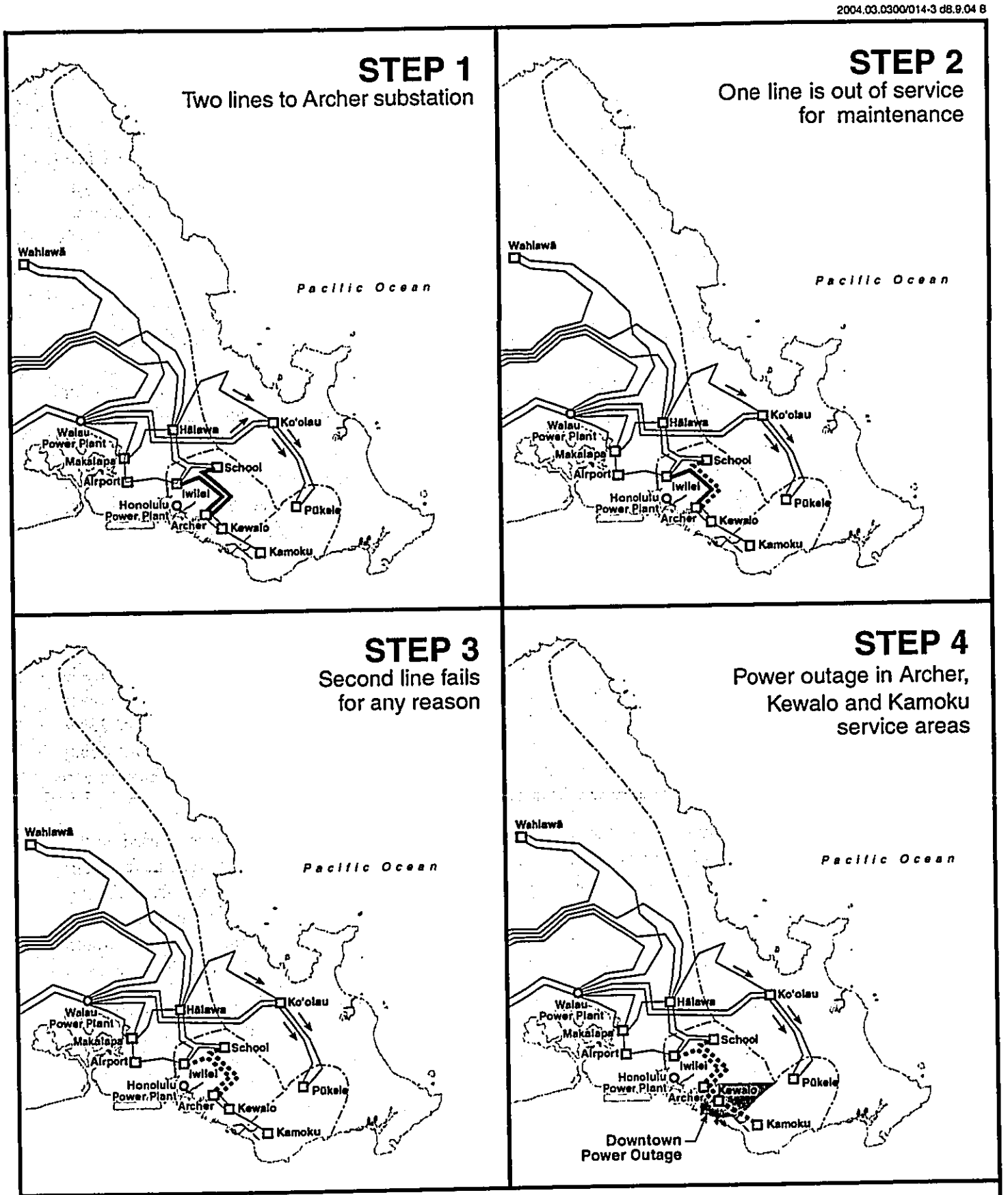
The Archer Substation is one of the newer transmission substations on the HECO system, and is fed from the Iwilei and School Street Substations by two underground 138kV transmission lines. These underground lines are relatively new and considered relatively reliable; however, a catastrophic underground duct bank failure could result in loss of power to the Archer Substation for some time depending on the severity of the failure. Installing a third line to the substation would increase the reliability of the substation.

The Kewalo Substation is also one of the newest transmission substations and is located on Kona Street. Two 138kV underground transmission lines supply power to Kewalo Substation. Kewalo serves customers at the distribution voltage of 25kV in the Kaka'ako area. A catastrophic failure to the underground duct bank could result in loss of power to the Kewalo Substation. A third 138kV transmission line to Kewalo Substation would increase the reliability of the substation.

The Kamoku Substation is the newest transmission substation and is located on the corner of Date Street and Kapi'olani Boulevard. Kamoku Substation is fed from one 138kV underground transmission line, which brings the power from Archer Substation via Kewalo Substation to Kamoku. The entire Kamoku Substation has a 25kV back up system. If the 138kV transmission line feeding the substation should fail, then the Kamoku Substation load would be transferred to Kewalo Substation.

If the two 138kV feeds to Kewalo Substation experience an outage, then both the Kewalo and Kamoku Substations would be unable to serve the load. The Kewalo and Kamoku Substations provide service to portions of Ala Moana Shopping Center, several high-rise luxury condominiums in the area and the Hawai'i Convention Center. A second 138kV transmission line to Kamoku Substation would increase the reliability of the substation and provide a second 138kV feed and a third path of electricity for the substation.

2004.03.0300/014-3 d8.9.04 8



NORTH

0 5 10
SCALE IN MILES

Figure 2-6
DOWNTOWN SUBSTATION RELIABILITY CONCERN

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

The concerns regarding the reliability of the three downtown substations are not as critical as the concerns regarding the Ko'olau/Pūkele Overload Situation and the Pūkele Substation Reliability Concern. The underground lines serving the substations are relatively new, the line segments between the substations are shorter than the Ko'olau/Pūkele 138kV lines (which reduces the exposure to outages), and the substations are not as heavily loaded as the Pūkele Substation. Also, the two transmission lines serving the Pūkele Substation cross the Ko'olau Mountains. The difficult access to the lines, their exposure to corrosive marine air, and the location of the two lines on a common right-of-way causes the Pūkele transmission lines to be at a relatively higher risk for an extended outage than the transmission lines in other areas of the island.

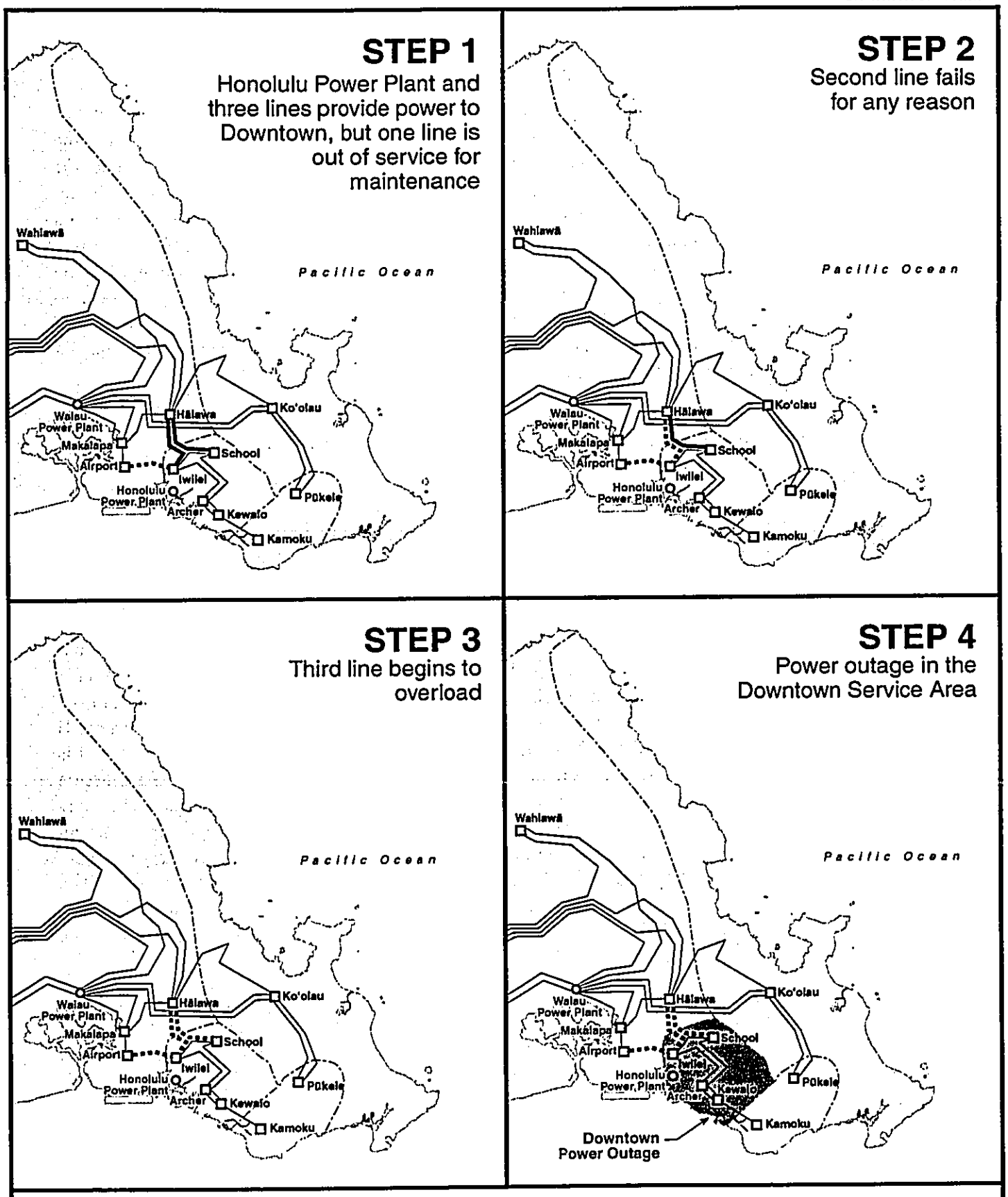
2.4 DOWNTOWN OVERLOAD SITUATION

There are two 138kV transmission substations serving the Downtown area, including the Iwilei Substation and the School Street Substation. Power to serve the Downtown area can also come from the HPP, when it is on line (Figure 2-7). Together, these two substations and the HPP (when on-line) provided power to 25 percent of the load served by HECO at the time of the 2002 Day Peak load.

These two transmission substations are fed from three 138kV transmission lines providing power from the Hālawa Substation via the Hālawa–Iwilei 138kV transmission line and the Hālawa–School Street 138kV transmission line, and from Makalapa Substation via the Makalapa-Airport-Iwilei 138kV transmission line. If one of the three 138kV transmission lines to Iwilei or School Street Substation is taken out of service for maintenance, and a second Downtown 138kV transmission line becomes unavailable, then the current flowing through the remaining Downtown 138kV transmission line is forecast to exceed the emergency current carrying capacity rating during daytime peak load conditions after the year 2024, assuming the HPP is available. Again, this would result in a violation of HECO's Transmission Planning Criteria, because the current flowing through the third 138kV transmission line feeding the downtown substations would exceed the emergency rating of the line.

The availability of HPP defers the overload problem. When HPP is operating, power from the plant feeds the neighboring areas and decreases the demand for power from the west side of O'ahu, which decreases the current flowing through the three 138kV transmission lines feeding School Street and Iwilei Substations. If HPP was not operating, the Downtown Overload Situation would be accelerated to 2009.

2004.33.0800/014-4 d8.9.04 9



NORTH

0 5 10
SCALE IN MILES

Figure 2-7
DOWNTOWN OVERLOAD SITUATION

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

If the current flowing through the third remaining 138kV transmission line exceeds the emergency rating of the line, the conductor could heat up and could possibly break down and the line could suddenly be lost. Loss of the third 138kV transmission line feeding the Downtown area would result in loss of electricity service to 25 percent of HECO's customers. The damage caused to the failed transmission line from the overload could lead to a continuous prolonged outage of the line in order to perform the repairs, placing HECO at risk of an additional overload situation. The Hālawa–Iwilei, Hālawa–School Street and the Makalapa–Airport–Iwilei 138kV transmission lines feeding the Downtown area 138kV substations do not have overcurrent protection schemes in place. Similar to the Ko'olau/Pūkele Overload Situation, designated HECO operational personnel may, at their discretion, take precautionary measures and intervene by shedding load using 12kV and 46kV distribution feeders in the Downtown area to decrease the current flow through the remaining line to a level that does not exceed the emergency rating of the line.

2.5 EAST O'AHU SERVICE AREA LOADS

The Pūkele and Downtown Substation Reliability Concerns already exist. The Ko'olau/Pūkele and Downtown Overload Situations are forecast to occur in 2005 and after 2024, respectively, based on forecast loads for the Ko'olau/Pūkele and Downtown Service Areas.

Maintenance on a transmission line usually is scheduled during the day, where the 138kV transmission line is taken out of service at about 9:00 A.M. and is returned to service by 2:00 P.M. or prior to the Evening Peak. The Ko'olau/Pūkele and Downtown Overload Situations occur during the contingency where one 138kV transmission line is out for maintenance and HECO loses a second 138kV transmission line.

At the time of the 2002 Day Peak (which occurred on July 30, 2002), the load for the Ko'olau/Pūkele area was 346 MW (or 30 percent of the load served by HECO), and the load for the Downtown area was 293 MW (or 25 percent of the HECO service load). The Ko'olau/Pūkele area load of 346 MW included 192 MW (or 17 percent of the HECO service load) served by Pūkele Substation, and 154 MW (or 13 percent of the HECO service load) served by Ko'olau Substation.

Several changes have occurred since July 2002 to the 46kV subtransmission system and a 25kV distribution system has been installed from the Kewalo and Kamoku Substations, which have changed how the Pūkele, Ko'olau, Archer, Kewalo, and Kamoku Substations were loaded in 2002. Some of the changes described were completed prior to the 2003 Day Peak, and one change was implemented in 2004. These are normal changes in the subtransmission (46kV) and distribution (12kV and below) system configurations that are made from time-to-time as a result of

distribution planning to better balance circuit and transformer loads, address circuit reliability issues, and optimize use of the utility grid. In many instances, the changes are made by manually opening or closing existing circuit switches.

At the time of the 2002 Day Peak (as adjusted for the foregoing changes), the load for the Ko'olau/Pūkele area was 342 MW (or 29.5 percent of the load served by HECO), and the load for the Downtown area was 298 MW (or 25.7 percent of the HECO service load). The Ko'olau/Pūkele area load of 342 MW included 196 MW (or 16.9 percent of the HECO service load) served by Pūkele Substation, and 146 MW (or 12.6 percent of the HECO service load) served by Ko'olau Substation.

At the time of the 2003 Day Peak (as adjusted to reflect the reconfigured system), the load for the Ko'olau/Pūkele area was 352 MW (or 29.9 percent of the load served by HECO), and the load for the Downtown area was 301 MW (or 25.6 percent of the HECO service load). The Ko'olau/Pūkele area load of 352 MW included 200 MW (or 17 percent of the HECO service load) served by Pūkele Substation, and 152 MW (or 12.9 percent of the HECO service load) served by Ko'olau Substation.

To project the service area Day Peak loads for the 2003 transmission planning studies supporting the need for the 46kV Phased Project, the service area loads at the time of (i.e., coincident with) the system Day Peak for 2002 (which occurred on July 30, 2002) were projected to grow at the forecast growth rates for the system Day Peak in HECO's latest long-term forecast at the time (the August 2002 Long-Term Sales and Peak Forecast).

Actual load growth rates may differ from those forecast for a number of reasons, such as changes in the population growth, economic growth and customer electricity consumption factors that drive electricity load growth. Changes in load growth rates from those forecast may impact the timing of the Downtown Overload Situation, but will *not* impact the Pūkele and Downtown Substation Reliability Concerns (which result from the number of lines serving the substations, rather than the growing loads on the lines), and are unlikely to defer the Ko'olau/Pūkele Overload Situation (due to the loads already experienced on the lines serving the area).

The adjusted loads for the Ko'olau/Pūkele Service Area were 342 MW in 2002 and 352 MW in 2003. (The unadjusted loads were higher.) The overload level is 362 MW. Also, HECO's latest Long-Term Sales and Peak Load Forecast, completed in February 2004 as part of its integrated resource planning process, forecasts higher, not lower, growth rates in the near-term. While it may be possible to slow the rate of load growth in the area through the use of energy conservation measures and distributed generation (which are reflected to varying degrees in the load forecasts), it is not expected that these measures will eliminate load growth.

Based on the 2002 Day Peak loads and the August 2002 projected load growth rates for the Day Peak, the Downtown Overload Situation would be forecast to occur in 2026 with HPP operating, and 2011 without HPP. The 2002 load for the Downtown area, if the subsequent 46kV configuration changes and 25kV distribution circuit additions had already been implemented, would have been higher by 5 MW. If the forecast loads for the Downtown area were based on the adjusted 2002 load (which was 5 MW higher) and the same projected load growth rates, then the forecast overload years for the Downtown Overload Situation move up to 2025 with HPP operating and 2009 without HPP.

Chapter 3

Proposed Action and Alternatives

CHAPTER 3
PROPOSED ACTION AND ALTERNATIVES

3.1 DESCRIPTION OF PROPOSED ACTION

HECO's Proposed Action would be implemented in two independent phases, Phase 1 and Phase 2. As shown in Figure 3-1, Phase 1 involves the installation of 0.5 mile of underground ductline[1] for 46kV subtransmission lines, and related work at eight substations, in order to interconnect three 46kV circuits out of the Pūkele Substation, at the end of HECO's Northern 138kV Transmission Corridor, to four 46kV lines connected to HECO's Southern 138kV Transmission Corridor. Phase 1 includes: (1) the installation of six underground 46kV lines in the Ala Moana, McCully, Mō'ili'ili, and Kapahulu areas, (2) a 138kV/46kV transformer installation at the existing Kamoku Substation with associated protective relaying, (3) a 46kV/12kV transformer installation at the existing Makaloa Substation with associated switchgear, (4) various switching and reconnections on the existing 46kV and 12kV systems near Makaloa and McCully Substations, (5) the removal of existing 46kV and 12kV cables between Makaloa and McCully Substations, (6) the removal of an existing 46kV/12kV transformer and associated switchgear from McCully Substation, and (7) modifications of various existing distribution substations in the Honolulu area

As shown in Figure 3-1, Phase 2 involves the installation of 1.9 miles of underground ductline for 46kV subtransmission lines, and related work at one substation, in order to interconnect four out of the five remaining 46kV circuits out of the Pūkele Substation to three other 46kV lines connected to HECO's Southern 138kV Transmission Corridor. Phase 2 includes: (1) the installation of three underground 46kV lines in the Kaka'ako, Makiki, and McCully areas, and (2) a 138kV/46kV transformer installation at the existing Archer Substation with associated protective relaying.

[1] The term "ductline" is used to describe the underground corridor that houses multiple ducts or pipes encased in concrete. One duct could be used to contain one cable or multiple cables, depending on the size of the ducts and cables. Three cables make up one 46kV "circuit."

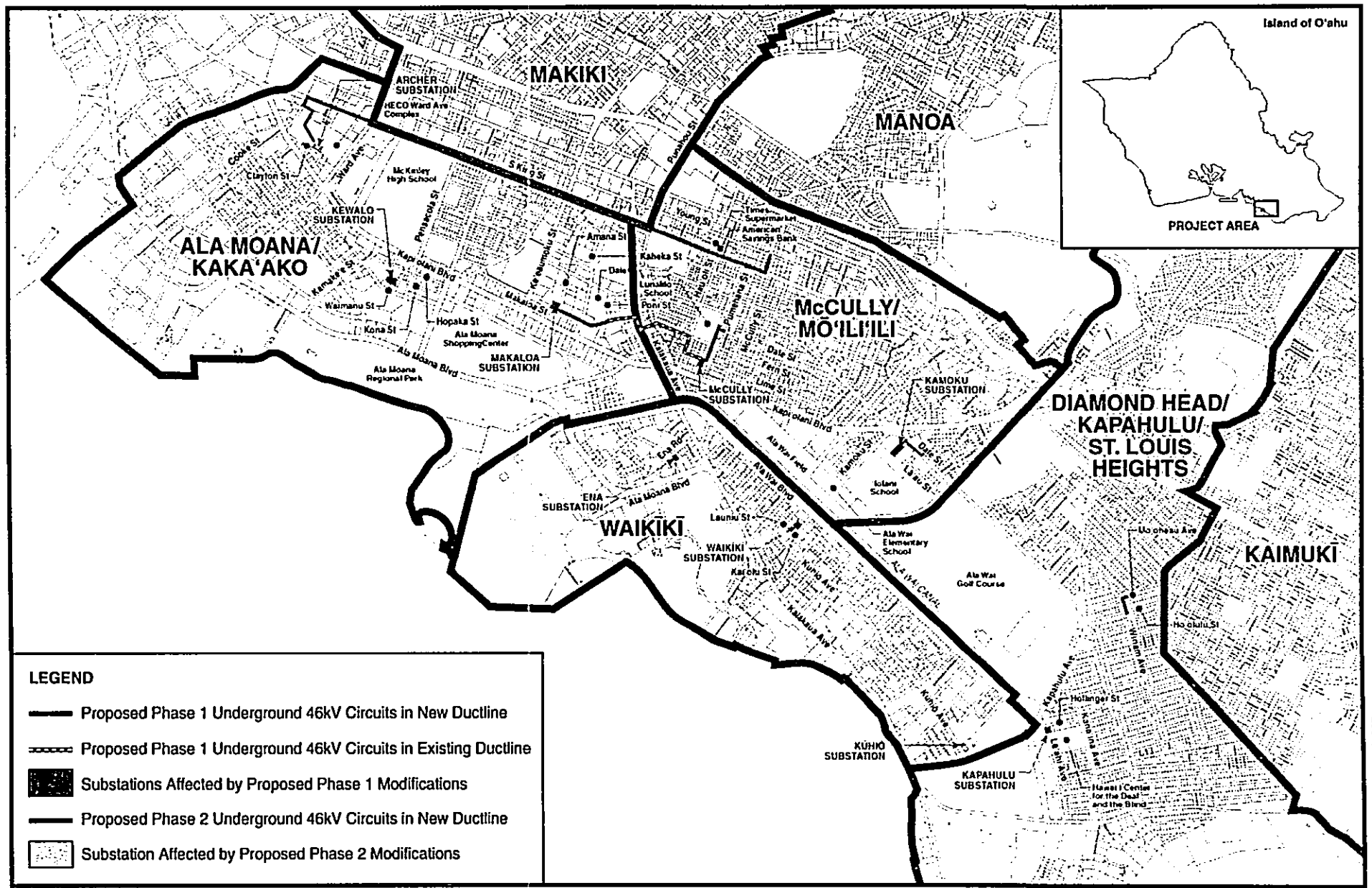


Figure 3-1
PROJECT AREA AND NEIGHBORHOODS

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

3.1.1 Phase 1 Construction Activities

Phase 1 construction activity locations are illustrated in Figure 3-2. Table 3-1 describes these activities and provides their approximate durations, affected times of the day and work zones.

Text descriptions of ductline and circuit installations and substation modifications are presented in Section 3.1.1.1, followed by descriptions of construction methods and equipment in Section 3.1.1.2 and the construction schedule in Section 3.1.1.3.

3.1.1.1 Ductline, Circuit, and Substation Installations and Modifications

3.1.1.1.1 Ductlines and Circuits

Phase 1 would involve the installation of six new underground 46kV circuits. To install the new underground circuits, concrete encased ductlines and manholes[2] are required. Typical views and cross-section of these underground facilities are shown in Figure 3-3. The general descriptions of the new underground 46kV circuit installations follow.

Activities 1A-4, 1A-10, 1E-1, and 1G

One circuit is required to connect the existing Archer 46 underground 46kV circuit at Makaloa Substation with the existing Pūkele 2 overhead 46kV circuit near McCully Substation. This would be accomplished by installing this circuit in an existing ductline[3] between Makaloa and McCully Substations. Another circuit is required to connect the existing Archer 41 underground 46kV circuit at Makaloa Substation to the McCully Substation. This would be accomplished by installing this circuit in a new ductline from Makaloa Substation to Poni Street, which would transition into the existing ductline at Poni Street and continue in the existing ductline all the way to McCully Substation. The route of the existing ductline begins at Makaloa Substation on Makaloa Street near Ala Moana, continues in the Koko Head direction through Kalākaua Avenue, Fern Street, Hau'oli Street, and

2 For the purposes of this EA, the term "manhole" is used to identify the underground vault that contains the cable splice locations and line maintenance access.

3 The existing ductline between Makaloa and McCully Substations contains three existing 46kV circuits and three existing 12kV circuits. Each circuit, which is comprised of three cables, occupies a single duct in the ductline. The two new 46kV circuits between Makaloa and McCully Substations would replace the three existing 46kV circuits by utilizing higher current-carrying capacity cables. These higher current carrying capacity cables are larger in diameter than the existing cables. Thus, each duct would contain one new cable due to the larger diameters as opposed to three cables. The 12kV circuits would also be removed from the ductline from Poni Street to McCully Substation to free up ducts for the new 46kV circuits.

Lime Street, then terminates at McCully Substation on the corner of Lime Street and Pumehana Street in McCully. The route of the new ductline follows the existing ductline on Makaloa Street from Makaloa Substation to Poni Street. At Poni Street, the new ductline would be connected to the existing ductline. Overhead reconnections of existing overhead 46kV circuits in and around McCully Substation are also required, which includes the replacement of an existing wood pole with a new wood pole in the same location. See Table 3-1 and Figure 3-2.

Activities 1C-1, 1C-2, and 1E-2

One circuit is required to connect the new Archer 46 underground 46kV circuit near McCully Substation with the existing Pūkele 2 overhead 46kV circuit at the intersection of Date Street and Pumehana Street in McCully. An underground ductline would be constructed from the existing manhole fronting McCully Substation to a new wood pole (which replaces an existing wood pole in same location) on Date Street carrying the existing Pūkele 2 overhead 46kV circuit. See Table 3-1 and Figure 3-2.

Activities 1B-1, 1B-2, and 1E-4

Two circuits are required in separate ductlines to connect the new 138kV/46kV, 80 MVA transformer at Kamoku Substation (described in Section 3.1.1.1.2) to the existing Pūkele 4 overhead 46kV circuit on Date Street fronting Kamoku Substation in Mō'ili'ili. Existing ductlines in Kamoku Substation would be utilized to route the circuits out of the enclosed substation. Once outside of the enclosed substation, new ductlines would be constructed to new wood poles (which replace existing wood poles in the same location) carrying the Pūkele 4 overhead 46kV circuit on Date Street fronting the Kamoku Substation. The existing span of 46kV overhead conductors between these two wood poles would be removed. See Table 3-1 and Figure 3-2.

Activities 1D-1, 1D-2, and 1E-3

One circuit is required to connect the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit near the intersection of Mo'oheau Avenue and Winam Avenue in Kapahulu. An underground ductline would be constructed from a new wood pole (which replaces an existing wood pole in the same location) on Mo'oheau Avenue that carries the existing Pūkele 4 overhead 46kV circuit to a new wood pole (which replaces an existing wood pole in the same location) on Winam Avenue carrying the existing Pūkele 8 overhead 46kV circuit. See Table 3-1 and Figure 3-2.

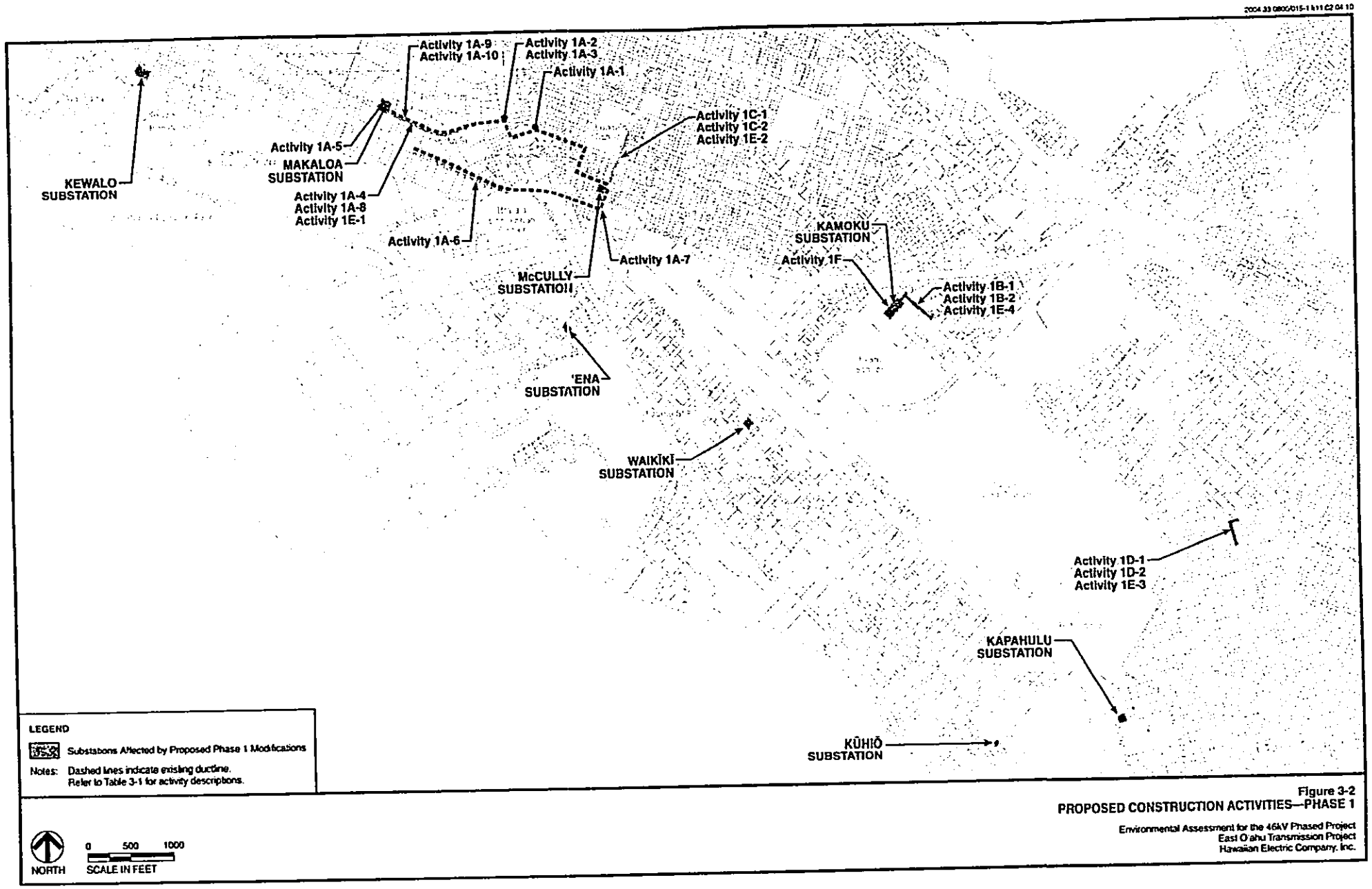


Figure 3-2
PROPOSED CONSTRUCTION ACTIVITIES—PHASE 1

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

Table 3-1. Phase 1 Construction Activities

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
1A-1	Fern Street – intersection with Punahou Street	Replace existing wood pole (Pole 4) at the Koko Head/makai corner of Fern and Punahou. Install 12kV switch on pole (relocated from Pole 43 on Kalākaua – See Activity 1A-2).	One week.	Daytime.	**Work Zone:** One lane by 100 feet, inclusive of staging. **Transition Zone:** 150 feet 'Ewa side of work zone.
1A-2	Kalākaua Avenue – intersection with Makaloa Street	Replace existing wood pole (Pole 43) at the Koko Head/mauka corner of Kalākaua and Makaloa, and install double riser on pole. Relocate overhead 12kV switch from Pole 43 to Pole 4.	One week, concurrent with Activity 1A-3.	Nighttime.	**Work Zone:** One lane by 100 feet, inclusive of staging. **Transition Zone:** 150 feet makai of work zone.
1A-3	Kalākaua Avenue – intersection with Makaloa	Hand-trench and construct approximately five feet of new underground ductline in sidewalk at the Koko Head/mauka corner of Kalākaua and Makaloa.	One week, concurrent with Activity 1A-2.	Daytime.[3]	**Work Zone:** 20 feet of sidewalk detour.
1A-4	Makaloa Street – Makaloa Substation to Poni Street	Trench and construct 250 feet of new underground ductline from inside Makaloa Substation to existing manhole P2 fronting the substation. Trench and construct approximately 1,000 feet of new underground ductline from manhole P2 to intersection of Makaloa and Poni, where it would be connected to existing underground ductline.	Two months of work (trenching), assuming an average of 60 lineal feet per shift progress.[4]	Evaluate both nighttime and daytime.[5]	**Work Zone:** Two lanes by 300 feet (150 feet of active construction, 150 feet for staging). **Transition Zone:** 300 feet, direction depending on work zone location.
1A-5	Makaloa Substation	Install new 46kV/12kV transformer and associated equipment at Makaloa Substation.	Eight weeks, with one day of activity outside the substation.	Daytime.	**Work Zone:** Two lanes by 150 feet in front of substation (from Amana, 150 feet in 'Ewa direction), inclusive of staging, for one day. **Transition Zone:** 300 feet.

Footnotes are located on page 3-11.

Table 3-1. Phase 1 Construction Activities *(continued)*

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
1A-6	Kapi'olani Boulevard – Kalauokalani Way to Kāheka Street	Remove existing 12kV circuit using existing manholes in mauka lane of Kapi'olani. Access will be through a maximum of six manholes along mauka side of Kapi'olani.	One week.	Nighttime.	**Work Zone:** One lane by 100 to 150 feet during pulling and 50 to 100 feet during splicing, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.
1A-7	Pumehana Street and Kapi'olani Boulevard – Pumehana to Kāheka	Install 12kV circuit from McCully Substation to manhole on Kapi'olani at Kāheka using existing underground ductlines.[6] Access will be through a maximum of 13 manholes along mauka side of Kapi'olani.	One week (approximately one work day at every other manhole).	Nighttime.	**Work Zone:** One lane by 100 to 150 feet during pulling, and 50 to 100 feet during splicing, centered around manholes, inclusive of staging. **Transition Zone:** 150 feet.
1A-8	Makaloa Street – manholes P2, P3, P4	Reconnect 12kV circuits in existing underground ductline.[6] Access will be through manholes P2 (located in front of Makaloa Substation), P3 (at the intersection of Makaloa and Kāheka), and P4 (at the intersection of Makaloa and Poni).	One week.	Daytime.	**Work Zone:** One lane by 50 feet, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.
1A-9	Makaloa Substation to McCully Substation along Makaloa, Kalākaua, Fern, Hau'oli, and Lime	Remove existing 46kV circuits from existing underground ductline. Remove a portion of existing 12kV circuits from existing underground ductline from Poni to McCully Substation using existing manholes.	Three weeks.	Nighttime.	**Work Zone:** One lane by 100 feet, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.
1A-10	Makaloa Substation to McCully Substation along Makaloa, Kalākaua, Fern, Hau'oli, and Lime	Install new 46kV circuits from Makaloa Substation to Makaloa/Poni intersection.[6] One circuit would be installed in existing ductline, the other in newly constructed underground ductline (Activity 1A-4). Both circuits would then join into one existing ductline from Makaloa/Poni intersection to McCully Substation.	Pulling – one workday at every other manhole (maximum of six); splicing – three workdays at every other manhole (maximum of six).	Nighttime.	**Work Zone:** One lane by 100 to 150 feet during pulling and 50 to 100 feet during splicing, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.

Table 3-1. Phase 1 Construction Activities *(continued)*

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
1B-1	Date Street	Trench and construct new underground ductline from Kamoku Substation on the makai side of Date to two new manholes constructed in Date – one in front of substation (approximately 50 feet) and one in Koko Head direction (approximately 330 feet). Construct new underground ductline from the two manholes to poles on the mauka side of Date. Replace wood poles.	Five weeks.	Daytime.[7]	**Work Zone:** Makai lanes – two lanes by 100 feet, staging at substation; center lanes – two lanes by 350 feet, staging between manholes; mauka lanes – two lanes by 150 feet at each location, inclusive of staging. **Transition Zone:** 300 feet.
1B-2	Date Street	Install two 46kV circuits in one underground duct bank from Kamoku Substation to new manhole fronting substation. Connect one circuit to existing overhead circuit on mauka side of Date fronting substation (Pole 39), connect one to second manhole, and from there to existing overhead circuit in Koko Head direction on Date (Pole 42). Remove section of 46kV overhead line between Pole 39 and Pole 42.	Three weeks,[6] includes pulling and splicing.	Daytime.	**Work Zone:** One lane by 350 feet, close area around both manholes at once, staging between manholes. **Transition Zone:** 150 feet.
1C-1	Pumehana Street	Trench and construct new underground ductline, approximately 720 feet long, between McCully Substation and intersection of Date and Pumehana. Construct two new manholes – one at intersection of Pumehana and Fern, one at intersection of Pumehana and Date. Replace wood pole.	Two months, with consideration given to Lunalilo School schedule.[8]	Daytime.	**Work Zone:** All lanes by one block (approximately 300 feet) at a time, inclusive of staging. Open to local traffic.
1C-2	Pumehana Street	Install new 46kV circuit in new underground ductline from McCully Substation to existing overhead 46kV circuit near intersection of Date and Pumehana.[6]	Two weeks.	Daytime.	**Work Zone:** One lane by 100 to 150 feet pulling and 50 to 100 feet splicing, centered around manhole inclusive of staging. **Transition Zone:** 150 feet.

Table 3-1. Phase 1 Construction Activities *(continued)*

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
1D-1	Winam Avenue	Trench and construct new underground ductline, approximately 420 feet long, along Winam from Ho'olulu onto Mo'oheau. Construct two new manholes.	One month.	Daytime.	**Work Zone:** All lanes by one block (approximately 300 feet) at a time, inclusive of staging. Open to local traffic.
1D-2	Winam Avenue	Install one new 46kV circuit, approximately 420 feet long, in a new ductline between an existing overhead 46kV circuit on Winam and an existing overhead 46kV circuit on Mo'oheau.[6]	Two weeks.	Daytime.	**Work Zone:** One lane by 100 to 150 feet pulling and 50 to 100 feet splicing, centered around manhole inclusive of staging. **Transition Zone:** 150 feet.
1E-1	Makaloa Street	Pave trenched areas of Makaloa.	Three days (600 to 800 lane-feet per day).	Evaluate both daytime and nighttime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 300 feet.
1E-2	Pumehana Street	Pave trenched areas of Pumehana.	Two days (600 to 800 lane-feet per day).	Daytime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 300 feet.
1E-3	Winam Avenue	Pave trenched areas of Winam.	One day (600 to 800 lane-feet per day).	Daytime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 300 feet.
1E-4	Date Street	Pave trenched areas of Date.	One day (600 to 800 lane-feet per day).	Evaluate both daytime and nighttime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 300 feet.
1F	Kamoku Substation	Install new 138kV/46kV transformer and associated equipment.[9]	12 months, with three to five days of work outside the substation.[9]	Daytime.	**Work Zone:** Most work conducted inside substation building, with three to five days of single lane closure on makai side of Date Street to unload equipment.

Table 3-1. Phase 1 Construction Activities *(continued)*

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
1G	Various	Proposed substation modifications at McCully (including wood pole replacement), Kewalo, Kūhiō, Waikīkī, 'Ena, and Kapahulu Substations.	Duration varies, one day to two weeks.	Daytime.	Not applicable.

Notes:

1 The activities would proceed in the order presented. Activity number shows the phase (first digit), activity grouping (second letter), and order within activity group (third digit).

2 Daytime hours are from 9:00 A.M. to 3:00 P.M., nighttime hours are 8:00 P.M. to 5:00 A.M.

3 Hand-trenching at the Kalākaua-Makaloa intersection would occur during the day because a jackhammer may be required.

4 Average of 60 lineal feet per day includes two-week period for preparation activities (e.g., expose existing utilities, harden sewer lines).

5 Night work preferred for Makaloa Street trenching, except for Makaloa-Amana intersection where presence of residential high-rise condominiums may make obtaining a noise variance difficult.

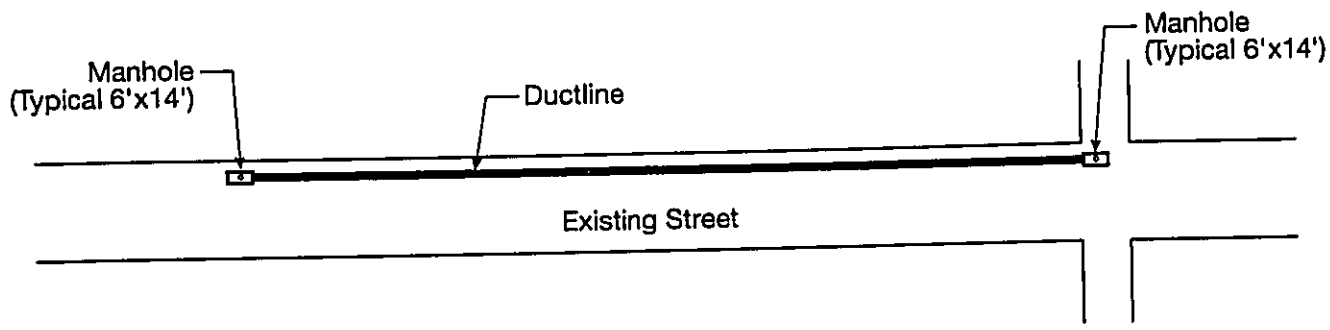
6 Circuit installation, to occur after installation of new ductline and reconnection, consists of pulling and splicing.

7 Date Street trenching and ductline construction would occur during the day because of the high-density residential neighborhood.

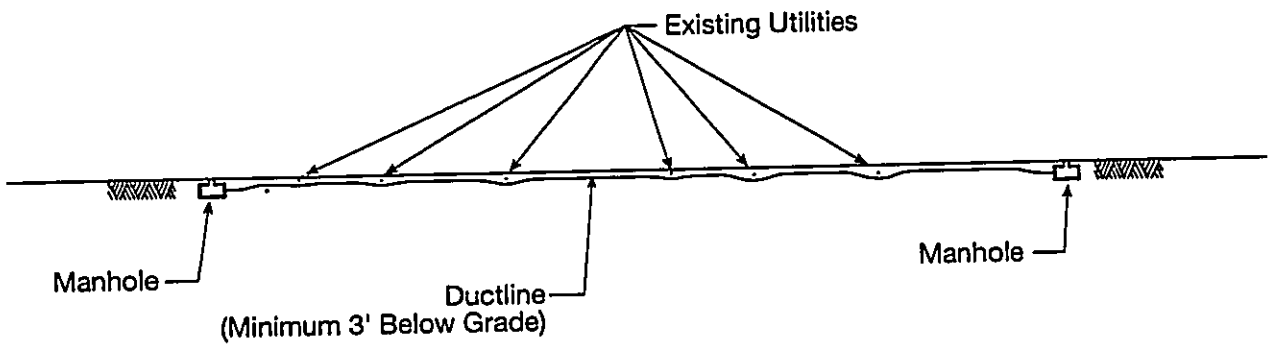
8 Work on Pumehana Street would occur one block at a time to minimize disruption from street closure.

9 Equipment installation work at Kamoku Substation would occur concurrently with the rest of the Phase 1 activities.

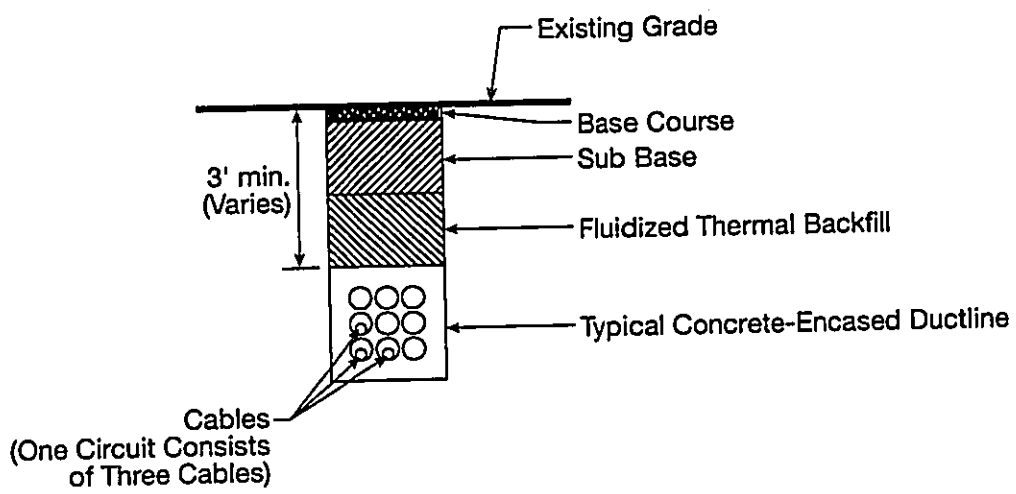
2004.33.0800/016-1 d8.3.04 6



PLAN VIEW



PROFILE VIEW



TYPICAL CROSS-SECTION

Figure 3-3
TYPICAL DUCTLINE WITH CIRCUITS AND TYPICAL MANHOLE

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

Phase 1 also involves changing sources and reconnecting existing 12kV circuits in and around the Makaloa and McCully Substations and their respective service areas. This would allow the removal of existing 46kV underground circuits from the existing ductline between Makaloa and McCully Substations, 12kV underground circuits from Poni Street to McCully Substation, and other ductlines in service areas of these substations. The general description of this work follows.

Activities 1A-1, 1A-2, and 1A-3

Existing 12kV circuits in ductlines between Makaloa and McCully Substations would be rerouted to make the ductlines available for new 46kV circuits. In order to ensure that 12kV vaults on Kalākaua Avenue are still served when the 12kV circuits are rerouted, an existing 12kV switch would be relocated from an overhead pole on Kalākaua Avenue to an overhead pole on Fern Street at the intersection with Punahou Street. The existing poles would be replaced with slightly thicker poles, and approximately five feet of new underground ductline would be constructed in the sidewalk on Kalākaua Avenue to link the overhead circuits and the underground vaults. See Table 3-1 and Figure 3-2.

Activities 1A-5 and 1A-9

Currently, a 12kV circuit originating from the McCully Substation, known as the McCully Substation Shopping Center 12kV circuit, serves loads in and around Ala Moana Shopping Center, including parts of Ke'eaumoku Street, Kapi'olani Boulevard and Kona Street. This circuit would be removed from the existing ductline to make room for the new 46kV circuits. In order to serve the loads currently served by this 12kV circuit, a new 46kV/12kV transformer and switchgear would be installed at the Makaloa Substation (described in Section 3.1.1.1.2) as the new source of the McCully Substation Shopping Center 12kV circuit. See Table 3-1 and Figure 3-2.

Activities 1A-6 and 1A-7

An existing 12kV circuit originating from McCully Substation is known as the Kona Street 12kV circuit. The route of the Kona Street 12kV circuit currently proceeds from the McCully substation in the 'Ewa direction along Lime Street, mauka on Hau'oli Street, then 'Ewa on Fern Street, and mauka on Kalākaua Avenue to Makaloa Street where it proceeds to Kāheka Street. At Kāheka Street, the circuit turns makai on Kāheka and then 'Ewa on Kapi'olani Boulevard. At Ke'eaumoku Street the line heads makai and then both Koko Head and 'Ewa on Kona Street. A second section of the circuit exits McCully Substation on Pumehana Street and heads makai until Kapi'olani Boulevard. It continues on Kapi'olani Boulevard until it turns makai on Atkinson Drive. This 12kV circuit would be

rerouted in available spare ducts along Pumehana Street and Kapi'olani Boulevard. An idle section of circuit would be removed along Kapi'olani Boulevard from Kalauokalani Way to Kāheka Street to make this section of duct available (Activity 1A-6, dotted green line in Figure 3-2), and the new 12kV circuit would be installed from a manhole on Pumehana Street fronting the McCully Substation to a manhole in Kapi'olani Boulevard at Kāheka Street (Activity 1A-7). This would be the new route for the Kona Street 12kV circuit (purple line in Figure 3-2).

Activities 1A-8 and 1A-9

Three 46kV circuits and 12kV circuits currently occupy a ductline between the Makaloa and McCully Substations (dotted red line in Figure 3-2). To prepare for removal of these existing 46kV and 12kV circuits, a 12kV circuit would be reconnected in the existing underground manholes along Makaloa Street (Activity 1A-8). The existing 12kV and 46kV circuits would be removed from the ductline between Makaloa and McCully Substations (Activity 1A-9).

Activities 1E-1 through 1E-4

Paving associated with trenching activities, as required by City and County of Honolulu Ordinance, would occur after completion of ductline construction. At the time the Draft EA was issued, a curb-to-curb repaving policy issued by the City and County of Honolulu Managing Director, dated January 27, 2004, was in effect. The potential impacts resulting from both the curb-to-curb policy and the requirements of the Ordinance were evaluated in the Draft EA because of the implications of the curb-to-curb repaving policy in terms of traffic and costs. On September 30, 2004, the City and County of Honolulu Managing Director issued a policy for trenching work on City and County of Honolulu owned or maintained roadways. This policy supercedes the policy on curb-to-curb repaving. It requires repaving of the trench width plus an additional one foot on each side for a trench aligned longitudinally to the travel way. This updated policy is consistent with the existing City and County of Honolulu Ordinance.

3.1.1.1.2 Substations

Phase 1 also involves the substation modifications described as follows:

Makaloa Substation (Activity 1A-5)

Activity 1A-5 involves work at the existing Makaloa Substation located on Makaloa Street near Ala Moana. This activity includes the installation of one 46kV/12kV, 10/12.5 megavolt ampere (MVA), low sound level transformer; one

15kV two circuit switchgear; one 6 foot by 14 foot handhole; and one set of 46kV interrupters. Site development work includes installation of approximately 250 feet of three 5-inch concrete-encased ducts all within the substation property (also see Activity 1A-4).

Kamoku Substation (Activity 1F)

Activity 1F involves work at the existing Kamoku Substation located on Date Street in Mō'ili'ili, which is an enclosed facility. This activity includes the installation of one 138kV/46kV, 80 MVA, standard sound level transformer with cooling equipment; 138kV circuit breakers; protective relaying; 46kV gas insulated switchgear (GIS); and control cables. Site development work includes one 24 foot by 39 foot transformer pad, 126 linear feet of 22-foot high transformer vault walls, one 18.5 foot by 21 foot switchgear pad and 250 feet of 5-inch ducts all within the substation property.

Other Substations (Activity 1G)

Activity 1G involves modifications (all within the respective substation property) at the following existing distribution substations:

1. McCully Substation – This work involves the replacement of three existing 46kV switches (4684, 4909, 4794) with new switches rated at 46kV, 800 amperes, the replacement of existing 4/0 bus sections between switches 4794 and 4752 with 750 kcmil[4] aluminum conductors to achieve a continuous bus rating of 800 amperes, and the installation of a termination structure complete with 46kV terminators and lightning arrestors under switch 4909. This work also involves the removal of the existing McCully #4 46kV/12kV, 10/12.5 MVA transformer and two-circuit 15kV switchgear.
2. Makaloa Substation (in addition to Activity 1A-5) – This work involves the replacement of existing 4/0 bus sections between switches 4498 and 5405 and switches 4928 and 6089 with 750 kcmil aluminum conductors to achieve a continuous bus rating of 800 amperes, and installation of three new three-phase 46kV group operated switches with associated steel work.
3. Kewalo Substation – This work involves the installation of 750 kcmil aluminum conductors between switches 4919 and 5311 to achieve a continuous bus rating of 800 amperes.
4. Kūhiō Substation – This work involves the replacement of three existing hydraulic operators with new motor operators including all associated

[4] kcmil is a unit of measure where one kcmil is equal to 1,000 circular mils. A circular mil is the area of a circle with a diameter of one thousandth (0.001) of an inch.

control duct installations, battery banks, cabinets, and wiring, and the installation of one 46kV switch interrupter.

5. Waikīkī Substation – This work involves the replacement of six existing hydraulic operators with new motor operators including all associated control duct installations, battery banks, cabinets, and wiring, and the installation of two 46kV switch interrupters.

6. 'Ena Substation – This work involves the replacement of seven existing hydraulic operators with new motor operators including all associated control duct installations, battery banks, cabinets, and wiring, and the installation of three 46kV switch interrupters.

7. Kapahulu Substation – This item involves the replacement of nine existing hydraulic operators with new motor operators including all associated control duct installations, battery banks, cabinets, and wiring and three 46kV switch interrupters.

3.1.1.2 *Construction Methods and Equipment*

Proposed construction methods and typical equipment used to perform this work are described herein. Construction equipment is listed in Table 3-2.

Table 3-2. Typical Equipment for Phase 1 Construction Activities

Activity Type[1]	Typical Equipment
Pole Replacement Activity 1A-1, 1A-2, 1B-1, 1C-1, and 1G	Flatbed boom truck with crane Truck with "cherry picker" bucket Concrete mixer (or ready-mix truck)
Hand Trenching Activity 1A-3	Jackhammer Hand tools Dump truck
Ductline Construction and Installation Activity 1A-4, 1B-1, 1C-1, 1D-1	Flatbed boom trucks Backhoe Crane Pavement cutter Excavator Ready-mix concrete trucks Dump truck
Manhole Installation Activity 1A-4, 1B-1, 1C-1, 1D-1	Pre-cast manholes Excavating equipment Dump truck

Table 3-2. Typical Equipment for Phase 1 Construction Activities *(continued)*

Activity Type[1]	Typical Equipment
Substation Modification Activity 1A-5, 1F, 1G	Flatbed truck Utility vans Crane Ready-mix concrete truck
Circuit Removal Activity 1A-6, 1A-9	Cable cutting equipment Pickup trucks Cable-reel trailers Self propelled cable trailers Line truck with winch
Circuit Installation Activity 1A-7, 1A-8, 1A-10, 1B-2, 1C-2, 1D-2	Pickup trucks Cable-reel trailers Self-propelled cable trailers Line truck with winch
Paving Activity 1E-1, 1E-2, 1E-3, 1E-4	Drum roller planer Tractor with power broom attached to the front Rubber-tire backhoe Tack coat oil truck Paving machine Dump trucks Roller compactor

Notes:
[1] See Table 3-1 for more detailed activity descriptions.

3.1.1.2.1 Pole Replacement

Pole replacement (Activities 1A-1, 1A-2, 1B-1, 1C-1, and 1G) would be conducted by removing the existing pole from the ground, holding it in the air with a crane while the new pole is secured in its place, and transferring the circuits and associated equipment from the existing to the new pole. The old pole would be cut into four-foot lengths and hauled to HECO's base yard for proper disposal at a landfill.

Construction equipment for pole replacement would include a flatbed boom truck to transport and lift the poles, a truck with a "cherry picker" bucket to allow work on the pole, and a concrete mixer (or ready-mix truck) to pour concrete into the hole to stabilize the pole.

3.1.1.2.2 Trenching and Ductline Installation

Construction equipment for hand trenching (Activity 1A-3) would include a jackhammer, hand tools, and a dump truck. Construction equipment for trenching (Activities 1A-4, 1B-1, 1C-1, and 1D-1) would include the following equipment:

- 30 horsepower (hp) gas-powered circular saw (pavement cutter),
- 75 to 80 hp rubber-tire backhoe loader for light to medium digging (to depths of about five feet),
- 110 to 150 hp track type excavator for medium to heavy digging,
- dump trucks to hold excavated material,
- flatbed boom trucks to haul and handle material, and
- hydraulic breaker/jackhammer to break rock encountered during trenching.

Construction equipment for ductline installation (Activities 1A-4, 1B-1, 1C-1, and 1D-1) would include flatbed boom trucks, cranes, ready-mix concrete trucks, and other typical construction equipment.

Prior to trenching, HECO would coordinate with other utility companies to locate and mark existing underground utilities along the proposed alignment. During construction, vehicular and pedestrian traffic would be diverted around the construction site, in accordance with a City and County of Honolulu-approved traffic management plan. Construction hours would be determined prior to the commencement of activities in accordance with required permits (such as street usage, noise permits or variances).

Hand trenching would be conducted by jackhammering and/or digging through the ground where the five-foot section of ductline would be installed. The ductline would be encased in concrete and covered, and the ground surface would be restored to the original condition.

The trench alignment in the roadway would be marked and the work area prepared with traffic cones, signs, and staging areas. The pavement in the work area would be broken using a pavement cutter, and the pieces of broken pavement hauled away. A backhoe loader and/or track-type excavator would be used to dig the trench. Typical trench dimensions would be three to four feet wide by three to five feet deep. Approximately 150 feet of trench length would be open at a given time for ductline installation prior to paving. Trucks would be used to haul away excavated material. Steel plates would be securely placed and welded together over any exposed or unfinished section of trench during non-working hours to allow vehicles to travel over the excavated area. If work occurs below the water table, dewatering may be required to keep the trench clear of water so that ductlines can be installed. Dewatering effluent would be contained in a holding tank or receiving

pit located near the work area and discharged back into the trench, or in accordance with applicable permits.

The ductline would be laid in the excavated trench, encased in concrete, set, and backfilled with a fluidized thermal backfill,[5] which would be poured into the trench and left to cure. The trench area would be graded and compacted to near the surface of the asphalt roadway, base course would be added and compacted, and the construction area would be temporarily paved. This sequence would continue until the length of the new ductline is installed and connected to the existing ductline. Activities would be conducted in accordance with the City and County of Honolulu's policy for trenching work on City and County of Honolulu owned and maintained roadways, dated September 30, 2004.

3.1.1.2.3 Manhole Installation

HECO typically uses pre-cast manholes, 6 feet wide by 14 feet long and 7.5 feet high, as shown in Figure 3-3. The area would be excavated, the manholes shored in place, and the excavated area set, backfilled, and graded. This process is described in the previous section on trenching and ductline installation.

3.1.1.2.4 Substation Modifications

The majority of work at substations would involve equipment replacement or upgrades and associated control and relay wiring. Section 3.1.1.2 describes the equipment modifications at the substations. New transformers would be installed at Makaloa and Kamoku Substations. Construction equipment associated with this activity would include a flatbed truck, crane, ready-mix concrete truck, and utility vans.

3.1.1.2.5 Removal of Existing Circuits

Construction equipment associated with removing circuits would include cable cutting equipment, pickup trucks, cable-reel trailers, self-propelled cable trailers, and a line truck with a winch.

[5] Fluidized thermal backfill is a concrete mixture with low thermal resistivity properties. It is used in lieu of native soil to backfill a trench because its heat dissipation properties allow the cables to operate at lower temperatures than native soil. Lower temperatures increase the current carrying capacity of the cables and reduce risk of overheating and damage.

3.1.1.2.6 *Installation of New Circuits*

Construction equipment associated with installing new circuits would include much of the same equipment as removal of existing circuits.

After installation of the new ductline and removal of existing circuits to free up existing ductline, HECO would pull segments of the new cables into the ductline and splice them together at vaults along the route. Large cable-reel trailers would be brought along the alignment, and temporary shelters would be erected as needed over exposed cable and pulling lines to prevent damage. The cables would be prevented from touching the ground and would be visually inspected as they are pulled into the ducts. Weatherproof caps would be placed on the end of the cables to prevent moisture from entering prior to splicing. Splicing, or cable connection, would occur according to manufacturer's specifications, with emphasis on preventing contamination from moisture, dust, or other contaminants. Cables would be connected in manholes along the route according to the maximum pulling tension of the cables specified by the manufacturer.

3.1.1.2.7 *Paving*

Trenched areas would be repaved as required by City and County of Honolulu Ordinance, after completion of ductline construction. As explained in Section 3.1.1.1.1, the current City and County of Honolulu policy on trenching within City and County of Honolulu roadways, which is consistent with the Ordinance, will be followed; however, the implications of both the current policy and the City and County of Honolulu's former curb-to-curb repaving policy have been evaluated in this EA.

Paving equipment would include a drum roller planer to prepare the adjoining surfaces, a small tractor with a power broom attached to the front, rubber-tire backhoe, tack coat oil truck, paving machine, dump trucks to haul in the asphalt, and a roller compactor.

3.1.1.3 *Construction Schedule*

Phase 1 construction is planned to begin in 2006, and estimated to take 12 months to complete. Figure 3-4 shows the schedule of activities for Phase 1. The construction schedule is approximate; actual duration of activities may vary.

3.1.2 Phase 2 Construction Activities

Proposed construction activity locations for Phase 2 are illustrated in Figure 3-5. Table 3-3 describes these activities and provides their approximate durations, affected times of the day, and work zones.

Text descriptions of ductline and circuit installations and substation modifications are presented in Section 3.1.2.1, followed by descriptions of construction methods and equipment in Section 3.1.2.2, and the construction schedule in Section 3.1.2.3.

3.1.2.1 Ductline, Circuit, and Substation Installations and Modifications

3.1.2.1.1 Ductlines and Circuits

Phase 2 involves the installation of three new underground 46kV circuits. To install the new underground circuits, concrete-encased ductlines and manholes are required. Typical views and cross-section of these underground facilities are shown in Figure 3-3. The new underground 46kV circuits (Archer 45, Archer 47, and Archer 48) would interconnect a new 138kV/46kV, 80 MVA transformer at Archer Substation (described in Section 3.1.2.1.2) to three existing 46kV circuits (Pūkele 7, Pūkele 6, and Pūkele 5) terminating at the Pūkele Substation. A general description of the new 46kV circuit installations follow:

Activities 2D and 2B-1

New cable trays in Archer Substation would be installed to route the circuits out of the enclosed substation located on HECO's Ward Avenue facility near the corner of Cooke Street and King Street in Kaka'ako. See Table 3-3 and Figure 3-5.

Activities 2A-1, 2A-2, 2B-1, 2B-2, 2C-1, and 2C-2

Once outside of the enclosed substation, a new ductline carrying the three new underground 46kV circuits (Archer 45, Archer 47, and Archer 48) would be constructed and routed through HECO's property onto Cooke Street. On Cooke Street, the ductline proceeds mauka until King Street then proceeds in the Koko Head direction on King Street until Hau'oli Street. See Table 3-3 and Figure 3-5.

Phase 1	Approximate Duration in Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Trenching and Ductline Installation												
Cable Installation (Includes existing cable removal and preparatory work)												
Paving (Schedule same for single lane only or curb-to-curb paving)												
Contingency												

LEGEND

Additional time if needed

2004.33.0800/017-1 d8.9.04 10

Figure 3-4
PHASE 1 CONSTRUCTION SCHEDULE

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

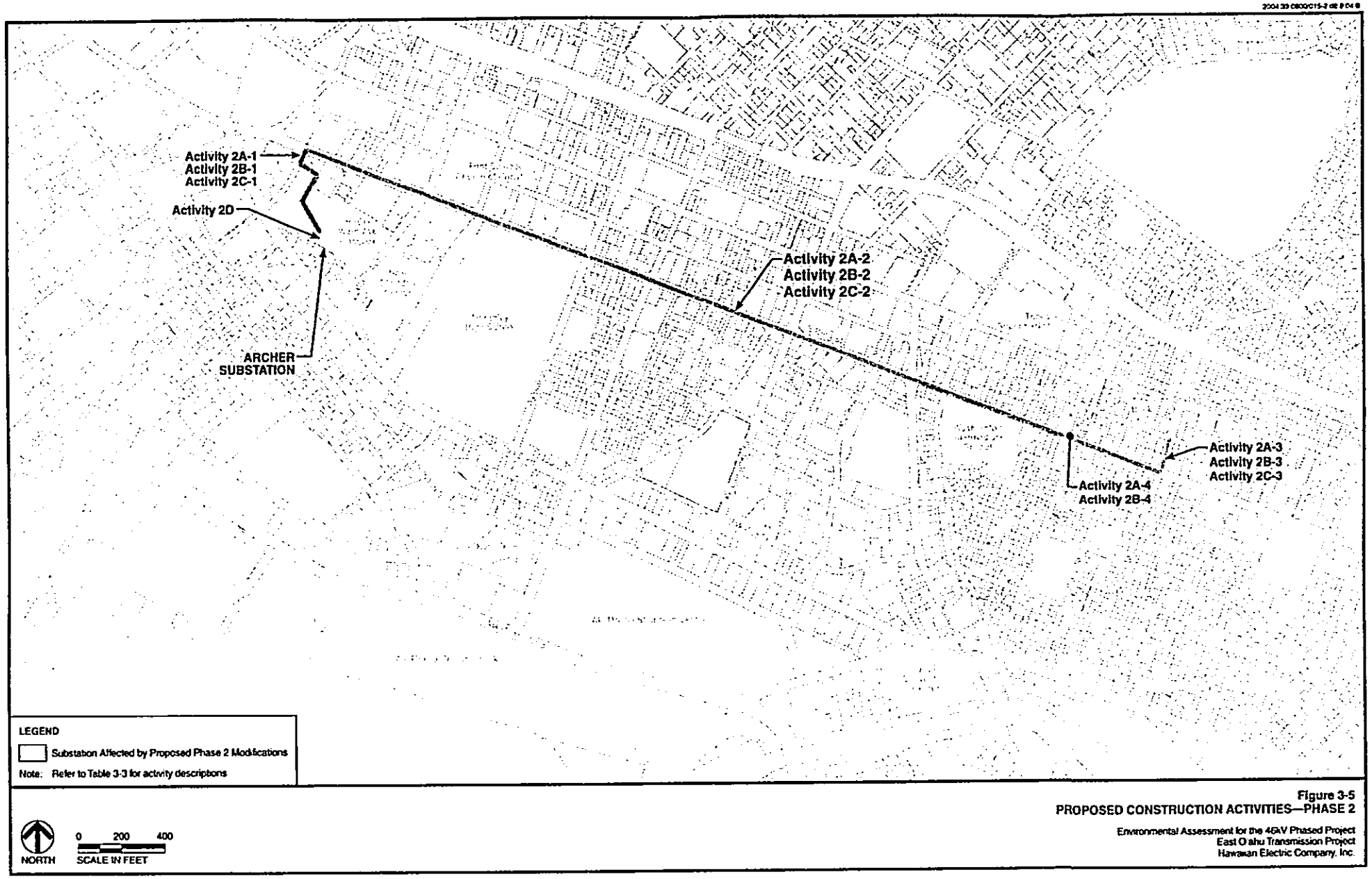


Figure 3-5
PROPOSED CONSTRUCTION ACTIVITIES—PHASE 2

Environmental Assessment for the 46kV Phased Project
East Oahu Transmission Project
Hawaiian Electric Company, Inc.

Table 3-3. Phase 2 Construction Activities

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
2A-1	Cooke Street	Trench and construct new underground ductline from Archer substation to the intersection of Cooke and King.	One month.	Nighttime.	**Work Zone:** Two lanes by 300 feet, inclusive of staging. **Transition Zone:** 300 feet.
2A-2	King Street	**Trenching option in specific areas (preferred):** Trench and construct underground ductline along King from Cooke to McCully.	Six months.	Evaluate both nighttime and daytime.*	**Work Zone:** Two lanes by 300 feet inclusive of staging. **Transition Zone:** 300 feet. Average progress of 60 lineal feet per day (including preparation activities, e.g., spot survey and manhole preparation).
	King Street	**Directional drilling option:** Drill and install ductline along King from Cooke to Punahou Street using directional drilling; trench remainder to McCully.	Approximately 28 weeks (seven months) for drilling (three to four weeks at seven manholes); six weeks for trenching remaining sections.	Evaluate both nighttime and daytime, and consider school schedules.*	**Work Zone:** Two traffic lanes (second and third makai lane) by 100 feet, and 500-foot laydown for ductline (at next manhole), close curb lane for one hour to move ductline in position. **Transition Zone:** 300 feet for all areas. Assume 24-hour per day closure in vicinity of staging areas for directional drilling.
2A-3	McCully Street	Trench and construct new underground ductline along McCully from manhole in King to pole on Young. Replace wood pole.	One month.	Evaluate both nighttime and daytime.	**Work Zone:** One lane and sidewalk by 200 feet, inclusive of staging. **Transition Zone:** 150 feet.

* Nighttime work preferred on King Street.

Table 3-3. Phase 2 Construction Activities *(continued)*

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
2A-4	King Street	Trench and construct new underground ductline from manhole in King to poles fronting McCully Times Supermarket and American Savings Bank on King. Replace wood poles.	One month.	Evaluate both nighttime and daytime.	**Work Zone:** Two lanes by 300 feet, inclusive of staging. **Transition Zone:** 150 feet.
2B-1	Cooke Street	Install 46kV circuits in new underground ductline from Archer substation to the intersection of Cooke and King.[3]	Two weeks.	Evaluate both nighttime and daytime.	**Work Zone:** One lane by 100 to 150 feet during pulling and 50 to 100 feet during splicing, centered around manhole. **Transition Zone:** 150 feet.
2B-2	King Street	Install 46kV circuits in new underground ductline along King from Cooke to McCully.[3]	Two months.	Evaluate both nighttime and daytime.	**Work Zone:** One lane by 100 to 150 feet pulling and 50 to 100 feet splicing, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.
2B-3	McCully Street	Install 46kV circuit in new underground ductline along McCully from King to Young.[3]	Two weeks.	Evaluate both nighttime and daytime.	**Work Zone:** One lane by 100 to 150 feet pulling and 50 to 100 feet splicing, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.
2B-4	King Street	Install 46kV circuits in new underground ductlines from manhole in King to existing overhead poles fronting McCully Times Supermarket and American Savings Bank.[3]	One week.	Evaluate both nighttime and daytime.	**Work Zone:** One lane by 100 to 150 feet pulling and 50 to 100 feet splicing, centered around manhole, inclusive of staging. **Transition Zone:** 150 feet.

Table 3-3. Phase 2 Construction Activities *(continued)*

Activity No.[1]	Segment	Activity	Approximate Duration	Time of Day[2]	Work Zones
2C-1	Cooke Street	Pave trenched areas of Cooke.	One day (600 to 800 feet per day).	Evaluate both nighttime and daytime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 150 feet.
2C-2	King Street	Pave trenched areas of King.	Two weeks (1,000 lane-feet per day).	Evaluate both nighttime and daytime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 150 feet.
2C-3	McCully Street	Pave trenched areas of McCully.	One day (600 to 800 lane-feet per day).	Evaluate both nighttime and daytime.	**Work Zone:** Two lanes, maximum 500 feet. **Transition Zone:** 150 feet.
2D	Archer Substation[4]	Install new 138kV-46kV transformer and associated equipment.	12 months.	Daytime.	Not applicable, all work would be conducted inside substation.

Notes:

1 The activities would proceed in the order presented. Activity number shows the phase (first digit), activity grouping second letter), and order within activity group (third digit).

2 Daytime hours are from 9:00 A.M. to 3:00 P.M., nighttime hours are 8:00 P.M. to 5:00 A.M.

3 Circuit installation, to occur after installation of new ductline, consists of pulling and splicing.

4 Completion of work at Archer Substation should coincide with all other Phase 2 work.

Activities 2A-4, 2B-4, and 2C-2

Near the King Street and Hau'oli Street intersection, the Archer 48 underground 46kV circuit branches off into a separate ductline that terminates at a new wood pole (which replaces an existing wood pole in the same location) located on King Street fronting the McCully Times Supermarket parking lot. The wood pole would carry the existing Pūkele 5 overhead 46kV circuit, which would be connected to the new Archer 48 circuit at this point. See Table 3-3 and Figure 3-5.

Activities 2A-4, 2B-4, and 2C-2

Also near the King Street and Hau'oli Street intersection, the Archer 47 underground 46kV circuit branches off into a separate ductline that terminates at a new wood pole (which replaces an existing wood pole in the same location) located on King Street fronting American Savings Bank. The wood pole would carry the existing Pūkele 5 overhead 46kV circuit, which would be connected to the new Archer 47 circuit at this point. See Table 3-3 and Figure 3-5.

Activities 2A-3, 2B-3, and 2C-3

The Archer 45 underground 46kV circuit continues in the Koko Head direction on King Street in a separate ductline until McCully Street then proceeds in the mauka direction until Young Street. At Young Street, the ductline would terminate at a new wood pole (which replaces an existing wood pole in the same location) carrying the existing Pūkele 7 overhead 46kV circuit, which would be connected to the new Archer 45 circuit at this point. See Table 3-3 and Figure 3-5.

Activities 2C-1, 2C-2, and 2C-3

Paving associated with trenching activities, as required by City and County of Honolulu Ordinance, would occur after completion of ductline construction. As explained in Section 3.1.1.1.1, the current City and County of Honolulu policy on trenching within City and County of Honolulu roadways will be followed; however, the implications of both the current policy and the City and County of Honolulu's former curb-to-curb repaving policy have been evaluated in this EA.

3.1.2.1.2 Substations

Phase 2 also involves substation modifications at Archer Substation located on HECO's Ward Avenue facility near the corner of Cooke Street and King Street in Kaka'ako (Activity 2D). This activity includes the installation of one 138kV/46kV, 80 MVA, standard sound level transformer; redundant air handling equipment; 138kV circuit breakers; protective relaying; and control cables. Site development

work includes knocking out a concrete masonry unit (CMU) wall at Archer Substation to install the transformer and then replacing the wall, one 12 foot by 18 foot transformer pad, 485 cubic yards of rock fill, 35 feet of six 5-inch ducts and 50 feet of three 3-inch ducts.

3.1.2.2 *Construction Methods and Equipment*

Proposed construction methods and typical equipment used to perform this work are described herein. A list of construction equipment is included in Table 3-4.

Table 3-4. Typical Equipment for Phase 2 Construction Activities

Activity Type[1]	Typical Equipment
Pole Replacement Activity 2A-3 and 2A-4	Flatbed boom truck with crane Truck with "cherry picker" bucket Concrete mixer (or ready-mix truck)
Ductline Construction and Installation – Conventional Trenching Activity 2A-1, 2A-2, 2A-3, 2A-4	Flatbed boom trucks Backhoe Crane Pavement cutter Ready-mix concrete trucks Excavator Dump truck
Ductline Construction and Installation – Directional Drilling Activity 2A-2	Drilling rig Crane Bentonite mud handling truck Rollers Vacuum extractor truck Dumpster/dump truck
Manhole Installation Activity 2A-1, 2A-2, 2A-3, 2A-4	Pre-cast manholes Excavating equipment Dump truck
Circuit Installation Activity 2B-1, 2B-2, 2B-3, 2B-4	Pickup trucks Cable-reel trailers Self-propelled cable trailers Line truck with winch

Table 3-4. Typical Equipment for Phase 2 Construction Activities *(continued)*

Activity Type[1]	Typical Equipment
Paving Activity 2C-1, 2C-2, 2C-3	Drum roller planer Tractor with power broom attached to the front Rubber-tire backhoe Tack coat oil truck Paving machine Dump trucks Roller compactor
Archer Substation Modification Activity 2D	Flatbed truck Utility vans Crane Ready-mix concrete truck

Notes:
1 See Table 3-3 for more detailed activity descriptions.

3.1.2.2.1 Trenching and Ductline Installation

Conventional open trenching methods proposed would be the same as those described in Section 3.1.1.2.

3.1.2.2.2 Horizontal Directional Drilling and Ductline Installation

At the request of the City's Facility Maintenance Department, horizontal directional drilling (HDD) was considered as an optional installation method. *The Hawaiian Electric Company, Inc., East O'ahu Transmission Project Phase 2–46kV Lines, Horizontal Drilling Feasibility Study* (Power Engineers 2004) was prepared to evaluate the feasibility of installing three 46kV circuits in King Street from Cooke Street to McCully Street using HDD technology (Appendix A).

HDD is a construction method that uses a drill rig to install underground pipes or casings. Drilling would follow a pre-planned underground profile, which would be designed to avoid conflicts with existing utilities and known sensitive areas below the ground surface. Therefore, drilling profiles would typically be designed to be deep enough to avoid any known potential conflicts. Figure 3-6 illustrates typical views and a cross-section of the directional drilling option. When HDD is used, trenching is typically limited to areas where the drill enters and exits the ground and areas of a project where drilling is not feasible. Heavy equipment is required at

both the entry and exit pits located at each end of the drilling bore, and this equipment must generally remain in position while the installation progresses to completion.

Some of the major technical factors that must be evaluated for the use of HDD include:

- Conducive soil conditions that would allow heat from the cables to dissipate sufficiently. The ampacity, or the magnitude of electric current, that an underground electrical cable can carry is affected by the ability to dissipate heat from the cable. The ampacity of a cable decreases the hotter a cable gets. Typically, directional drilling profiles are deeper than conventionally trenched ductline installations to avoid conflicts with subsurface obstacles, such as existing utilities. A consequence of having the cables installed deeper underground is that heat dissipation is reduced, thereby decreasing the cable ampacity. With the greater depth of installation for HDD ductlines, soil conditions become a more significant factor and play a critical role in the heat dissipation process.
- Conducive geological conditions that would allow the drilling to be controlled. If the project area has "mushy" soil conditions or there are underground caverns present, it is difficult to control the direction of the drill head. This is critical when known subsurface obstacles to be avoided are in the project area.
- Availability of work areas for drilling equipment and pipe assembly. The work area required for drilling equipment typically ranges from 12 feet by 100 feet for a small to medium size HDD drill rig, up to 100 feet by 150 feet for a large drill rig, depending on the set-up configuration of the HDD drilling equipment. Pipe assembly space depends on the drill lengths required. For example, if the drill length is 1,000 feet, approximately that amount of linear workspace is needed to lay down that length of pipe in preparation to be pulled into the bore.

In applying the above factors for Phase 2, the following determinations were made:

- From a heat dissipation perspective, the soil conditions on King Street near Punahou Street are not conducive for dissipating the heat from the proposed circuits. As a result, the last 25 to 30 feet from the ends of the bores to the manhole locations, where the drills near the surface, should be trenched and the native soil replaced with fluidized thermal backfill.
- HDD techniques require nearly straight sections. In the Archer Substation/Cooke Street area, numerous bends are required to route the cables from the substation located within HECO's Ward Avenue facility, onto Cooke Street and then around the corner onto King Street and therefore this segment should be conventionally trenched.

2004.33.0800/016-2 d8.8.04 8

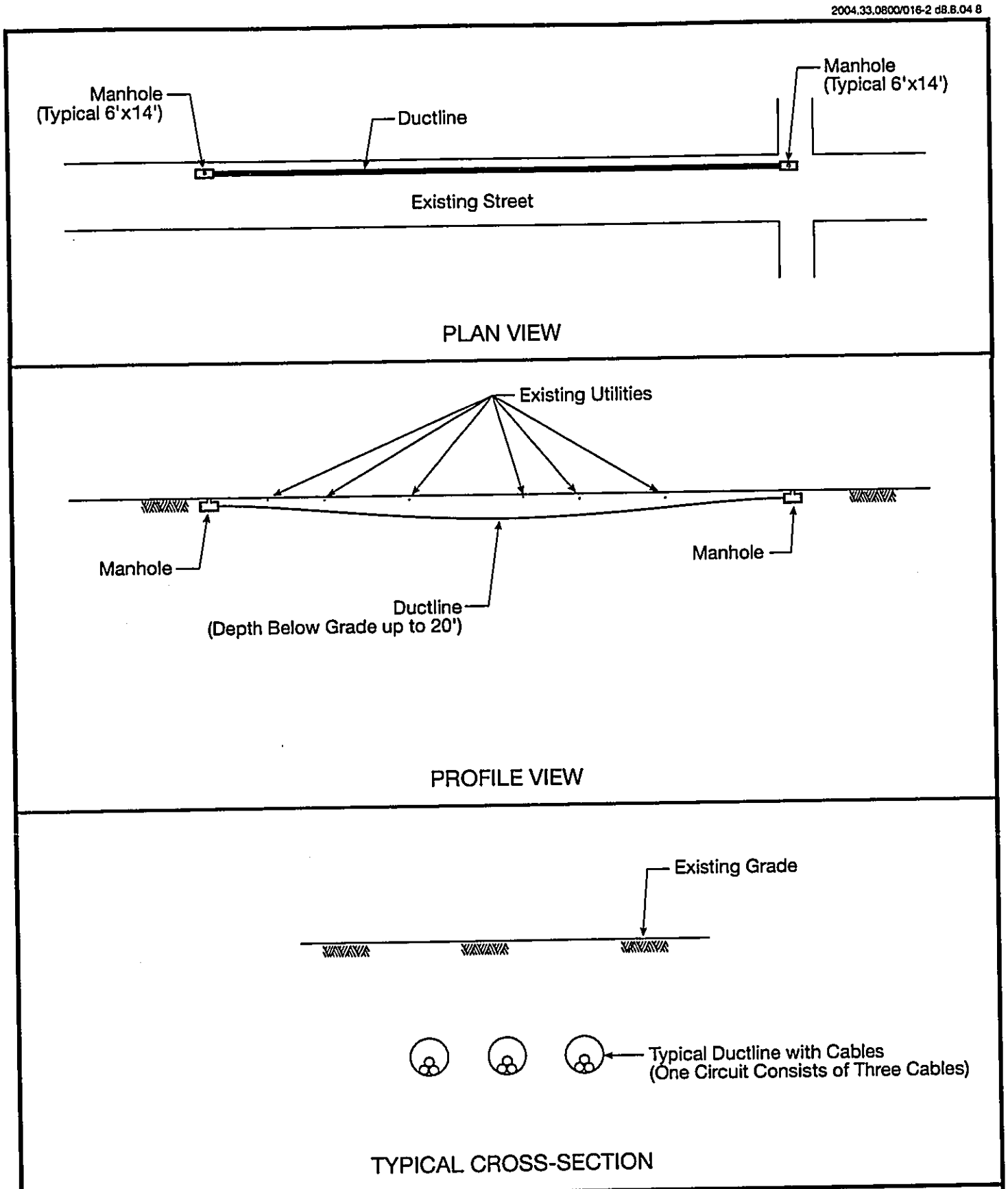


Figure 3-6
TYPICAL DUCTLINE AND CIRCUITS FOR DIRECTIONAL DRILLING OPTION

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

- From a workspace requirements perspective, in the area Koko Head of Washington Middle School to McCully Street, there is insufficient workspace and lay down areas to consider HDD.
- From a drilling perspective, the soil conditions appear to be conducive for drilling.

Given the above determinations, HDD could only be considered for King Street, from Cooke Street to Punahou Street. The remaining sections of Phase 2 would require conventional trenching for the proposed circuit installations.

Drilling would proceed in 500-foot segments along King Street from Cooke Street to Punahou Street. For each segment of directional drilling, equipment set up in one area would remain in place for the duration of the construction activity. An entrance pit and exit pit would be located at each end of the 500-foot segment to be drilled. The drill head would be guided electronically underground from the entrance pit, sloping beneath the surface to depths of approximately 20 feet below ground surface (bgs) before being directed toward the surface to the exit pit. Progressive passes with a larger reamer would increase the size of the borehole; a total of three reams are planned. The borehole would be kept open and the drill head lubricated by application of a bentonite mud slurry injected through the drill pipe into the borehole. The drilling process is estimated to take approximately two days for each bore. High Density Polyethylene (HDPE) pipe casing (rather than concrete encased ductline used with open trenching) would then be assembled. This process is expected to take about ten to twelve hours and would require an additional 500 feet of the lane to be blocked off beyond the exit pit. To avoid blocking cross traffic on major cross streets, such as Kalākaua Avenue, it would be necessary to install the product pipeline in a shallow trench that is plated to provide "storage" area for the assembled casing.

Once assembled, the HDPE pipe casing would be pulled back through the borehole from the exit pit toward the entrance pit where the drilling rig is located, a process that is estimated to take 10 hours. The overall process of drilling, pipe casing assembly, and pipe casing pullback is repeated six times at each drill rig set up, three in each direction. On King Street from Cooke Street to Punahou Street, it estimated that the drill rig would be set up at seven different locations.

HDD equipment would be set up at the entrance and exit areas, with the majority of the equipment set up at the entrance pit. This set up would include the following equipment:

- 30,000 to 50,000 pound drill rig,
- drill pipe to run the length of the alignment,
- a crane to lift the drill pipe to the attachment point,

- a mud mixing truck,
- a control unit with a power plant to control the equipment and guide the drill head underground,
- vacuum extractor truck to remove excess mud,
- rollers to lay the assembled ductline prior to installation, and
- dumpster or dump truck.

Additional staging would be required for pipe and equipment storage. Possible staging locations include McKinley High School, Washington Middle School, and the HECO property at Cooke Street.

In summary, the HDD alternative offers no significant advantages over conventional trenching for Phase 2. The cable ampacity impacts, workspace limitations, and traffic disturbances are significant constraints in utilizing HDD on King Street. Furthermore, the uncertainty in securing needed permits and approvals for allowing the equipment and the pipe assembly to remain on the roadway around the clock until the drilling and pulling operations are complete for a given segment does not support further consideration of this alternative.

3.1.2.2.3 Manhole Installation

Manhole installation would be similar to that described in Section 3.1.1.2.

3.1.2.2.4 Substation Modifications

Modifications to the Archer Substation would be similar to those for the Kamoku Substation described in Section 3.1.1.2.

3.1.2.2.5 Installation of New Circuits

The installation of new circuits would be similar to that described in Section 3.1.1.2. For directional drilling, the length of the circuit pulling would extend approximately 500 feet from the entrance pit to the exit pit, where a manhole would be installed and the circuits connected. Figure 3-6 shows the typical configuration of circuits and ductlines using directional drilling, including a conceptual plan and profile view of the segments.

3.1.2.2.6 *Paving*

Paving activities would be similar to those described in Section 3.1.1.2. Paving would only be required in the sections that are trenched and where the entrance and exit pits are located.

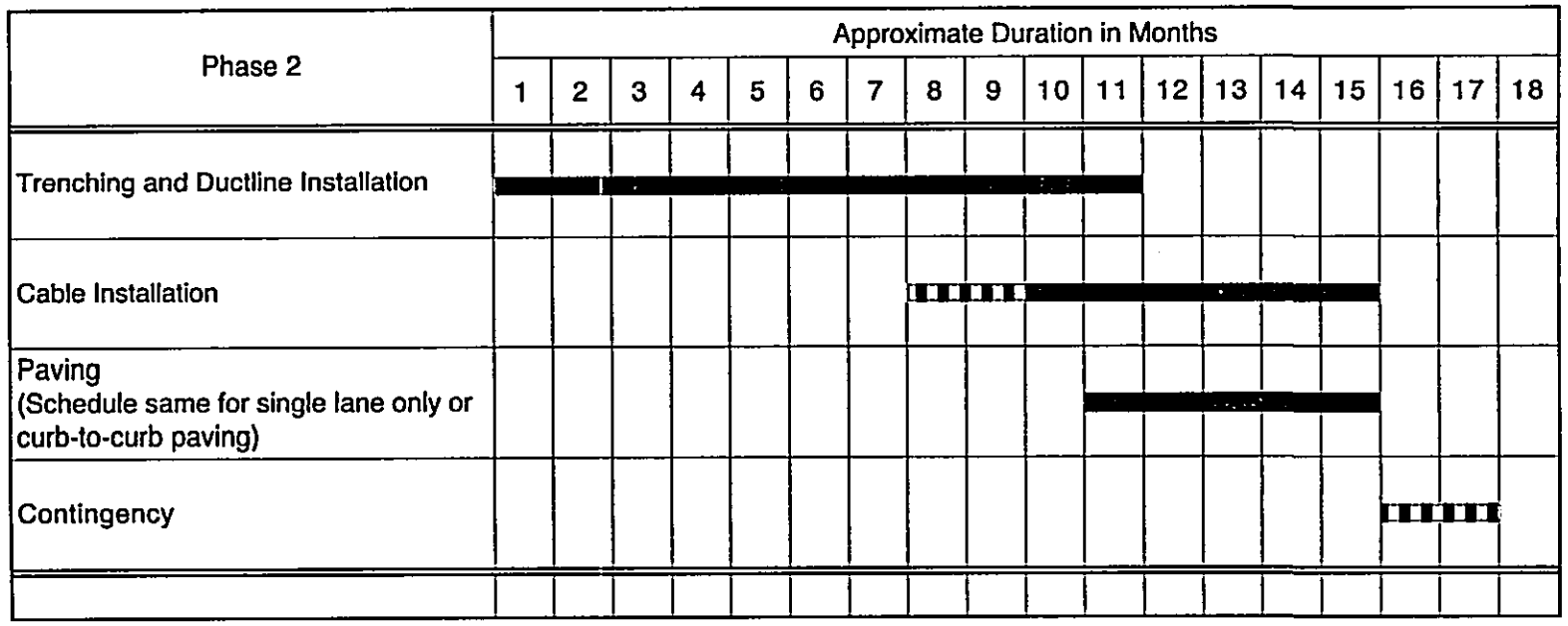
3.1.2.3 *Construction Schedule*

The Phase 2 construction schedule is flexible and would be coordinated with City and County of Honolulu agencies so as not to conflict with other projects along King Street. City and County of Honolulu projects are scheduled for as early as 2004 and as far as 2015. Figure 3-7 shows the schedule of activities for Phase 2. The construction schedule is approximate; actual duration of activities may vary.

3.1.3 Operational Activities

This Section addresses how the reliability concerns and overload situations identified in Chapter 2 would be addressed by the Proposed Action. The implementation of the 46kV Phased Project would allow electrical loads currently being served exclusively from Pūkele Substation, located at the end of the Northern 138kV Transmission Corridor, to also be served from Kamoku Substation and Archer Substation, located in the Southern 138kV Transmission Corridor. Essentially, this project allows load to be shifted among the three substations using 46kV lines, and also allows the substations to back up each other. These operating features will address the four transmission problems in varying degrees.

First, some of Pūkele Substation's existing electrical load would be shifted to Archer Substation and Kamoku Substation with the implementation of the project. This will reduce the overall Ko'olau/Pūkele Service Area load, which will relieve the potential overload situation of the 138kV transmission lines transporting power to the area for the 20-year study period.



LEGEND

Additional time if needed

2004.33.0800/017-2 d8.9.04 7

Figure 3-7
PHASE 2 CONSTRUCTION SCHEDULE

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

- Second, most of the loads transferred from Pūkele Substation to Archer Substation and Kamoku Substation as a result of the implementation of this alternative, plus some existing load currently served by Archer Substation (through the Pi'ikoi Distribution Substation), could temporarily be shifted to Pūkele Substation when a transmission line providing power to the Downtown Service Area is taken out of service for maintenance. This would reduce the load in the Downtown Service Area while the line is out of service, and avoid accelerating the overload situation. This load shift would only be done when there is a possibility that the overload situation would occur. After the line taken out for maintenance has been restored to service, load would be shifted back from Pūkele Substation to the Downtown Service Area.
- Third, some of Pūkele Substation's existing electrical load would be shifted to Archer Substation and Kamoku Substation with the implementation of this project. Therefore, if the two 138kV transmission lines serving Pūkele Substation were to be lost, the loads that were transferred to Archer Substation and Kamoku Substation because of this alternative would not experience an outage. The loads that continue to be served by Pūkele Substation even after the implementation of this alternative would experience a momentary outage (approximately six seconds) as these loads are automatically transferred to Archer Substation and Kamoku Substation (as well as to Ko'olau Substation).
- Fourth, if the two 138kV transmission lines that serve Archer Substation are lost, some of the loads served by Archer Substation, Kewalo Substation and Kamoku Substation would experience an outage, but other Archer Substation loads would experience a momentary outage (approximately six seconds) as these loads are automatically transferred to Pūkele Substation.

Table 3-5 summarizes the operational activities made possible with the completion of Phase 1 and Phase 2 construction activities.

Table 3-5. Summary of Operational Activities

Problem	Phase 1	Phase 2
Pūkele Substation Reliability Concern (Date problem is anticipated: present)	• Shifts about 80 MW of existing load from the Northern Corridor (Pūkele) to the circuits from substations on the Southern Corridor (Archer and Kamoku). • *In the event of an outage,* automatically transfers the load from some Pūkele circuits to Kamoku Substation circuits.	• In the event of an outage at Pūkele Substation, additional 46kV feeder connections between Archer, Kamoku, and Pūkele Substations would provide connections to back up some of the power. • In the event of a substation outage, allows remaining load from Pūkele to be shifted to Archer, Kamoku and Ko'olau Substations.
Ko'olau/Pūkele Overload Situation (Date problem is anticipated: 2005)	• Shifts about 80 MW of existing load from Pūkele to Archer and Kamoku Substations, which reduces Pūkele load below the 362 MW overload threshold.	• No effect. Phase 1 operational activities would eliminate Ko'olau/Pūkele Overload for 20-year period studied.
Downtown Substation Reliability Concern (Date problem is anticipated: present)	• In the event of downtown substation outages, 38 MW, or 39 percent of the load served by downtown substations, could be served by Pūkele Substation via 46kV subtransmission lines.	• Addition of circuits between Archer and Pūkele Substations would increase the likelihood of transferring entire Archer load to Pūkele.
Downtown Overload Situation (Date problem is anticipated: 2025)	• In the event that one of the three 138kV transmission lines is taken out of service, about 71 MW of Pūkele load previously transferred from Pūkele to Downtown could be shifted back temporarily. • In addition, 14 MW of load from Pi'ikoi Distribution Substation (served from Archer) could be shifted temporarily to Pūkele.	• No effect.

Note:
The loads reflected in this table and in Section 3.1.3 are based on the loads at the time of the 2002 Day Peak, as adjusted for the 46kV and 25kV configuration changes identified in Section 2.5.

3.1.3.1 *Pūkele Substation Reliability Concern*

Phase 1 would transfer approximately 80 MW (approximately 41 percent of demand in the existing Pūkele Service Area) of load from Pūkele Substation to Archer and Kamoku Substations (Figure 3-8), leaving the remaining 116 MW or 59 percent of the demand in the existing area without instantaneous back-up. Hence, should both of the 138kV transmission lines between Ko'olau and Pūkele become unavailable, the areas receiving the transferred 80 MW of electricity would not be affected. For the remaining 116 MW, approximately 63 MW, representing 32 percent of the existing Pūkele Service Area, would be automatically transferred at various distribution substations to Archer, Kamoku, and Ko'olau 46kV feeders. Automatic transfers would require brief interruption of power lasting up to six seconds.

The last approximately 53 MW, representing 27 percent of the existing Pūkele Service Area, would be manually switched to 46kV lines from the Ko'olau Substation if there is an extended outage of the Pūkele Substation. Manual transfers would require HECO personnel to go to various locations to manually switch the loads, which is estimated to take up to two to four hours. Manual transfers would take place inside the substations and on switches on overhead poles outside the substations.

Phase 2 would provide back-up feeds to areas that would continue to be served primarily from Pūkele Substation after Phase 1 is implemented (Figure 3-9). Should both 138kV transmission lines between the Ko'olau and Pūkele Substation be unavailable, back-up sources would be automatically initiated (Figure 3-9). During this transfer of electrical loads, the areas served by Pūkele Substation, after Phase 1 is implemented, would experience no more than a six-second outage while the other areas transferred to Archer and Kamoku Substations would not be affected. Table 3-6 summarizes the anticipated effects of the automatic transfer of electrical load should both 138kV transmission lines become unavailable after Phases 1 and 2 of the Proposed Action are implemented. This would resolve the Pūkele Substation Reliability Concern (described in Section 2.1), although some customers could still have interruptions of up to six seconds.

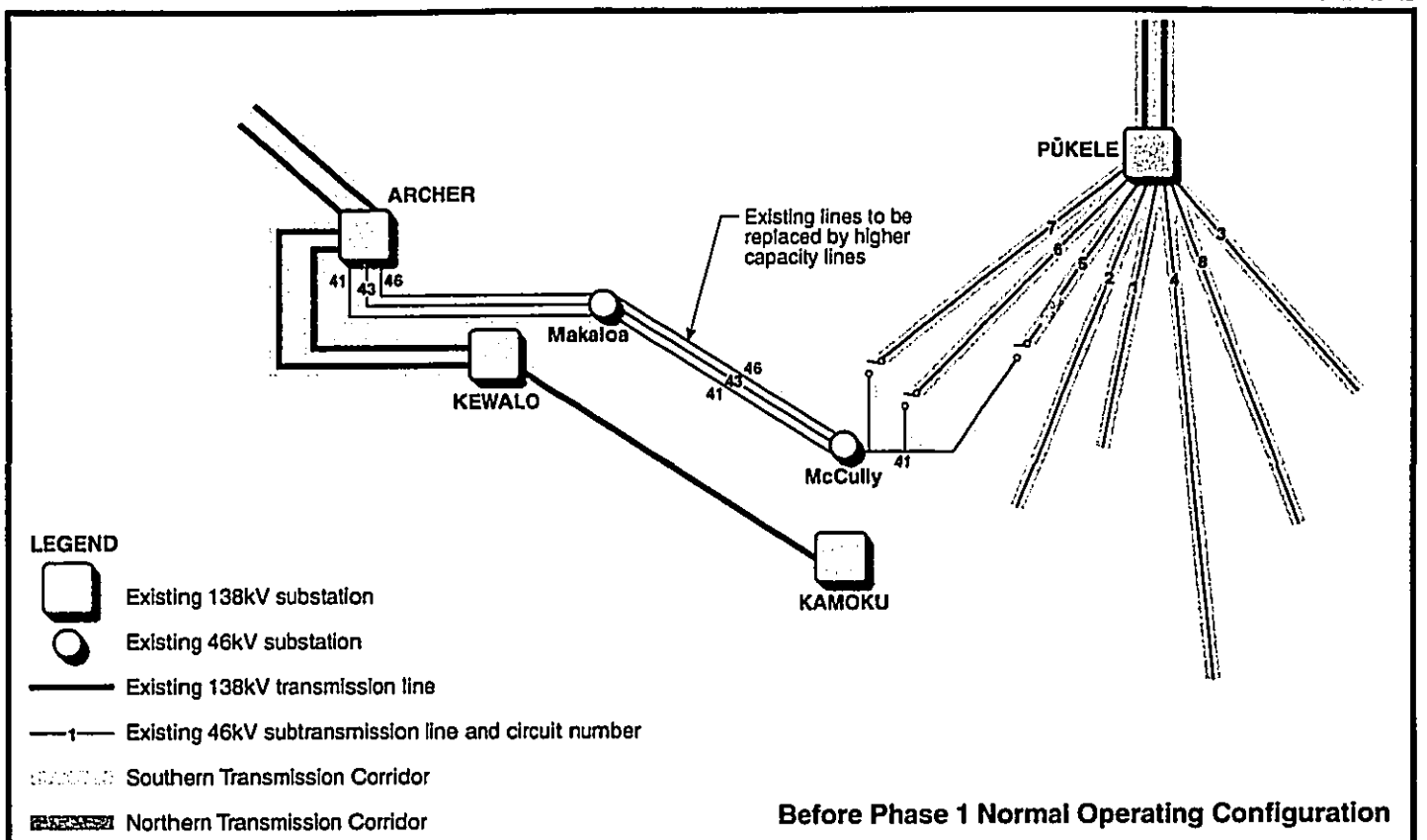
Table 3-6. Operational Impacts Under Pūkele Substation Reliability Concern

Distribution Substation	No Interruption	Six-second Interruption	Two- to Four-hour Outage
Phase 1			
McCully	X		
'Ena (portion)	X	X	
Waikīkī (portion)	X	X	
Kapahulu (portion)	X	X	
Kapi'olani (portion)	X	X	

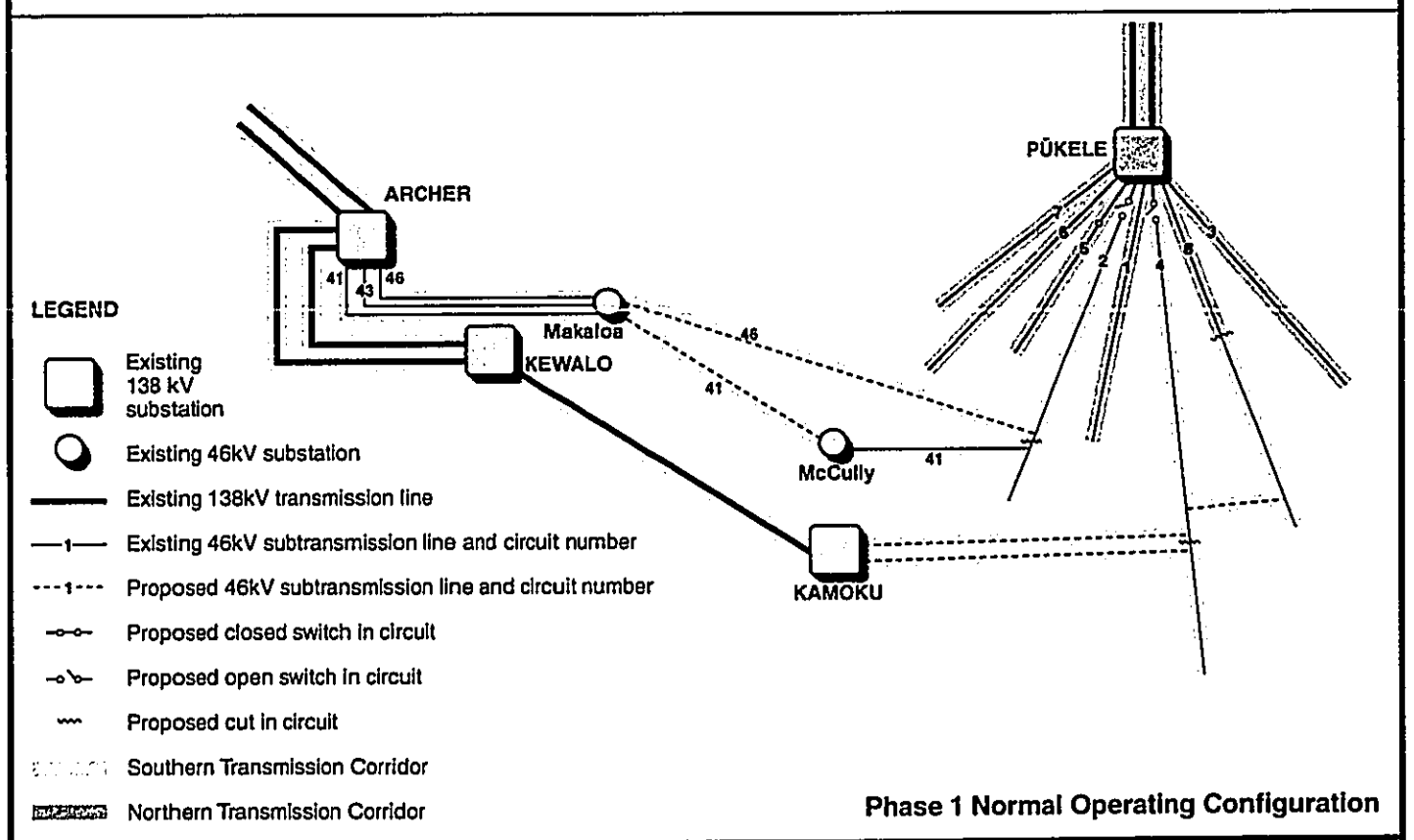
Table 3-6. Operational Impacts Under Pūkele Substation Reliability Concern *(continued)*

Distribution Substation	No Interruption	Six-second Interruption	Two- to Four-hour Outage
Phase 1 *(continued)*			
Kaimukī (portion)	X	X	
Kūhiō	X		
Aina Koa (portion)		X	
Mō'ili'ili		X	
Kāhala			X
Wai'alae			X
Pūkele			X
Mānoa			X
Woodlawn			X
UH-Quarry			X
East-West Center			X
% of Existing Pūkele Service Area	41	32	27
Phase 2			
McCully	X		
'Ena (portion)	X	X	
Waikīkī (portion)	X	X	
Kapahulu (portion)	X	X	
Kapi'olani (portion)	X	X	
Kaimukī (portion)	X	X	
Kūhiō	X		
Aina Koa (portion)		X	
Mō'ili'ili		X	
Kāhala		X	
Wai'alae		X	
Pūkele		X	
Mānoa		X	
Woodlawn		X	
UH-Quarry		X	
East-West Center		X	
% of Existing Pūkele Service Area	41	59	0

2004.33.0800/013-2 d8.11.04 12



Before Phase 1 Normal Operating Configuration



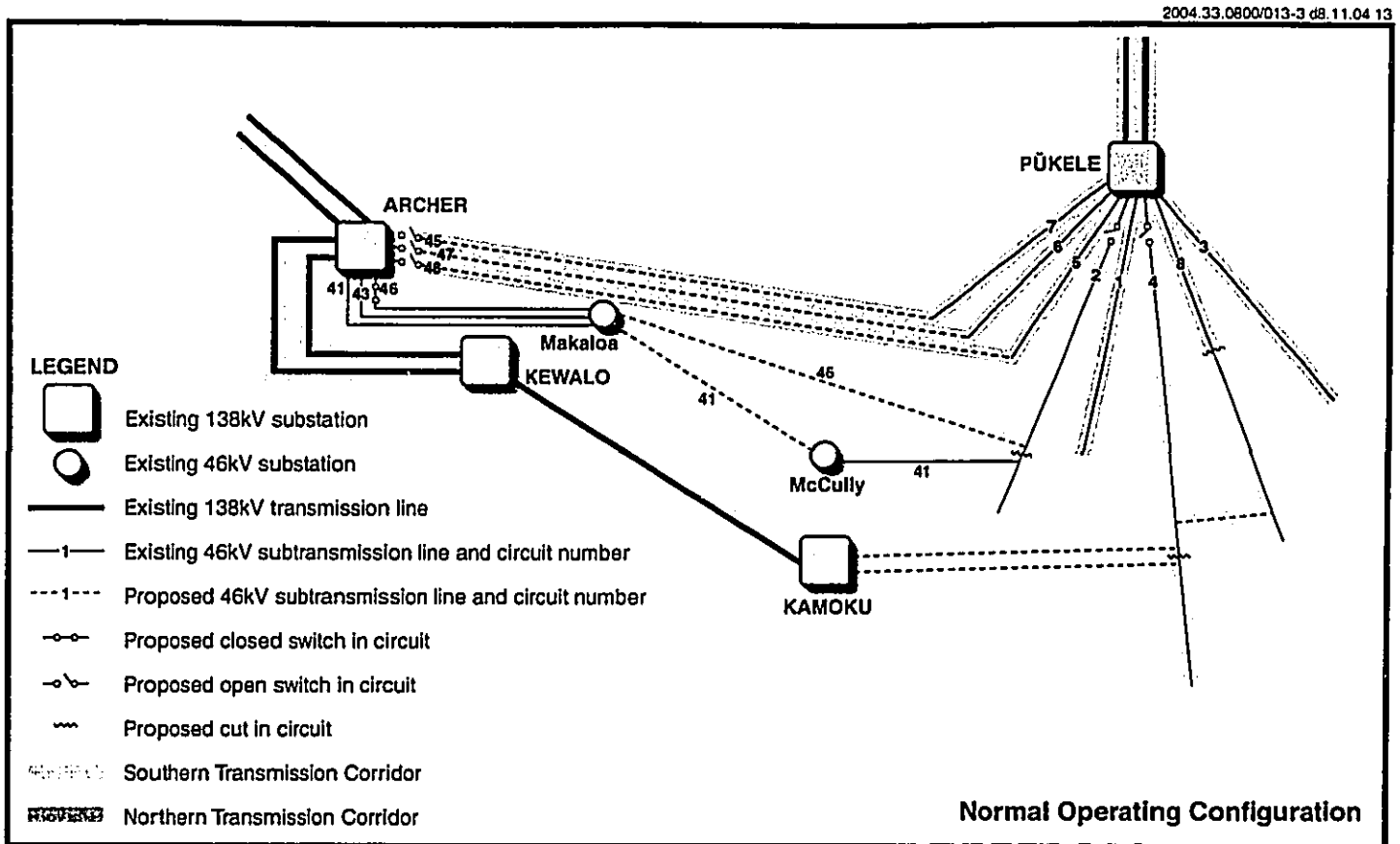
Phase 1 Normal Operating Configuration

Figure 3-8
DIAGRAM OF OPERATIONAL CAPABILITY—PHASE 1

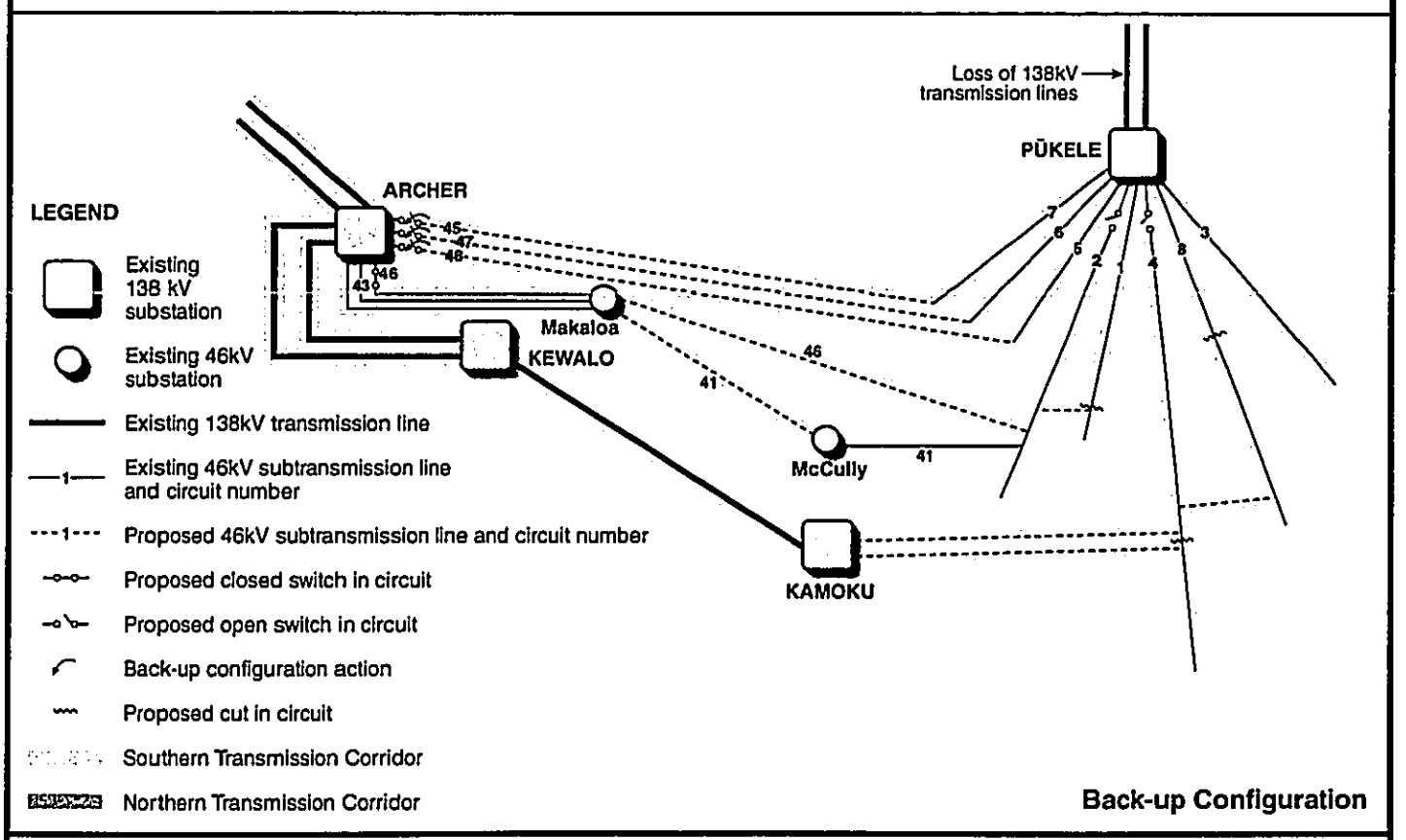
Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

DIAGRAM NOT TO SCALE

2004.33.0800/013-3 d8.11.04 13



Normal Operating Configuration



Back-up Configuration

Figure 3-9
DIAGRAM OF OPERATIONAL CAPABILITY—PHASE 2

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

DIAGRAM NOT TO SCALE

3.1.3.2 *Ko'olau/Pūkele Overload Situation*

Phase 1 would allow substations in the Southern 138kV Transmission Corridor to provide service to some areas currently being served by Pūkele Substation (Figure 3-8). Specifically, 80 MW of electrical load would be transferred from the Ko'olau/Pūkele area (Figure 3-8 Existing Conditions) to the Archer and Kamoku Substations (Figure 3-8 Phase 1 Normal Operating Configuration). The load shift is expected to remain in this configuration under normal operating conditions and would reduce the combined load at the Ko'olau and Pūkele Substations to a level below 362 MW, which is the amount of combined load that triggers an overload condition on the remaining line to Ko'olau Substation. The reduction in combined load with the implementation of Phase 1 would resolve the Ko'olau/Pūkele Overload Situation (described in Section 2.2) for the 20-year period studied.

Phase 2 would have no additional effect on the Ko'olau/Pūkele Overload Situation, as Phase 1 activities would resolve the concern.

3.1.3.3 *Downtown Substation Reliability Concern*

Phase 1 (Figure 3-8 Phase 1 Normal Operating Configuration) would partially resolve the Downtown Substation Reliability Concern (described in Section 2.3). It would provide a backup to about 38 MW, representing 39 percent of the load served by downtown substations (Archer, Kewalo, and Kamoku Substations) via 46kV subtransmission lines from Pūkele Substation if Archer Substation loses its two 138kV transmission line feeds. A momentary outage would occur while the load is automatically transferred to the Pūkele Substation. Under Phase 1, 61 percent of the load served by the downtown substations would not be served, resulting in outages in the affected areas.

Under Phase 2, it would be technically feasible to transfer all or most of the load served by Archer Substation to Pūkele Substation based on the current estimated loading at Archer Substation and the capacity of the Pūkele transformers. With this load transfer, however, there may be low voltage situations on the 46kV systems, and further analysis is needed to determine whether further steps should be taken to allow the complete transfer of the load at Archer Substation to Pūkele Substation. In the event of a catastrophic failure to the Archer 138kV duct line, HECO could consider transferring the Archer load to the Pūkele Substation by transferring load by feeders, ensuring that low voltage and overload situations do not occur on the 46kV system, until the Archer 138kV duct line and/or cables can be repaired.

3.1.3.4 *Downtown Overload Situation*

The Downtown Overload Situation (described in Section 2.4) is not forecast to occur until after 2024. If the 80 MW transferred to Archer and Kamoku Substations

continues to be served by these substations in situations in which two out of the three downtown 138kV transmission lines could be out of service, the Downtown Overload Situation will be accelerated. However, with the installation of the project, it is HECO's plan to shift load back to the Pūkele Substation if one of the downtown 138kV lines is taken out of service for maintenance, or experiences a prolonged forced outage.

After the installation of Phase 1, not all of the 80 MW of load shifted from Pūkele Substation to downtown substations can be transferred back to Pūkele Substation when maintenance is being performed on one of the downtown transmission lines. This is due to limitations on the load that can be carried by the 46kV circuits (taking into account the substation transformer loads normally served by the circuits, plus the additional loads that the circuits must be able to serve as a result of automatic load transfers due to outages of other circuits). Based on the planned circuit configuration, approximately 9 MW originally served by the Pūkele Substation would not be transferred back from the Archer Substation. The remaining 9 MW of load, which cannot be shifted, can be replaced by temporarily shifting 14 MW additional load from the Pi'ikoi Substation (located between the Archer and Pūkele Substations, and served from the Archer Substation) to the Pūkele Substation. These actions would restore the load to the 2004 level prior to the planned transfer of load in 2004 from Pūkele Substation to Archer Substation as described in Section 2.5, and avoid accelerating (or even deferring) the Downtown Overload Situation.

If the Downtown Overload Situation continues to develop as projected, HECO could create the flexibility (with minor circuit modifications that are not currently planned) to shift additional load to Pūkele Substation when a Downtown Area transmission line is taken out of service for maintenance, which could further defer the line overload situation for up to a few years.

Phase 2 activities would not provide additional relief from this situation.

3.2 DESCRIPTION OF ALTERNATIVES

3.2.1 Background

HECO, with assistance from utility experts, has identified and evaluated a wide variety of options to address East O'ahu transmission problems (identified in Section 1.2 and discussed in Chapter 2) during the past 10 years. This section describes the alternatives to the Proposed Action that are evaluated in this EA, including the No Action alternative, and the alternatives that were considered but eliminated from further analysis.

3.2.2 Alternatives Evaluated In This EA

3.2.2.1 Alternative Alignments Between Makaloa and McCully Substations

Alternative alignments are being considered based on requests made subsequent to the public input process of 2003. These alternative alignments would route the two new 46kV circuits away from certain residential areas as much as practical by using Kapi'olani Boulevard. The alternative alignments are variations on the Proposed Action; each would require installation of new ductlines along the entire length from the Makaloa Substation to the McCully Substation. The paths of these alignments all begin at the Makaloa Substation and proceed as shown in Figure 3-10, and as described in the following subsections.

3.2.2.1.1 Alternative Alignment 1

From the Makaloa Substation, the circuits in new ductline would exit the substation to Makaloa Street, proceed in the Koko Head direction until Kāheka Street, continue on Kāheka Street in the makai direction to Kapi'olani Boulevard and proceed in the Koko Head direction on Kapi'olani Boulevard to Pumehana Street. At Pumehana Street, the circuits in new ductline would then proceed in the mauka direction to Lime Street at the McCully Substation. This alignment is depicted by the purple line in Figure 3-10.

3.2.2.1.2 Alternative Alignment 2

From the Makaloa Substation, the circuits in a new ductline would exit the substation to Makaloa Street, proceed in the Koko Head direction to Kalauokalani Way, continue on Kalauokalani Way in the makai direction to Kapi'olani Boulevard, and proceed in the Koko Head direction on Kapi'olani Boulevard to Pumehana Street. At Pumehana Street, the circuits in new ductline would then proceed in the mauka direction to Lime Street at the McCully Substation. This is depicted by the red line in Figure 3-10.

3.2.2.2 No Action

No Action is an option inherent in all decision-making. No Action means that the activities described to address the potential overload and reliability issues at the Ko'olau, Pūkele and Downtown Substations, along with their associated transmission and subtransmission lines (circuits), would not occur.

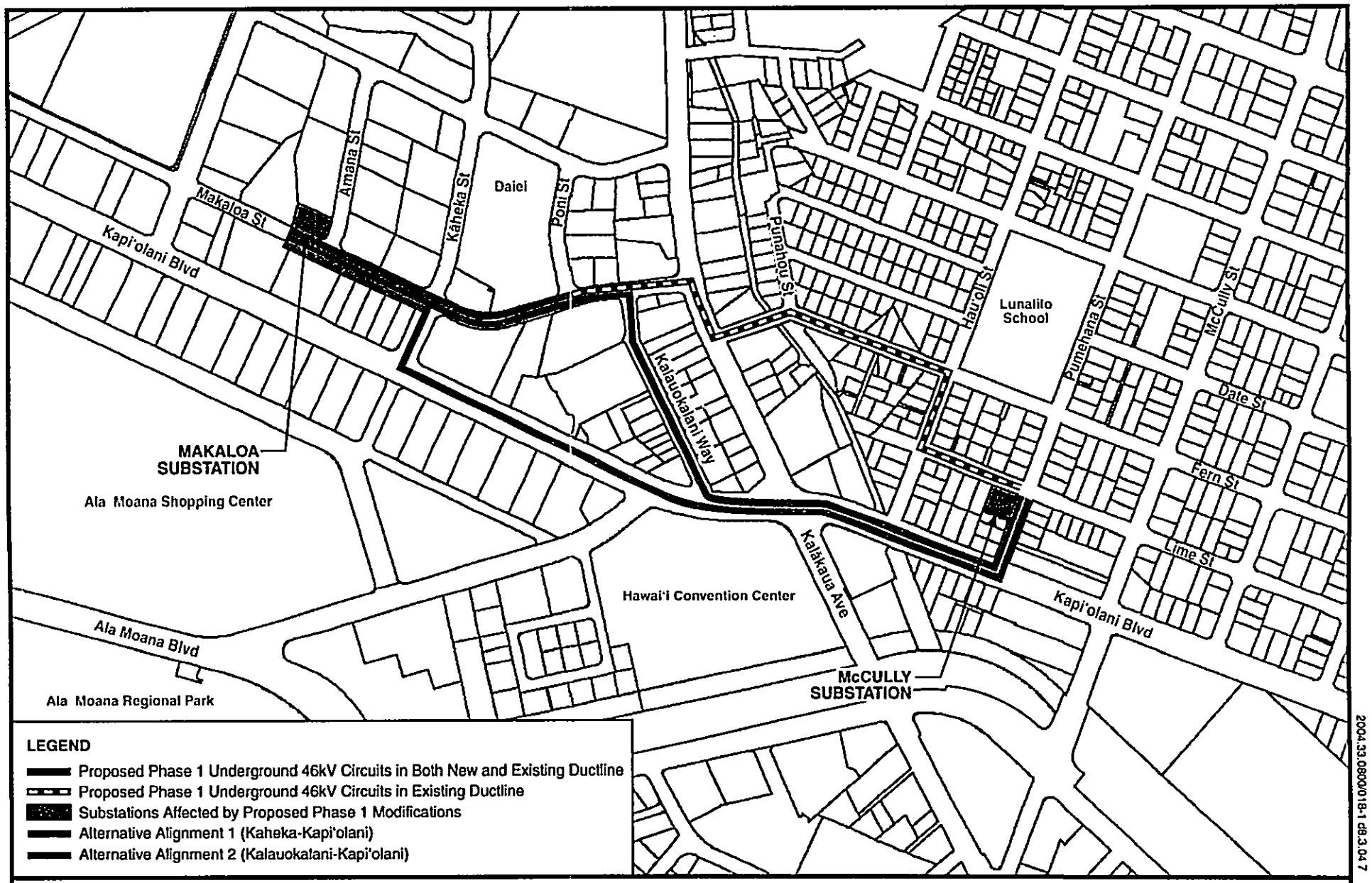


Figure 3-10
ALTERNATIVE ALIGNMENTS

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

3.2.3 Alternatives Considered and Eliminated from Further Analysis

Alternatives considered by HECO and eliminated from further analysis in this EA are summarized herein.

3.2.3.1 Kamoku–Pūkele 138kV Transmission Line

Early on in the project, HECO identified fourteen 138kV and two 46kV transmission system alternatives to address the transmission problems. The preferred alternative was a partial underground, partial overhead 138kV transmission line connecting Kamoku Substation to Pūkele Substation via Wa'ahila Ridge called the Kamoku–Pūkele 138kV Transmission Line. After an extensive public input process, EIS process and contested case hearing to secure a CDUP for the project, the State BLNR denied HECO's permit request on June 28, 2002. Therefore, the Kamoku–Pūkele 138kV Transmission Line is no longer a viable option.

3.2.3.2 Other Line Alternatives

The following transmission alternatives were evaluated but were eliminated from further analysis in this EA for various reasons.

School Street–Pūkele 138kV Alternative

This alternative involves the installation of an underground 138kV transmission line between the School Street Substation in Liliha and the Pūkele Substation and an underground 138kV transmission line between the School Street and Kamoku Substations. This alternative effectively addresses all the East O'ahu transmission problems. The facilities required are much more extensive than the Kamoku–Pūkele 138kV Underground Alternative (discussed below), which provides similar effectiveness in addressing the transmission problems. Thus this option is not considered further in this EA.

Hālawa–Pūkele 138kV Alternative

This alternative involves the installation of an overhead 138kV transmission line between the Hālawa Substation in Hālawa Valley and the Pūkele Substation and an underground 138kV transmission line between the School Street and Kamoku Substations. This alternative effectively solves all the East O'ahu transmission problems except for the Downtown Overload Situation in the event the HPP is not operational in the near future. The facilities required for this alternative are much

more extensive than the Kamoku–Pūkele 138kV Underground Alternative (discussed below), which better addresses the transmission problems. Thus, this option is not considered further in this EA.

Hālawa–Ko'olau-Pūkele 138kV Alternative

This alternative involves the installation of an overhead 138kV transmission line between the Hālawa and Ko'olau Substations, an overhead 138kV transmission line between the Ko'olau and Pūkele Substations, and an underground 138kV transmission line between the School Street and Kamoku Substations. This alternative effectively solves all the East O'ahu transmission problems except for the Downtown Overload Situation in the event the HPP is not operational in the near future. The facilities required for this alternative were much more extensive than the Kamoku–Pūkele 138kV Underground Alternative (discussed in Section 3.2.3.3), which better addresses the transmission problems. Thus, this option is not considered further in this EA.

Network 46kV Alternative

This alternative involves the installation of a partial overhead/partial underground 138kV transmission line between the Hālawa and School Street Substations, eight underground and overhead 46kV lines in the Mō'ili'ili and Kaimukī areas, and four transformers at the Kamoku Substation. This alternative solves all the East O'ahu transmission issues except that it only partially addresses the Downtown Substation Reliability Concern. This alternative requires facilities that are much more extensive than the Kamoku–Pūkele 138kV Underground Alternative (discussed in Section 3.2.3.3), which better addresses the transmission problems. Thus, this option is not considered further in this EA.

Radial 46kV Alternative

This alternative involves the installation of six underground 46kV lines, two transformers at the Kamoku Substation, one transformer at the Archer Substation, four 46kV circuit breakers at the Pūkele Substation and modifications to the control house at the Pūkele Substation. This alternative solves the Ko'olau/Pūkele Overload Situation, can defer the Downtown Overload Situation (which is not expected to occur until after 2024 if HPP is operating), and fully addresses the Pūkele Substation and Downtown Substation Reliability Concerns. If the HPP is not operational in the near future, this alternative would not be able to address the Downtown Overload Situation. This alternative is similar in effectiveness to the proposed project, but the cost of this alternative is higher than the proposed project and involves the installation of one more 138kV/46kV transformer, with marginal benefits. Thus, this option is not considered further in this EA.

3.2.3.3 *Summer 2003 Public Participation Alternatives*

Kamoku–Pūkele 138kV Underground Alternative

The Kamoku-Pūkele 138kV Underground Alternative via Pālolo involves the installation of an underground 138kV transmission line between Kamoku Substation and Pūkele Substation, approximately 3.6 miles in length. There are two technologies that could be utilized for the 138kV underground transmission line: High Pressure Fluid Filled (HPFF) cables or Cross-Linked Polyethylene (XLPE) cables. For the HPFF technology, a pumping facility would be needed in Pālolo Valley due to the elevation difference between Kamoku Substation and Pūkele Substation. The effect of this alternative is to add (1) a fourth 138kV transmission line into the Ko'olau/Pūkele area via the Kamoku Substation and into the downtown area via Pūkele Substation, (2) a third 138kV transmission line to feed Pūkele via Kamoku Substation and to the Archer and Kewalo Substations, and (3) a second 138kV feed to the Kamoku Substation. This addresses all of the transmission overload and reliability issues for the Pūkele and Downtown areas. From an engineering standpoint, this is the best alternative to fully address all the transmission problems effectively in the long-term, and the duration of its effectiveness would be longer. It would not address the existing Pūkele Substation Reliability Concern or the Ko'olau/Pūkele Overload Situation (expected to occur in 2005) in the near-term, however, due to the estimated time to implement this alternative (2010), and it appears to have the highest degree of schedule uncertainty due to the permits and approvals required. This alternative also has a substantially higher capital cost at approximately $110 million (XLPE) to $122 million (HPFF). The 46kV alternatives described below can be installed sooner, appear to have less schedule uncertainty and are less costly to implement when compared to this alternative. Thus, this alternative is not considered further in this EA.

Kamoku 46kV Underground Alternative

This alternative generally is the same as Phase 1 of the 46kV Phased Project. This alternative addresses the Ko'olau/Pūkele Overload Situation by transferring load to the downtown area. It adds a 46kV feeder to Archer and Kamoku substations via Pūkele Substation. This alternative is adequate to solve the Ko'olau/Pūkele Overload Situation, can defer the Downtown Overload Situation (which is not expected to occur until after 2024 if HPP is operating) for several years, provides partial back-up of the load served by the Pūkele Substation (although some customers would still incur a six-second outage if the second Ko'olau-Pūkele 138kV transmission line experienced a forced outage while the first Ko'olau-Pūkele 138kV line was out for maintenance), and provides partial back-up of the load served by the downtown substations. If the HPP is not operational in the near future, this alternative would not be able to address the Downtown Overload

Situation. It was estimated that this alternative could be implemented as early as 2006. The advantage of this alternative is that it can be installed sooner, although the duration of its effectiveness is not as long as that of the Kamoku–Pūkele 138kV Underground Alternative.

Kamoku 46kV Underground Alternative–Expanded (Cooke Street–King Street)

This alternative generally is the same as the 46kV Phased Project, assuming both phases are implemented at the same time. This alternative effectively addresses the Ko'olau/Pūkele Overload Situation, can defer the Downtown Overload Situation (which is not expected to occur until after 2024 if HPP is operating), and fully addresses the Pūkele Substation and Downtown Substation Reliability Concerns, but would take longer to install than the Kamoku 46kV Underground Alternative. This alternative was selected with the recommendation that it be installed in two independent phases (with the first phase being the Kamoku 46kV Underground Alternative). Implementing the project in two phases would address near-term transmission problems such as the Ko'olau/Pūkele Overload Situation and a part of the Pūkele Substation Reliability Concern, which includes Waikīkī, in a more timely manner. This is the project assessed in this EA.

3.2.3.4 *Phase 2 Alternatives*

Phase 2, Alternative Route, Young Street

Young Street was considered as an alternative alignment to King Street for routing three new underground 46kV subtransmission lines between Archer Substation and McCully Street. The disadvantages of this alternative route included the need to prohibit parking along both sides of Young Street during construction, which would negatively impact local businesses and residents; uncertainty regarding the City and County of Honolulu's planned Young Street Boulevard Project, which may include undergrounding utilities; and proximity to residential dwellings, which would make obtaining a noise variance for night-time work difficult. Thus, this alternative is not considered further in this EA.

Phase 2, Alternative Route, Beretania Street

Beretania Street was considered as an alternative alignment to King Street for routing three new underground 46kV subtransmission lines between Archer Substation and McCully Street. The disadvantage of this alternative route was the longer distance of the alignment and resulting increase in cost. Thus, this alternative is not considered further in this EA.

3.2.3.5 *Other Options Considered*

In addition to the alternatives described in the sections above, other options were considered to address the transmission problems. These options can be categorized into two broad categories: (1) Options that might address all of the East O'ahu transmission problems collectively and (2) Options that might only address the Ko'olau/Pūkele Overload Situation.

Some of the options considered to address all of the East O'ahu transmission problems collectively are:

- **Live Line Maintenance.** This strategy, also called live working (LW), involves maintenance work on and sometimes replacement of distribution and transmission facilities without de-energizing the lines. Since the Ko'olau Overload Situation and Pūkele Reliability Concern generally arise when a transmission line has to be taken out of service for maintenance, this strategy could help to address both issues, and an evaluation of the applicability and practicability of LW was conducted (EDM International, Inc., December 2003). In the case of HECO's 138kV system as it is currently configured, LW has, at best, very limited applicability, particularly for the lines serving the Ko'olau and Pūkele Substations, due to constraints imposed by climate, terrain, and facility conditions. These constraints render LW impracticable for all but a very small percentage of the needed maintenance activities. The very frequent occurrence of rain and periods of fog, high humidity and unpredictable winds will prevent the safe use of LW. Remote structures, particularly in the Ko'olau mountain areas, cannot be accessed by heavy equipment and/or do not have sufficiently large flat areas for use of heavy equipment such as insulated aerial devices with outriggers. Helicopter use is often hindered by fog, rain and strong winds. Many structures lack sufficient mechanical strength to support additional loading posed by climbing and conductor supports (strain sticks) needed for removal of insulators, and would need to be refurbished before LW could be attempted. Few of HECO's lines were designed with the goal of facilitating LW. In particular, none of the lines serving the Ko'olau and Pūkele Substations, which are more than 40 years old, were designed for LW. For this reason, LW is not possible in many situations without retrofitting the existing lines. Taking the lines out of service to retrofit the structures would place the Pūkele Service Area at risk of the double outage that LW would be attempting to avoid. Also, in most cases LW on HECO's system will be more time consuming and costly than de-energized maintenance. Thus, this option is not considered further in this EA.

- **Renewable Resources.** This involves development of renewable resource generating plants (e.g., wind, solar). In general, the 1995 CH2M HILL Alternatives Study, as updated in 2000, found that renewable resource generating plants were not a viable alternative due to the lack of suitable sites, the large land requirements, the non-firm nature of wind and solar resources, and the costs and need for interconnection lines if suitable sites could be found and battery energy storage systems were added to firm up the resources. Thus, this option is not considered further in this EA.

- **Distributed Generation (DG).** DG refers to the installation of small generating units located at or near the load demands. Various technologies such as internal combustion engines (ICE) (which in Hawaii are often diesel generators), fuel cells, micro-turbine generators, and renewable energy generators (wind and photovoltaic) are often suggested for DG applications. The purpose of the DG Alternatives Study completed by HECO in March 2000 was to review the suitability of using DG as an alternative to the installation of the Kamoku–Pūkele 138kV transmission line. In principle, installation of DG resources can defer the need for new transmission and distribution (T&D) capacity by providing customers with a nearby redundant source of electricity that otherwise would have been provided by T&D upgrades. For DG to provide the same reliability improvements as the Kamoku–Pūkele line, it was estimated that at least 200 MW of distributed generation would have to be installed up front in the neighborhoods of Mānoa, Pālolo, Wai'alae/Kāhala, Kaimukī, Kapahulu, McCully/Mō'ili'ili, and Waikīkī (of which 39 MW was already assumed to be installed). The review concluded that DG was not a suitable alternative to the Kamoku–Pūkele line due to the cost of this option, as well as uncertainties with land, fuel supply, interconnection, and permitting with the installation of small generating units in the Pūkele Substation Service Area. Thus, this option is not considered further in this EA.

- **Demand Side Management (DSM) and Load Management (LM).** HECO has implemented DSM programs targeting commercial and residential clients; these encourage energy conservation and efficiency using financial incentives such as subsidies for solar water heaters. LM programs target peak load reductions rather than energy conservation, and HECO has filed applications to implement residential and commercial LM programs. The 1995 CH2M HILL Alternatives Study, as updated in 2000, indicated that the transmission overload problems might be deferred for a few years by even more aggressive (but not necessarily cost-effective) DSM programs, but the problems would only reappear due to overall load growth in the service areas, the customer mix, and the already high saturation goals for the approved DSM programs. The study also recognized that DSM and LM programs could not address the

Pūkele Reliability Concern, since these resources could not provide the Pūkele Substation with a reliable and cost-effective source of electricity equivalent to its peak load, or eliminate all of the customer load in the Pūkele Service Area. Thus, this option is not considered further in this EA.

Some of the options considered to address the Ko'olau Overload Situation only were:

- **Increased Conductor Capacity Options.** Increasing conductor capacity involves the implementation of various techniques, materials, and equipment to increase the line capacities of the existing transmission lines. The options to increase the current carrying capacity of transmission lines can be problematic and would place the HECO system at an increased risk of experiencing an overload situation. For example, the re-conductoring option would require installation of new conductors to replace the existing conductors on the three 138kV transmission lines serving the Ko'olau Substation, and various structure and poles supporting the conductors may have to be strengthened or replaced. The process would be time consuming, difficult, and expensive, particularly given the logistics of stringing new conductors in the mountainous areas traversed by the lines. The work would necessitate prolonged outages of the lines, which would increase the possibility of an overload occurring if a second line serving the Ko'olau Substation becomes unavailable for any reason. This option was not considered viable to address the Ko'olau/Pūkele Overload Situation and is not considered further in this EA.
- **Reduced Demand Options.** Reduced Demand involves the implementation of initiatives and programs such as DSM programs to reduce power demand at customer sites. This option relies on targeted market penetration of DSM and LM initiatives and programs in the Ko'olau/Pūkele Service Area. At this time, there is not enough reliable data to determine whether an adequate market exists for these programs to be effective for the overload situation. This option was not considered viable to address the Ko'olau/Pūkele Overload Situation and is not considered further in this EA.
- **DG Options.** Due to uncertainties discussed above under DG (i.e., land, fuel supply, interconnection, and permitting), these options were not considered viable to address the Ko'olau/Pūkele Overload Situation and are not considered further in this EA.
- **Combined Heat and Power (CHP) Options.** CHP systems are a form of DG that utilize waste heat from the power generation process as energy (heat or steam) for heating or cooling purposes. The advantage of a CHP system over conventional electric generating units is the increased efficiency obtained when the captured waste heat is put to useful purposes.

HECO filed an application requesting approval of its proposed CHP programs in 2003. Even if it was assumed that all of the forecasted CHP installations occurred in the Ko'olau/Pūkele area, the installations would still be inadequate to resolve the Ko'olau/Pūkele Overload Situation. As CHP options were not considered viable to address the transmission overload situation, they were not considered further in this EA.

- **Combined Alternatives.** In theory, it might be possible to defer, but probably not eliminate, the Ko'olau/Pūkele Overload Situation through some combination of targeted DSM, DG, and CHP installations in the Ko'olau/Pūkele Service Area. However, there would be substantial uncertainty as to whether the objective could be achieved, given the practical problems with substantially increasing the amount of DSM, DG and/or CHP installed in the area in the near-term, particularly in light of the fact that the overload problem could occur in 2004 during daytime peak periods, and is already at risk of occurring during evening peak periods. The total cost of deferring the overload problem using such measures would probably exceed the cost of the Proposed Action (which will fully address the Pūkele Substation Reliability Concern, with the exception of the customers that will still incur six-second interruptions). And, the DSM, DG and CHP option would not address the Pūkele Substation Reliability Concern (with the possible exception of the customers with on-site DG or CHP, assuming their loads could be islanded), or help with the Downtown Overload Situation if the Honolulu Power Plant is unavailable for any reason. Total costs associated with combined alternatives to defer the overload situation would likely be greater than the cost of the Proposed Action. Neither DSM, nor CHP (and DG), nor renewable resources can eliminate or cost effectively address the East O'ahu transmission problems. Thus they will not be considered further in this EA.

Chapter 4

Affected Environment and Environmental Consequences

CHAPTER 4
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes the affected environment within the study area for the proposed 46kV Phased Project (Proposed Action) and alternatives, evaluates possible environmental consequences that could occur from the Proposed Action and alternatives, and identifies possible management and design measures to minimize or avoid impacts. Direct impacts are analyzed in this chapter. Secondary and cumulative impacts are addressed in Chapter 5.

4.2 LAND USE

4.2.1 Existing Conditions

Land use designations for the Proposed Action and alternatives were identified by reviewing the State land use district designations,[1] the Hawai'i Community Development Authority (HCDA) Mauka Area Plan and Mauka Area Rules,[2] the Primary Urban Center Development Plan,[3] and the City and County of Honolulu Land Use Ordinance (LUO).[4]

The project area is within the State-designated Urban District and within the City and County of Honolulu's Primary Urban Center. Affected neighborhoods include:

---

1 State of Hawai'i. Office of Planning. 2004. Hawai'i Statewide GIS Program Internet Website, http://www.state.hi.us/dbedt/gis/. Accessed June 2004.

2 Hawai'i Community Development Authority. August 1999. *Mauka Area Plan Kakaako Community Development District Honolulu, Hawai'i.* Unofficial Compilation. http://www.hcdaweb.org/images/maukaareaplan_a383.pdf Accessed June 10, 2004.

3 City and County of Honolulu. Department of Planning and Permitting. July 1999. *Primary Urban Center Development Plan.*

4 City and County of Honolulu. Department of Planning and Permitting. 2004. Honolulu Land Information System (HOLIS) Website, http://gis.hicentral.com. Accessed in May and June 2004.

Ala Moana/Kaka'ako, McCully/Mō'ili'ili, Waikīkī, and Diamond Head/Kapahulu/St. Louis Heights.[5] Land uses in the project area include: residential, business, parking, gas station, grocery store, office, retail, restaurants, and vacant units. Table 4-1 summarizes the sections of the project area that are within Special Districts and lists the associated zoning. Figure 4-1 illustrates the location of the Special Districts; Figure 4-2 shows the associated zoning within the Kaka'ako Community Development District. Sections of the project area that are not within Special Districts are classified in one of the following zoning districts: P-2 General, BMX-3 Community, AMX-3 High Density, A-2 Apartment, or A-3 Apartment (shown on Figure 4-3).

Table 4-1. Summary of Special Districts and Associated Zoning

Section of Project Area	Special District	Zoning
Kewalo Substation, Archer Substation, and connecting activity	Kaka'ako Community Development District, under the authority of the State through the Hawai'i Community Development Authority Figure 4-1	Mixed-use zone commercial emphasis (MUZ-C)
South King Street between Cooke and Kealamakai Streets	Hawai'i Capital Special District	BMX-3 Community
South King Street between Kealamakai and Pensacola Streets	Thomas Square Special District	BMX-3 Community
'Ena Substation	Waikīkī Special District	Resort Commercial Precinct
Waikīkī Substation and Kūhiō Substation	Waikīkī Special District	Apartment Precinct
Kapahulu Substation	Diamond Head Special District	R-3.5 Residential

Source: City and County of Honolulu. 2004. Department of Planning and Permitting. HOLIS Internet Website, http://hicentral.com.

4.2.2 Potential Impacts and Actions to Minimize Impacts

Potential impacts to land use were evaluated by comparing the Proposed Action and alternatives to the relevant State and City and County of Honolulu policies and controls.

5 State of Hawai'i, Department of Business, Economic Development and Tourism. *State of Hawai'i Data Book 2001*. Website, http://hawaii.gov/dbedt/db01/sec01.html. Accessed on June 7, 2004.

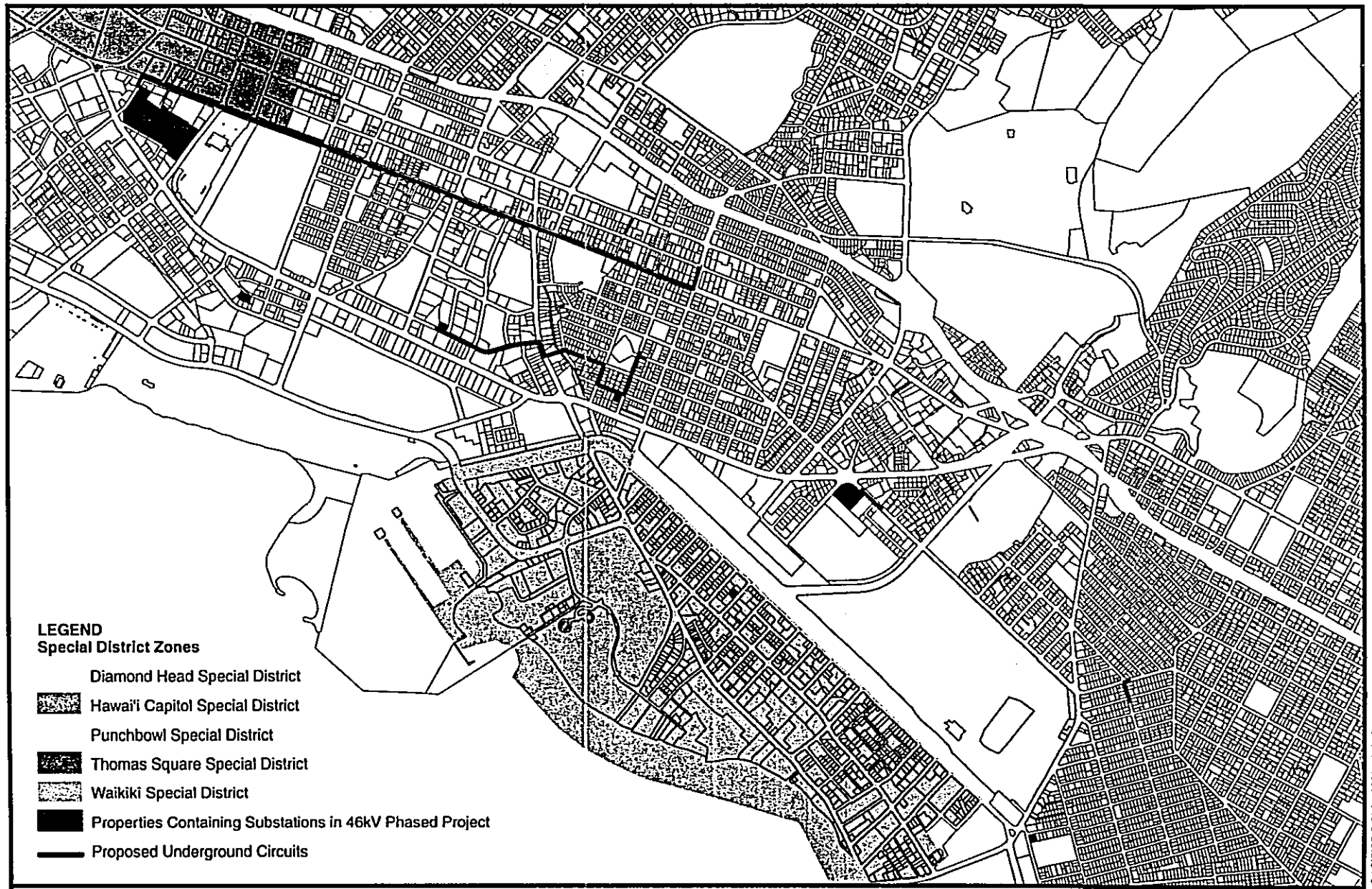
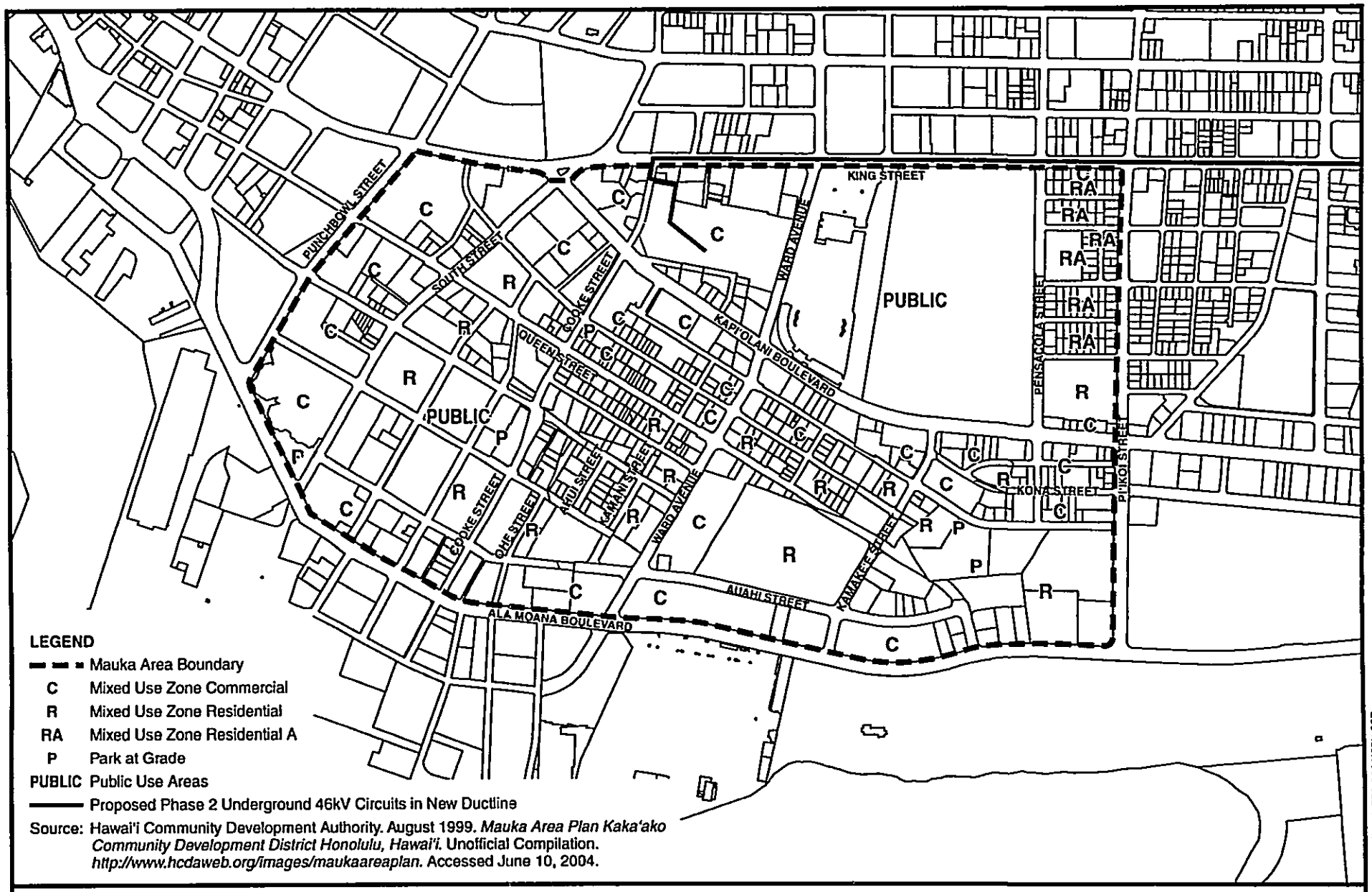


Figure 4-1
SPECIAL DISTRICTS

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

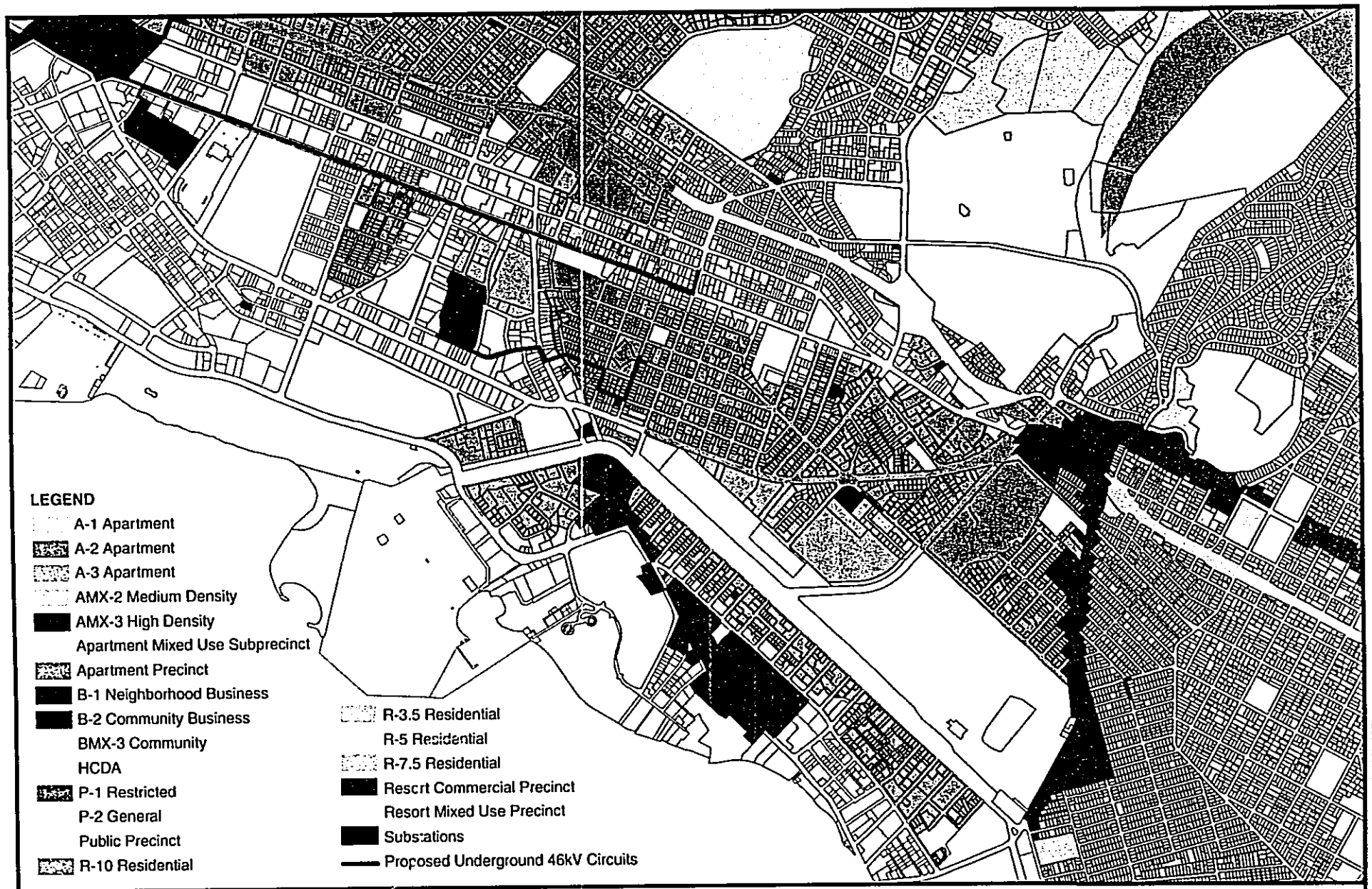


2004.33.0800/022-1 d12.10.04 5

Figure 4-2
LAND USES IN KAKA'AKO COMMUNITY DEVELOPMENT DISTRICT

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

RECEIVED AS FOLLOWS



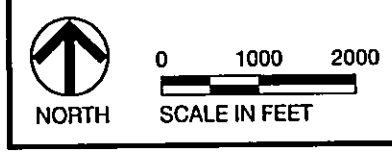


Figure 4-3
CITY AND COUNTY ZONING MAP

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

4.2.2.1 *Proposed Action*

Construction

The Proposed Action would have no significant impact on land use; it would support and be consistent with the State and County plans described as follows.

HCDA. The Proposed Action would be evaluated with HCDA to determine whether the activities can be accommodated within the existing development permits or as an amendment to the existing permit, or whether HCDA would require a new base zone or planned development permit. The Kewalo Substation activity is limited in scope and is unlikely to require a permit from HCDA. No impacts to land use are anticipated, as the appropriate HCDA permit or amendment would be obtained prior to construction.

City and County of Honolulu General Plan. The long-term policies and objectives for the growth and development of the island set forth in the General Plan include maintaining a high level of service to all utilities by: (1) maintaining existing utility systems in order to avoid major breakdowns, (2) providing improvements to utilities in existing neighborhoods to reduce substandard conditions, (3) planning for the timely and orderly expansion of utility systems, and (4) maintaining an adequate, dependable, and economic supply of energy to O'ahu residents. The Proposed Action supports the General Plan's objectives and policies as it is proposed, in part, to prevent major breakdowns of the existing utility system and would serve to provide an adequate, dependable, and economical supply of energy to O'ahu residents.

Approved Primary Urban Center Development Plan. On June 4, 2004, the City Council approved the Primary Urban Center Development Plan (Bill 74, Council Draft 2); the Plan is included in the Revised Ordinances of Honolulu (ROH) at Section 24-2.3. Sections of the Development Plan relevant to the Proposed Action are presented herein.

Guidelines from Section 24-1.8, *Identification of Public Buildings, Public or Private Facilities for Utilities, Terminals and Drainage,* include: giving energy efficiency a priority consideration in selection of sites for public and private utilities, and allowing local electrical lines (46kV and below) in any land use district. The Proposed Action is consistent with the Primary Urban Center Development Plan principles for utility facilities.

Section 24-2.1, *Area Description,* states that Waikīkī shall continue to be maintained as Hawai'i's primary visitor destination area (with emphasis on improving the quality of the environment). This section advocates promoting a more pleasing and attractive urban setting and maintaining a strong sense of the nearness of open space and nature through the establishment of mauka-makai view corridors. The Proposed

Action is consistent with the Primary Urban Center Development Plan because it (1) increases the reliability of the utility system needed to continue supporting Waikīkī as Hawai'i's primary visitor destination area, and (2) promotes the attractiveness of the urban setting through the preservation of view corridors because no new overhead lines are proposed as part of this project.

Section 24-2.2, *Urban Design Principles for the Primary Urban Center,* includes maintaining public views. The Proposed Action is consistent with the Primary Urban Center Development Plan principle to maintain public views because no new overhead lines are proposed as part of this project.

1990 LUO, as amended. The zoning districts are implemented by the LUO, which identifies permitted uses and structures, development standards, and height controls for twelve zoning districts. Underground transmission lines are generally not regulated at the zoning level by the Department of Planning and Permitting (DPP).[6] The LUO defines two types of utility installations: Type A and Type B. The majority of the Proposed Action would be Type A, those with minor impacts on adjacent land uses that typically include 46kV transmission substations. Type A utility installations are a permitted use within residential zoning districts and permitted in the respective apartment mixed use zoning districts subject to additional requirements for restricting public access. The Makaloa, McCully, and Kapahulu Substations are included within the definition of a Type A utility installation. The Kamoku Substation is a 138kV to 46kV transformer installation, and the associated work would be considered a Type B utility installation. The Kamoku Substation is located within the apartment zoning district (A-3), where Type B utility installations are permitted subject to a Conditional Use Permit – minor. No impacts to land use are anticipated as appropriate permits would be obtained prior to initiating work.

Article 9 of the LUO regulates Special Districts and implements design controls to preserve prominent views and the urban design architectural character of O'ahu's distinctive neighborhoods. Proposed Action activities within the Hawai'i Capital, Thomas Square/Honolulu Academy of Arts, and Waikīkī Special Districts are exempt from the requirements for Special District permits. Therefore, no land use impacts are anticipated from utility upgrades in the Special Districts.

Construction activities within roadways, construction site offices, and construction staging areas are not typically regulated within the LUO. Approval of temporary uses and structures is determined by the Planning Director on a case-by-case basis and may include the imposition of conditions. Such conditions, based on the impacts on the surrounding areas, may cover hours of operation, duration of activity, and general manner of operation (including minimization of impacts from noise, dust, etc.). The Proposed Action would include coordination with the Planning Director so that no significant impacts on land use would occur.

6 City and County of Honolulu, Department of Planning and Permitting. April 22, 2004. Personal communication with Ms. Kathy Sokugawa and Belt Collins Hawaii.

City and County of Honolulu Ordinance (Section 14-22.1, ROH). This ordinance requires public utility companies to place their utility lines and related facilities underground whenever certain streets, including King Street, are improved under certain circumstances. Portions of King Street (e.g., from Cooke Street to McCully Street) were improved years ago (e.g., public right-of-way improved, including placing overhead lines underground). Such improvements may have been done at the City and County of Honolulu's initiative under the improvement district ordinances in which both public and private funds are spent for improvements of the public right-of-way, including utility funds for the placement of overhead lines underground. The proposal to place the new circuits on King Street underground would be consistent with Section 14-22.1 of the City and County of Honolulu's ordinance.

Operation

Operation of the upgraded electrical infrastructure would not result in land use changes within the project areas.

4.2.2.2 *Alternative Alignments*

The analysis of potential construction and operational impacts and land use for the alternative alignments is the same as for the Proposed Action. The alternative alignments would have no significant impact on land use and would support and be consistent with State and County plans described above.

4.2.2.3 *No Action Alternative*

Under the No Action Alternative, the utility upgrade would not take place and there would be no impact on land use. To the extent State and County land use plans assure the availability of adequate electrical power to accommodate their objectives, there may be an adverse impact if the EOTP is not in place.

4.3 INFRASTRUCTURE

4.3.1 Electrical

Electrical infrastructure consists mainly of power generating facilities, electrical circuits, and substations. HECO is the major provider of electricity on O'ahu.

4.3.1.1 *Existing Conditions*

Power generated at leeward power plants is distributed across the island of O'ahu through the 138kV transmission line system as described in Chapter 2. Power from the 138kV transmission line system is stepped down by 46kV substations for regional power distribution through the 46kV subtransmission line system.

There are three 138kV transmission lines providing power to the Ko'olau Substation. Two 138kV overhead transmission lines currently feed the Pūkele Substation from the Ko'olau Substation in Kāne'ohe, on the windward side of O'ahu. The two 138kV lines cross the Ko'olau Mountain Range to connect the Pūkele Substation to the rest of the HECO system. The power transported from these two overhead lines is stepped down to the subtransmission voltage and transported over eight 46kV feeders that branch out from Pālolo Valley to distribution substations in Kāhala, Kaimukī, Mānoa, Makiki and Waikīkī. While many parts of the two overhead lines have been renewed and upgraded, the two Ko'olau–Pūkele 138kV transmission lines are more than 40 years old.

In the Southern 138kV Transmission Corridor, two 138kV transmission substations serve the Downtown area, including the Iwilei Substation and the School Street Substation. Power to serve the Downtown area can also come from the HPP when it is online.

These two transmission substations are fed from three 138kV transmission lines providing power from the Hālawa Substation via the Hālawa–Iwilei 138kV transmission line and the Hālawa–School Street 138kV transmission line, and from Makalapa Substation via the Makalapa–Airport–Iwilei 138kV transmission line.

There are three downtown substations including the Archer, Kewalo, and Kamoku Substations.

The Archer Substation is one of the newer transmission substations on the HECO system, and is fed from the Iwilei and School Street Substations by two underground 138kV lines.

The Kewalo Substation is also one of the newer transmission substations and is located on Kona Street. Two 138kV underground transmission lines supply power to Kewalo Substation. Kewalo serves customers at the distribution voltage of 25kV in the Kaka'ako area.

The Kamoku Substation is the newest transmission substation and is located on the corner of Date Street and Kapi'olani Boulevard. Kamoku Substation is fed from one 138kV underground transmission line, which brings the power from Archer Substation via Kewalo Substation to Kamoku. The entire Kamoku Substation has a 25kV back up system. If the 138kV transmission line feeding the substation should fail, then the Kamoku Substation load would be transferred to Kewalo Substation.

4.3.1.2 Potential Impacts and Actions to Minimize Impacts

4.3.1.2.1 Proposed Action

Construction

No significant adverse impacts to electrical infrastructure would occur with the Proposed Action during construction. Construction activities in most areas would not impact electrical service because there are redundant electrical feeders. The Proposed Action could result in brief interruptions of a few seconds in some areas during electrical disconnections and connections. Potentially affected customers would receive prior notification regarding construction activities.

Operation

No significant adverse impacts to electrical infrastructure would occur with the Proposed Action during operation. The Proposed Action would guard against a catastrophic power outage, where disturbances on the system could potentially throw the entire system into instability, and a localized power outage, where the outage affects a limited area of the island.

One issue associated with the operation of underground power lines is the potential for underground circuits to ignite trapped gases within the system, potentially causing manhole covers to lift and fires to start. To minimize the potential of gas buildup, HECO would install vented manhole covers that allow underground gases to dissipate. These vented manhole covers allow storm water and runoff to flow into the underground vaults and manholes, potentially increasing the amount of maintenance required on the transmission line.

Completion of the Proposed Action would provide additional pathways to shift electrical loads within the 46kV Subtransmission System during critical conditions when peak loads or transmission line failures could result in line overloads and substation overloads. This flexibility would improve the reliability of electrical power service to East O'ahu.

4.3.1.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to electrical infrastructure from the alternative alignments is the same as for the Proposed Action. No significant adverse impacts to electrical infrastructure would occur during construction or operation.

4.3.1.2.3 No Action Alternative

Under the No Action Alternative, no construction or operational activities would occur, and the following transmission problems would not be addressed: (1) the Pūkele Substation Reliability Concern; (2) the Ko'olau/Pūkele Overload Situation; (3) the Downtown Substation Reliability Concern, and (4) the Downtown Overload Situation.

4.3.2 Potable Water

The Honolulu Board of Water Supply (BWS), a semi-autonomous agency of the City and County of Honolulu, constructs, operates, and maintains the potable and firefighting water system on O'ahu. This system includes supply wells, reservoirs, pumping stations, and pipelines. Currently, BWS maintains 163 reservoirs with 169 million gallons of capacity, and 1,842 miles of pipeline to distribute water resources island-wide.[7]

4.3.2.1 Existing Conditions

According to BWS drawings dated between 1987 and 1990, BWS potable waterlines are present within the roadways of both the Phase 1 and Phase 2 proposed alignments.[8] In the proposed project area, the drawings identify 8-inch waterlines between Makaloa and McCully Substations and within Cooke Street, a 6-inch waterline in Pumehana Street, 2-inch waterlines along Fern and Hau'oli Streets, a 1.25-inch waterline along Lime Street, and 12-inch waterlines along Kapi'olani Boulevard and King Street. Planned upgrades to BWS waterlines are discussed in the cumulative impacts section in Chapter 5.

In addition to the BWS waterlines identified above, a 12-inch waterline is present along Kāheka Street within the Alternative Alignment 1, and 8-inch and 4-inch waterlines are present along Kalauokalani Way within the Alternative Alignment 2.

7 Honolulu Board of Water Supply Website, http://www.hbws.org/ea_wat_resource/ea01_ct01_mainpage.htm. Accessed May 21, 2004.

8 BWS Half Size Plans, Numbers 31 (12/20/1989), 38 (12/5/1989), 39 (8/3/1987), 44 (12/4/1989), and 45 (9/26/1990).

4.3.2.2 Potential Impacts and Actions to Minimize Impacts

4.3.2.2.1 Proposed Action

Construction

No significant adverse impacts on the potable water infrastructure would occur with the Proposed Action during construction. Coordination between HECO and BWS would minimize the risk of damage to the BWS waterlines, particularly during Phase 2 when new BWS projects are planned within the project area. The locations of existing waterlines would be confirmed as closely as possible, and the alignment of the new ductline would be designed to avoid these lines. Plans would be submitted to BWS for review prior to construction. The construction contractor would exercise caution to avoid damage to existing utilities. Waterlines encountered during construction would be protected using construction methods appropriate to the situation. Activities conducted within existing ductlines, accessed by HECO manholes, are not expected to impact BWS waterlines as the infrastructure is already in place.

In summary, HECO, or its consultant, would research available records and conduct surveys to verify that the proposed alignment of subtransmission lines would not conflict with existing and planned utilities.

Operation

No significant adverse impacts to potable water infrastructure would occur from operation of the Proposed Action. Upon completion of new ductline construction, the infrastructure would be in place to conduct standard maintenance using manholes and other access routes. HECO and BWS maintenance access systems are separate; therefore, access to electrical lines through manholes or other vaults would not impact the BWS waterlines. In the case of emergency repairs to HECO lines that involve construction, coordination procedures similar to those discussed above would be carried out.

4.3.2.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to water infrastructure from the alternative alignments is the same for the Proposed Action. No significant adverse impacts on the potable water infrastructure would occur during construction or operation.

4.3.2.2.3 *No Action Alternative*

No impacts on potable water infrastructure would occur under the No Action Alternative. To the extent that the existing potable water system relies on electrical power from HECO, the reliability concerns discussed in Chapter 2 may have an impact if the EOTP is not in place.

4.3.3 Wastewater

4.3.3.1 *Existing Conditions*

The existing City and County of Honolulu sewer system consists of a network of buried pipes that convey wastewater to the Sand Island Wastewater Treatment Plant (WWTP) for treatment and disposal. Most of the sewers in the vicinity of the Proposed Action convey wastewater via gravity flow in the westward direction to the Ala Moana Wastewater Pumping Station, where it is then pumped to the Sand Island WWTP. Sewers within the area of the Proposed Action largely consist of concrete, vitrified clay or plastic pipes.

Most of the Phase 1 alignment and the Phase 2 alignment between Ke'eaumoku Street and McCully Street parallels 6-inch diameter gravity sewer mains. The remaining portion of the Phase 2 alignment is parallel to a gravity interceptor sewer that decreases in size from 21 inches in diameter at Cooke Street to 14 inches in diameter at the intersection of King Street and Ke'eaumoku Street. The proposed Phase 1 alignment at the Kamoku Substation would cross a 30-inch diameter gravity sewer in Date Street. The proposed Phase 1 alignment in Winam Avenue would cross an 8-inch diameter gravity sewer in Ho'olulu Street.

4.3.3.2 *Potential Impacts and Actions to Minimize Impacts*

4.3.3.2.1 *Proposed Action*

Construction

No significant impacts on wastewater infrastructure would occur from the Proposed Action. The proposed subtransmission lines would be constructed either over or under the existing buried sewers with proper clearances as specified by the City and County of Honolulu. HECO would follow the same procedures described in the previous section to minimize the risk of damage to sewer lines, including submittal of plans to the City and County of Honolulu for review prior to construction. HECO would research available records and conduct field explorations to verify that the

proposed alignment of subtransmission lines would not conflict with existing and planned utilities.

Operation

Operation of the Proposed Action would not impact the wastewater system.

4.3.3.2.2 Alternative Alignments

The analysis of potential construction and operational impacts on the wastewater system from the alternative alignments is the same for the Proposed Action. No significant impacts on wastewater infrastructure would occur from construction or operation.

4.3.3.2.3 No Action Alternative

There would be no construction and operational impacts on the sewer system under the No Action Alternative. To the extent that the existing wastewater system relies on electrical power from HECO, the reliability concerns discussed in Chapter 2 may have an impact if the EOTP is not in place.

4.3.4 Drainage

4.3.4.1 Existing Conditions

The existing drainage system consists of open waterways and buried drainage conduits that ultimately convey surface water runoff to the ocean. The drainage ways are typically oriented parallel to the slope from higher ground toward the coastline. As the drainage tributaries combine in the downstream direction, the drainage ways are progressively larger. The upper reaches of the open waterways are natural streams, while the lower reaches pass through inhabited areas and are channelized for increased flow capacity. Smaller buried drainage conduits typically consist of reinforced concrete pipes (RCP). Larger buried drainage conduits are typically rectangular-cross section concrete box culverts.

The alignments of the proposed electrical feeders would cross a number of drainage ways. The major drainage ways are summarized in the following table.

Table 4-2. Major Drainage Features

Phase	Location	Diameter or Width x Height (feet)	Type
1	Amana Street	1.5	RCP
	Amana Street	1.5	RCP
	Kāheka Street	6 x 8	Box Culvert
	Kāheka Street	6 x 8	Box Culvert
	Kalauokalani Way	3 x 1	Box Culvert
	Malanai Street	20 x 15	Stream
	Hau'oli Street	6 x 3	RCP
	Pumehana Street	1.5 x 1.2	Box Culvert
	Date Street	2	RCP
2	Ward Avenue	8 x 4	Box Culvert
	Pensacola Street	6	RCP
	Pi'ikoi Street	7 x 3	Box Culvert
	Sheridan Street	4 x 1.83	Box Culvert
	Sheridan Street	4	RCP
	Kalākaua Avenue	12 x 8	Box Culvert
	Hau'oli Street	3 x 2	Box Culvert
	Pumehana Street	1.5	RCP
	McCully Street	5.5 x 3	Box Culvert
Additional crossings – Alternative Alignments			
	Kapi'olani Blvd.	10 x 2	Box Culvert
	Kapi'olani Blvd.	1.5	RCP
	Kapi'olani Blvd.	2	RCP
	Kapi'olani Blvd.	3 x 9	Box Culvert
	Kapi'olani Blvd.	1.5	RCP

Source: City and County of Honolulu. 2004. Department of Planning and Permitting. HOLIS Website, http://gis.hicentral.com.

4.3.4.2 *Potential Impacts and Actions to Minimize Impacts*

4.3.4.2.1 *Proposed Action*

Construction

No significant impacts on drainage infrastructure would occur from the Proposed Action. The proposed subtransmission lines would be constructed either over or under the existing drainage conduits with proper clearances as specified by the City and County of Honolulu. HECO would follow the same procedures described in the previous section to minimize the risk of damage to drainage conduits, including

submittal of plans to the City and County of Honolulu for review prior to construction. HECO would be responsible for researching available records and conducting field explorations to verify that the proposed alignment of the subtransmission lines would not conflict with existing and planned utilities.

Operation

Operation of the Proposed Action would not impact the drainage system.

4.3.4.2.2 Alternative Alignments

The analysis of potential construction and operational impacts on the drainage system is the same as for the Proposed Action. No significant impacts on drainage infrastructure would occur from construction and operation.

4.3.4.2.3 No Action Alternative

There would be no construction and operational impacts on the drainage system under the No Action Alternative.

4.3.5 Communications

4.3.5.1 Existing Conditions

Wired communications infrastructure consists of telephone, low-speed data, broadband data, and television cables and lines. High-capacity communication transmission systems utilize underground fiber optic cable lines. Local communication lines use conventional copper wire lines that are typically located in the same alignment corridor with low-voltage, local electrical distribution lines, and thus can be located underground or overhead. Both high-capacity and local communication lines are located in the Phase 1, Phase 2, and alternative alignment areas.

Verizon is currently the sole public utility provider of wired telephone, low-speed data, and broadband data for O'ahu. Time Warner Oceanic Cable is the sole non-military, public utility provider of wired television and broadband data for O'ahu. The City and County of Honolulu Department of Transportation Services (DTS) also has underground wired data communication systems between its traffic signal control boxes located at most street intersections.

4.3.5.2 Potential Impacts and Actions to Minimize Impacts

4.3.5.2.1 Proposed Action

Construction

No significant adverse impacts to communication systems would occur from construction of the Proposed Action. Construction of the new ductline for the underground 46kV circuits would be coordinated with the utility providers so that its path would not conflict with any underground communication systems. HECO, or its consultant, would research available records and conduct surveys to verify that the proposed alignment of the subtransmission lines would not conflict with existing and planned utilities.

Operation

No significant adverse impacts to communications infrastructure would occur from operation of the Proposed Action. Upon completion of new ductline construction, the infrastructure would be in place to conduct standard maintenance using manholes and other access routes. In the case of emergency repairs to HECO lines that involve construction, coordination similar to those discussed above would be carried out.

4.3.5.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to communications infrastructure from the alternative alignments is the same for the Proposed Action. No significant adverse impacts to communication systems would occur from construction or operation.

4.3.5.2.3 No Action Alternative

No construction or operational impacts to communications systems would be associated with the No Action Alternative. To the extent that existing communications systems rely on electrical power from HECO, the reliability concerns discussed in Chapter 2 may have an impact if the ETOP is not in place.

4.3.6 Solid Waste

4.3.6.1 *Existing Conditions*

Solid waste facilities on the island of O'ahu can accommodate municipal solid waste (MSW), construction and demolition waste, petroleum-contaminated soil, and asbestos. There are no hazardous waste disposal facilities in the state, so such wastes must be shipped to the U.S. mainland for disposal.

PVT Land Company operates the one construction and demolition landfill on the west side of the island of O'ahu. The landfill, located in Nānākuli, accepts approximately 262,000 tons of waste per year (718 tons per day) and has an estimated remaining capacity of 15 years.[9] In separately permitted facilities within the PVT site, PVT accepts petroleum-contaminated soil from known sources (in their Nānākuli Soil Reclamation Facility) and asbestos waste.

Concrete and asphalt concrete may be recycled at American Hauling, Inc., Grace Pacific Corp., Resource Recovery, Ltd., R.H.S. Lee, Inc., Sphere LLC (dba Pacific Aggregate), and PVT.[10] Lead cables may be recycled at Island Demo and Hawai'i Metals Recycling.

4.3.6.2 *Potential Impacts and Actions to Minimize Impacts*

4.3.6.2.1 *Proposed Action*

Construction

No significant adverse impacts to existing solid waste facilities would occur from construction of the Proposed Action. The anticipated solid waste stream associated with the 46kV Phased Project could include: concrete, asphalt concrete, base course gravel fill, excavated soil, directional drilling slurry and soil cuttings, electrical poles, lead cable, and asbestos waste from transite ductline.

Aggregate, including asphalt paving and concrete, would be segregated and transported to a facility for recycling.

The soil and base course fill excavated during Phase 1 and Phase 2 trenching would be sold for reuse. Should directional drilling be used in Phase 2, soil cuttings and a

9 State of Hawai'i, Department of Health, Office of Solid Waste Management. July 2000. *Hawai'i 2000 Plan for Integrated Solid Waste Management.* and
PVT. June 25, 2004. Personal communication with Mr. Albert Shigemura and Belt Collins Hawaii.

10 State of Hawai'i, Department of Health. May 2003. *Minimizing Construction & Demolition Waste Third Edition.*

slurry of fine-grained soil from the subsurface mixed with bentonite would be generated. The mixture of slurry and soil cuttings would be dried until it passes the "paint filter test" (no free liquid flows when a sample is placed in a paint filter) and then transported to PVT for disposal. The volume of slurry and soil cuttings generated during Phase 2 is estimated to be less than 3,000 cubic yards. This equates to approximately 4,200 tons of material for disposal or less than 2 percent of the landfill's estimated annual capacity. According to the president of PVT, this volume would not constitute a significant impact to the landfill's capacity.[11]

If indications of soil contamination (e.g., staining and odors) are observed, handling and disposal would be conducted in accordance with applicable Federal and State law and guidance. Excavated petroleum-contaminated soil would be disposed of at either PVT's Nānākuli Soil Reclamation Facility or another facility, as appropriate.

Transite (asbestos cement) ductlines would be disposed of at PVT's asbestos-permitted facility in accordance with applicable Federal and State law. Lead cables would be recycled.

Electrical poles removed for disposal would be tested for creosol. Hazardous levels of creosol in the utility poles are not anticipated, but if such levels are present, the poles would be treated as hazardous waste and handled accordingly. If creosol levels are less than the level considered hazardous, the poles would be disposed of at the PVT construction and demolition landfill.

Operation

No significant impacts to existing solid waste facilities would occur from operation of the Proposed Action; wastes generated from operation of the Proposed Action and associated maintenance activities would be minimal.

4.3.6.2.2 Alternative Alignments

The analysis of potential construction and operational impacts for the alternative alignments is similar to the Proposed Action. No significant impacts to existing solid waste facilities would occur from construction or operation as most of the material would be recycled or sold for reuse.

4.3.6.2.3 No Action Alternative

Under the No Action Alternative, the utility upgrade would not take place and no solid waste would be generated.

[11] PVT. June 25, 2004. Personal communication with Mr. Albert Shigemura and Belt Collins Hawaii.

4.4 ROADS AND TRAFFIC

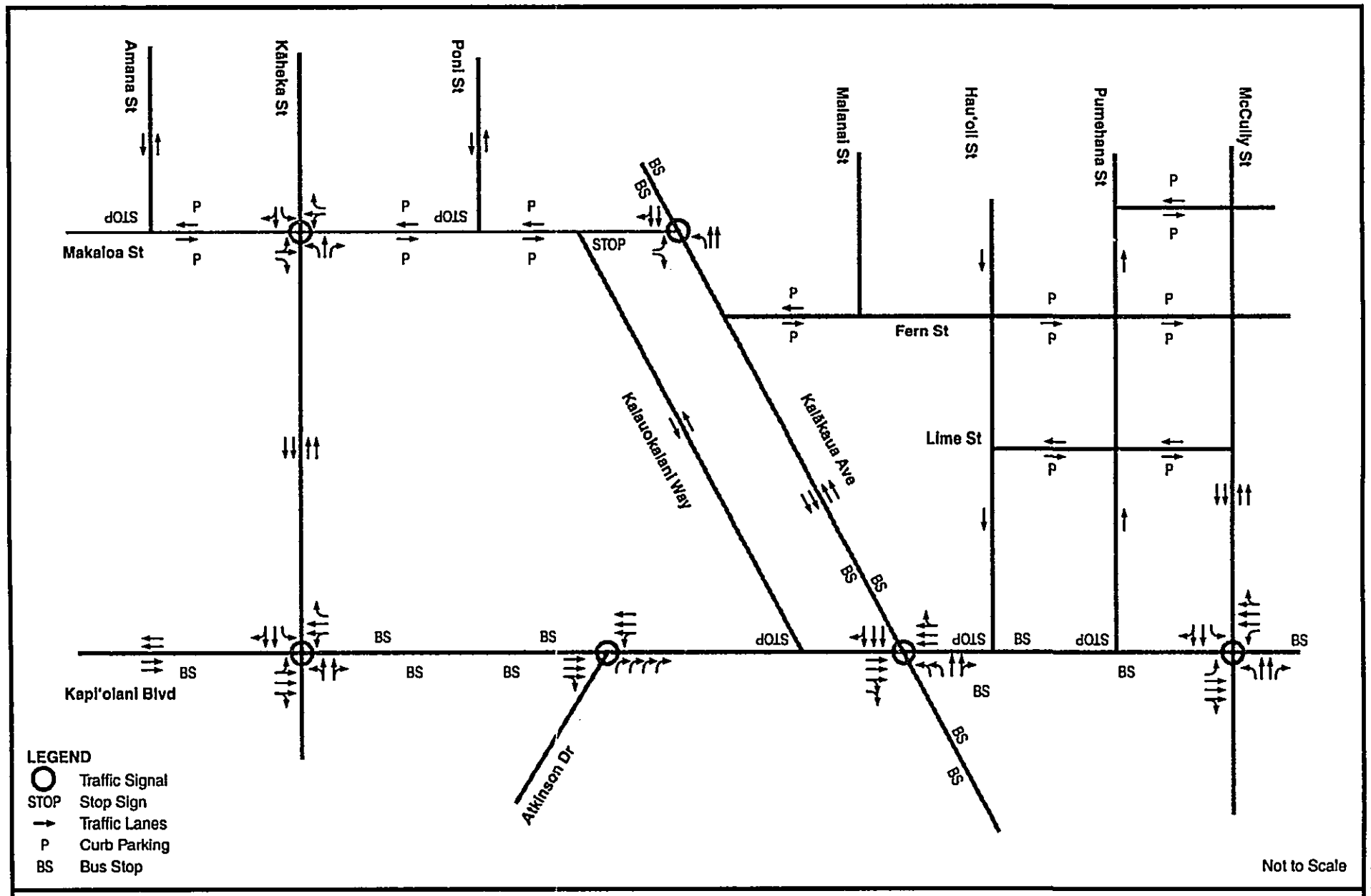
Detailed descriptions of existing conditions, impacts, and actions to minimize impacts pertaining to roadways, traffic controls, vehicular volumes, traffic conditions, public transit routes and stops, and pedestrians are provided in the *East O'ahu Transmission Project Traffic Impact Study Final* (Wilbur Smith Associates December 2004), presented as Appendix B. Findings are summarized herein.

4.4.1 Existing Conditions

Existing roadway intersections, curb parking, and approximate bus stop locations for the Proposed Action alignment (Makaloa Corridor) in Phase 1 are identified in Figure 4-4. This alignment follows the streets of Makaloa, Kalākaua, Fern, Hau'oli, Lime, and Pumehana. Additional information about this alignment is provided in Appendix B.

Vehicular volumes at key intersections during peak periods were obtained through traffic counts, conducted during spring of 2004 specifically for this EA, and from records obtained from the City and County of Honolulu Department of Transportation Services (DTS), unless otherwise noted in Appendix B. Based on evaluation of these data, peak periods may vary in time at different locations within the project area. These data also show that the greatest volume of vehicles during peak hours occurs along Kapi'olani Boulevard and Kalākaua Avenue. Similarly, highest daily (weekday) vehicular volumes are also found on these roadways as summarized below:

Kapi'olani Boulevard (at Hau'oli Street)	39,000 vehicles per day (VPD) entering intersection
Kalākaua Avenue (mauka of Kapi'olani Boulevard)	35,000 VPD



Note: Midday conditions are depicted as these conditions represent the period with the least number of available lanes thoughout the day. During peak morning and afternoon commuting hours, the curb lane(s) used for parking during midday could be used for through lanes.

Source: Wilbur Smith Associates

Figure 4-4
MAKALOA CORRIDOR

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

2004.33.0800/020-1 d8.11.04 7

For comparison, daily (weekday) vehicular volumes for other roads are listed below:

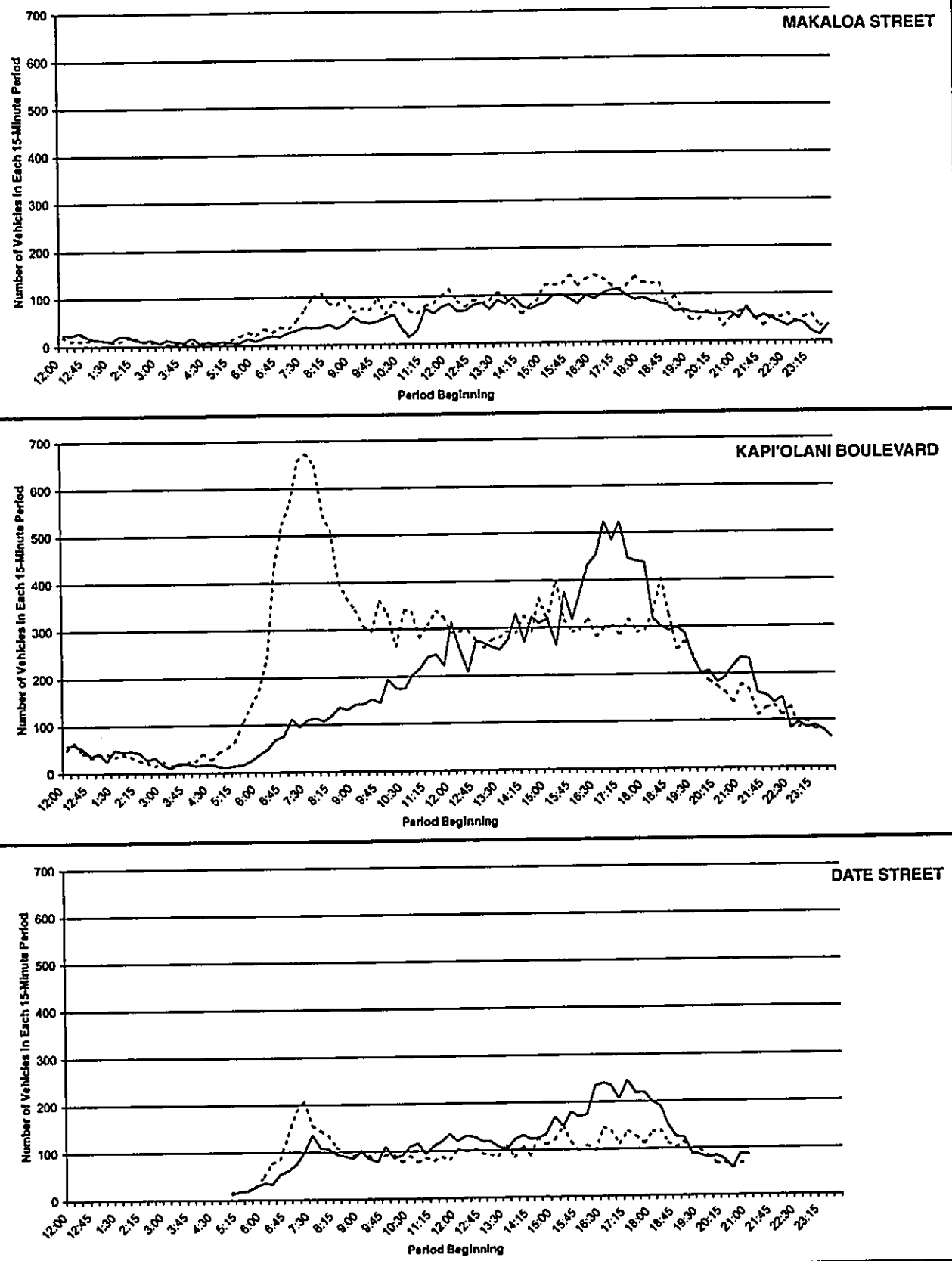
Kāheka Street	14,000 VPD
Makaloa Street	7,000 VPD
Hau'oli Street (at Kapi'olani Boulevard)	3,500 VPD
Fern Street (at Kalākaua Avenue)	2,000 VPD
Pumehana Street (approaching Fern Street)	2,700 VPD
Pumehana Street (approaching Lime Street)	2,900 VPD
Winam Avenue	3,650 VPD
Mo'oheau Avenue	8,220 VPD
Date Street (at Lukepane Avenue)[12]	16,200 VPD

As shown in Table 4-3 and Figure 4-5, vehicular volumes and patterns vary throughout the day at any one location. Along Makaloa Street (near Poni Street), volumes remain very low through the early morning, gradually double by noon, and remain at these levels through the afternoon and evening hours. Volumes decline to very low levels late in the evening, around midnight. Along Kapi'olani Boulevard, vehicular volumes are much greater, and directional splits[13] during morning and afternoon commute periods are pronounced. Directional splits associated with commuting and school traffic, and relatively low volumes at night, are also evident along Date Street (near Lukepane Avenue).

Intersection volume-to-capacity ratios (V/C) and levels of service (LOS) are indicators of how an intersection or a roadway is functioning. The V/C compares the existing or projected vehicular volumes on a roadway to the roadway's capacity, thus indicating the relative adequacy of the roadway to accommodate the traffic volumes. The LOS describes roadway traffic conditions in terms of travel delays or travel speeds with the service quality expressed on a letter basis from A to F, which signify excellent to unacceptable conditions, respectively. Descriptions of LOS A through LOS F for signalized and unsignalized intersections are provided in Table A-1 of Appendix B, *Traffic Impact Study*.

[12] Traffic volumes for Date Street are based on a 1999 traffic count, and increased by 0.75 percent per year to estimate the 2004 traffic volume.

[13] Directional splits refer to vehicular volumes that are high in one period in one direction and are high in another period in the opposite direction.



LEGEND

------ Ewa Bound

——— Koko Head Bound

Source: Wilbur Smith Associates

Figure 4-5
VEHICULAR VOLUMES BY TIME OF DAY—PHASE 1

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

Table 4-3 summarizes the existing traffic conditions at key intersections in the vicinity of Makaloa Street and Kapi'olani Boulevard. Traffic conditions on Makaloa generally operate at a higher LOS than on Kapi'olani Boulevard. The highest V/C ratio of 0.99 occurs during the morning peak hour at Kapi'olani Boulevard and Atkinson Drive; this intersection operates at LOS C. The most congested conditions occur at the intersection of Kapi'olani Boulevard and McCully Street, where the V/C ratio is 0.96 and the LOS is E during the afternoon peak hour.

Table 4-3. 2004 Traffic Conditions
Makaloa Street–Kapi'olani Boulevard Area

Intersections	Morning Peak Hour			Midday Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS	V/C	ADPV	LOS
Makaloa St.–Kāheka St.	0.27	18.1	B	0.39	19.8	B	0.66	25.3	C
Kapi'olani Blvd.–Kāheka St.	0.49	14.2	B	0.69	25.8	C	0.86	43.1	D
Kapi'olani Blvd.–Atkinson Dr.	0.99	23.6	C	0.62	20.2	C	0.63	24.5	C
Kapi'olani Blvd.–Kalākaua Ave.	0.93	49.2	D	0.80	39.0	D	0.90	43.0	D
Kapi'olani Blvd.–McCully St.	0.82	40.7	D	NA	NA	NA	0.96	57.3	E

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
NA = Not Available

Additionally, midday peak hour traffic volumes at the Date Street intersection with Kapi'olani Boulevard and Kamoku Street approximates 74 percent of the intersection capacity, with average traffic delays at LOS D. The highest estimated 2004 peak hour traffic volumes at Mo'oheau and Winam Avenues are 845 vehicles and 280 vehicles, respectively. A two-lane street should be able to accommodate about 1,000 vehicles in a one-hour period at LOS D. Volumes along Winam Avenue are well below this level, while Mo'oheau Avenue volumes approach this level.

As shown on Figure 4-4, bus routes are located along Kapi'olani Boulevard, Kalākaua Avenue, Makaloa Street, Kāheka Street, and McCully Street. While not shown on Figure 4-4, Mo'oheau Avenue and Date Street are also used as bus routes. The more heavily-used bus stops are at the intersection of Kapi'olani Boulevard and Kalākaua Avenue and the intersection of Kalākaua Avenue and Makaloa Street.

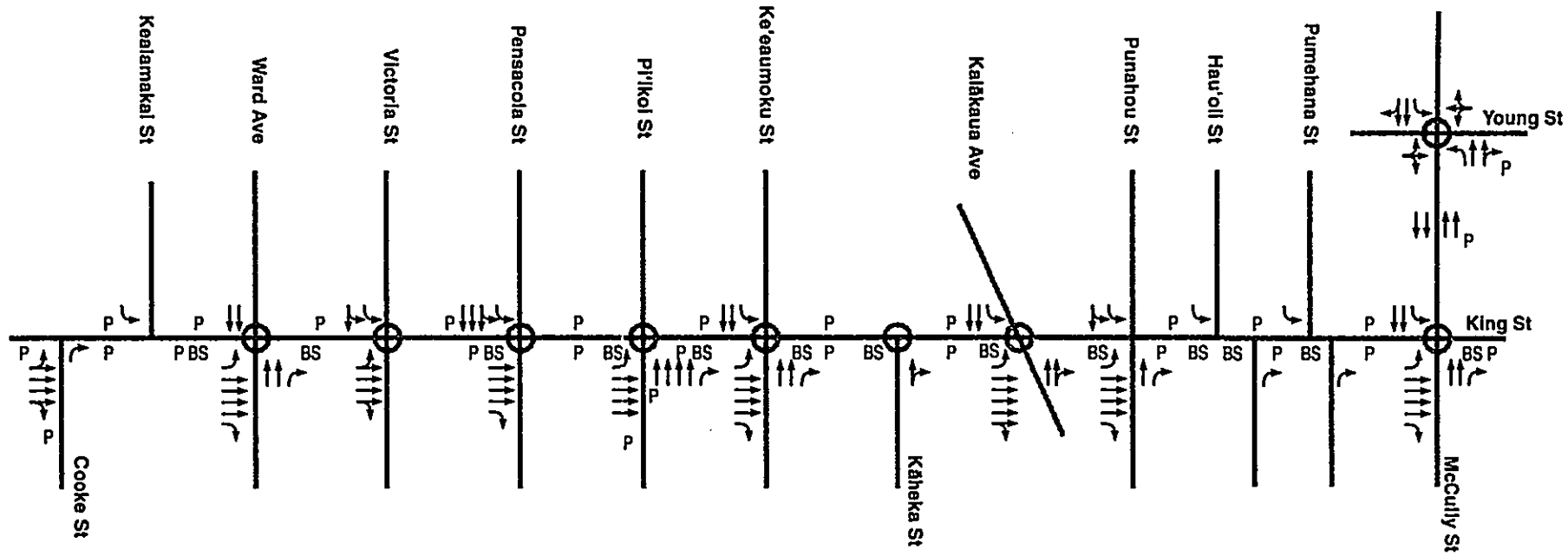
Most of the roads in the Phase 1 area have paved sidewalks for pedestrian access on both sides of the street, with the exception of sections of Pumehana Street and Winam Avenue. Although many of the blocks of Pumehana Street do not have paved sidewalks, there are marked crosswalks at the intersections.

Existing Phase 2 roadway intersections, curb parking, and approximate bus stop locations are identified in Figure 4-6. Peak-hour vehicular volumes[14] for key intersections are shown in Table 4-4. Daily (weekday) vehicular volumes at area intersections are summarized below:

Cooke Street (at Kapi'olani Boulevard)	6,400 VPD
King Street (at Cooke Street)	29,000 VPD
King Street ('Ewa of Punahou Street)	28,000 VPD
King Street ('Ewa of Hau'oli Street)	31,000 VPD
Punahou Street (mauka of King Street)	21,500 VPD

As shown in Figure 4-7, traffic volumes increased rapidly along King Street at the start of the morning commute period. Volumes generally continue to rise throughout the day, until a distinct decline at the end of the afternoon commute period (around 6 p.m.). Morning commute volumes are generally higher at the 'Ewa end of the Phase 2 alignment (King Street and Kealamakai Street) than at the Koko Head end of the alignment (King Street and Hau'oli Street).

[14] Vehicular volumes were obtained through traffic counts conducted during spring of 2004 specifically for this EA and the City and County of Honolulu Department of Transportation Services (DTS), unless otherwise noted in Appendix B.



LEGEND

- Traffic Signal
- Traffic Lanes
- P Curb Parking
- BS Bus Stop

Not to Scale

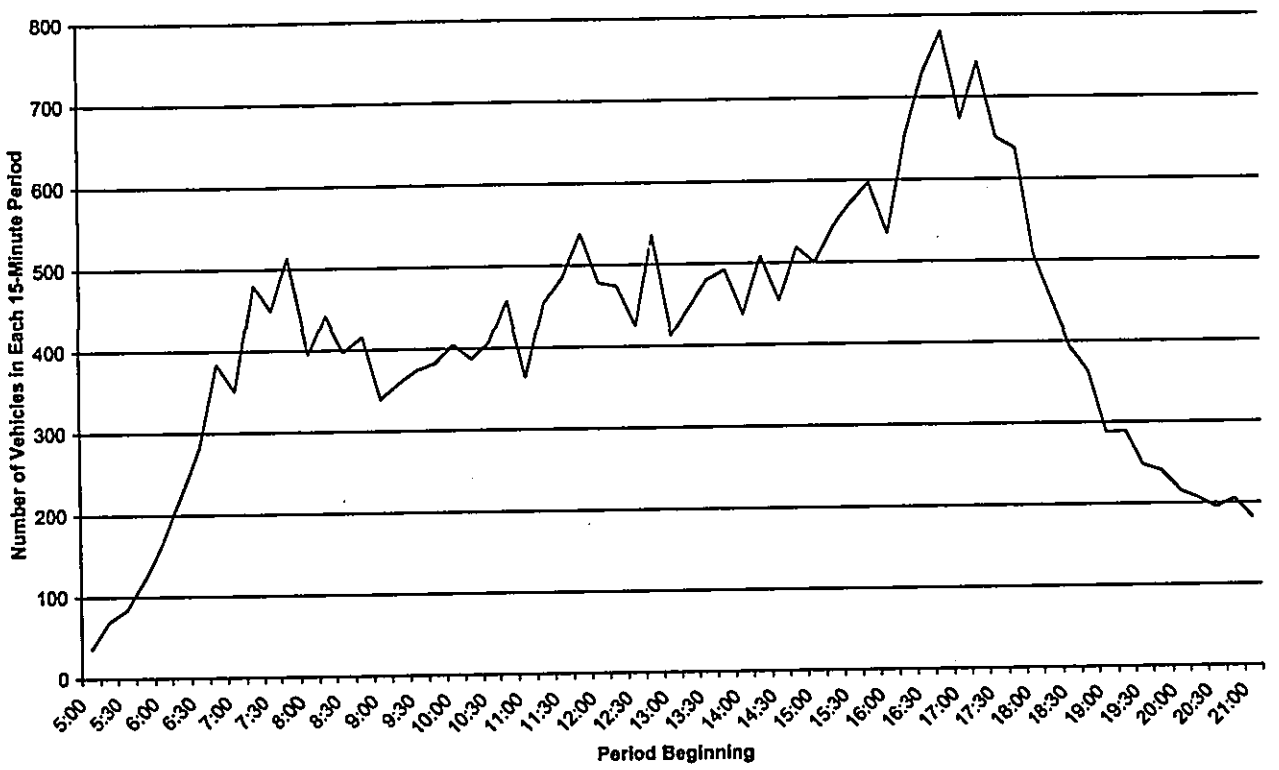
2004.33.0800/020-6 d8.11.04 8

Note: Midday conditions are depicted as these conditions represent the period with the least number of available lanes thoughout the day. During peak morning and afternoon commuting hours, the curb lane(s) used for parking during midday could be used for through lanes.

Source: Wilbur Smith Associates

Figure 4-6
KING STREET CORRIDOR

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.



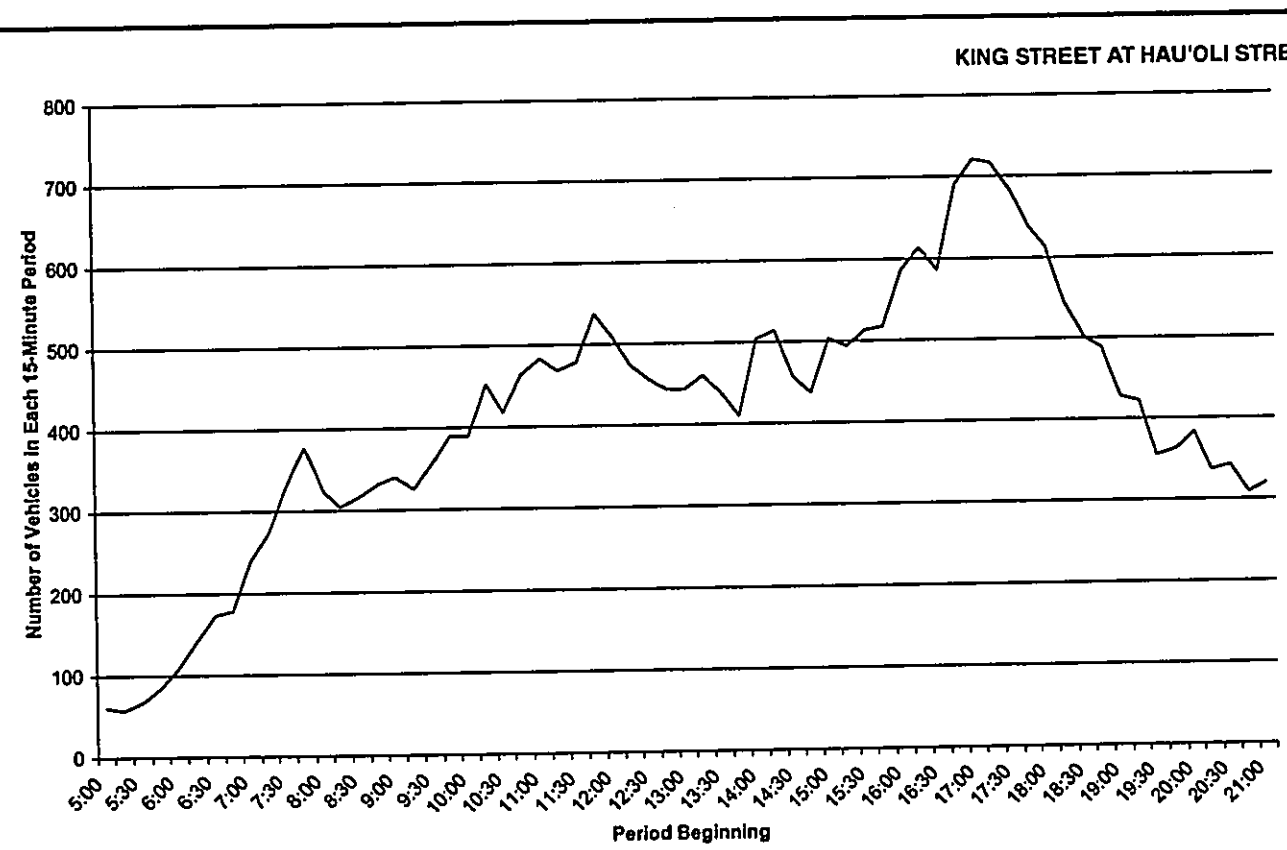


Figure 4-7
VEHICULAR VOLUMES BY TIME OF DAY—PHASE 2

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

Source: Wilbur Smith Associates

Table 4-4 summarizes the existing traffic conditions at key intersections along the Phase 2 alignment. The highest V/C ratio of 0.96 occurs during the afternoon peak hour at King and Punahou Streets; this intersection operates at LOS D with average delays of approximately 48 seconds per vehicle. All other intersections listed in Table 4-4 have lower V/C ratios and all operate at LOS C or better, with average delays less than 35 seconds per vehicle.

Table 4-4. 2004 Traffic Conditions King Street Corridor

Intersections	Morning Peak Hour			Midday Peak Hour			Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS	V/C	ADPV	LOS
King St.– Ward Ave.	0.68	20.7	C	0.64	20.2	C	0.84	26.1	C
King St.– Pensacola St.	0.51	18.4	B	0.60	19.5	B	0.61	17.3	B
King St.– Pi'ikoi St.	0.46	17.6	B	0.56	18.7	B	0.73	20.2	C
King St.– Ke'eaumoku St.	0.60	26.0	C	0.72	31.4	C	0.84	30.0	C
King St.– Kalākaua Ave.	0.69	24.7	C	0.71	23.5	C	0.85	27.7	C
King St.– Punahou St.	0.75	37.2	D	0.75	33.7	C	0.96	47.8	D
King St.– McCully St.	0.58	24.5	C	0.74	23.3	C	0.81	29.5	C
McCully St.– Young St.	0.56	20.2	C	0.54	19.4	B	0.66	23.1	C

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

King Street is used by a number of heavily-patronized bus routes. Several bus routes that cross King Street also service bus stops at King Street. The roads in the Phase 2 area have paved sidewalks for pedestrian access on both sides of the street, with crosswalks at major intersections.

4.4.2 Potential Impacts and Actions to Minimize Impacts

4.4.2.1 Proposed Action

Construction

Construction-related traffic impacts were evaluated using year-end 2006 to early 2007 conditions for Phase 1 and late 2008 to early 2009 conditions for Phase 2.[15] Traffic impacts from construction would not be significant as they would be short-term and temporary, affecting any one area not more than two months and, in most cases, less than a month. Potential impacts along the proposed project alignments are summarized in this section along with possible actions to minimize impacts. The Traffic Control Plan, which would be submitted for review by HECO to the City and County of Honolulu as part of the design package, would identify specific measures designed to minimize construction-related traffic impacts. The potential impacts of the current City and County of Honolulu policy on trenching within City and County roadways, which is consistent with the Ordinance, and the former curb-to-curb repaving policy (as described in Section 3.1.1.1.1) are also evaluated.

The Phase 1 alignment consists of the following roadway areas: Makaloa Corridor, Pumehana Street Area, Date Street Area, and Winam Avenue Area. In addition, two alternative alignments are being considered for Phase 1: Alternative Alignment 1, the Kāheka–Kapi'olani Corridor, and Alternative Alignment 2, the Kalauokalani–Kapi'olani Corridor. Potential impacts and actions to minimize impacts are summarized here. Summaries for the two alternative alignments are presented in Section 4.4.2.2.

Makaloa Corridor. As described in Chapter 3, ductline construction in this corridor would last approximately two months. During this period, daytime activities would affect traffic for about 12 to 15 days; nighttime activities would affect traffic for about 10 to 13 days. Day work would occur between 9:00 A.M. and 3:00 P.M.; night work would occur from 7:00 P.M. to 5:30 A.M. The traffic analysis evaluated both trenching at night between Amana and Poni Streets, and the daytime option.

A summary of potential traffic impacts and actions to minimize impacts is presented in Table 4-5. The daytime activity of ductline construction from the manhole in the center of Makaloa Street (fronting Makaloa Substation) to the makai-Koko Head side of the Amana and Makaloa Street intersection has the greatest potential to affect traffic within this corridor. As trenching progresses diagonally across the

15 Vehicular volumes were adjusted 0.75 percent per year from early 2004 data to account for growth. This growth rate was based on the average traffic growth between years 2000 and 2025 as forecast by the City and County of Honolulu for the major 'Ewa-Koko Head direction roadways at the Ward Avenue Screenline in the *Primary Corridor Transportation Project Final EIS* (City and County of Honolulu July 2003).

intersection, there would be two days when the width on either the mauka or makai side of the street would be inadequate to maintain two traffic lanes side by side. A single-lane, flagman operation is proposed to allow traffic movement. While these operations would accommodate projected vehicular volumes, some delay to virtually all through-traffic is expected due to the alternating flow of vehicles within one lane. Possible actions to minimize impacts include conducting this activity at night when vehicular volumes are lower, as shown in Figure 4-5, or maintaining two lanes along Makaloa Street, circumventing the construction area, with turn restrictions onto and from Amana Street. The measures listed in Table 4-5 would help to minimize these short-term and temporary construction-related traffic impacts and help maintain the existing LOS described in Table 4-3.

Table 4-5. Potential Traffic Impacts and Actions to Minimize Impacts Makaloa Corridor

Potential Impacts	Possible Actions to Minimize Impacts
Delays from single-lane/flagman operation at the intersection of Makaloa Street and Amana Street during daytime. All vehicular movements at that intersection would experience delays.	• Shift construction at this crossing to nighttime when there are substantially lower vehicular volumes. OR • Maintain two lanes along Makaloa Street around the construction area with no-left-turn restrictions at Amana Street.
Blockage of Kāheka Street to through traffic for two to four nights as ductline is constructed across intersection with Makaloa.	• Stage work to leave open one lane with flagman to allow through traffic with delays, and extend work by 2 to 3 nights.
Disruption of TheBus service by blockage of Kāheka Street intersection during nighttime construction.	• (same as above) OR • Work only during hours with no bus service, which may increase the number of work nights.
Blockage of crosswalks at intersections.	• Stage work area to block only one crosswalk at an intersection at one time.
Loss of parking along the section of street in the work area and traffic transition zones, and impacts on pedestrian due to blocked crosswalks during daytime construction.	• Begin work at 8 A.M. (or 7 A.M.) to shorten construction by 1 to 2 days. OR • Shift all work to nighttime.
Loss of detector loops at signalized intersections for approximately three to four weeks.	• HECO would coordinate with DTS to minimize impacts.

Table 4-5. Potential Traffic Impacts and Actions to Minimize Impacts Makaloa Corridor *(continued)*

Potential Impacts	Possible Actions to Minimize Impacts
Paving	
Loss of lane due to paving.	• Conduct paving work at night and restrict on-street parking on both sides of Makaloa Street to allow travel lanes in either direction.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Restrict parking in work area to leave single lane open to traffic, stagger paving across street to allow one lane of traffic. • Conduct paving work at night and restrict on-street parking on both sides of Makaloa Street to allow travel lanes in either direction.

Both day and night work was evaluated, and based on the traffic volumes that would be affected, night work is preferred for most of the trenching on Makaloa Street. If the section of the ductline from the 'Ewa side of Kāheka Street to Poni Street were constructed during the day, construction activities at the intersection of Kāheka Street and Makaloa Street would have significant impacts on area traffic, and the LOS described in Table 4-3 could not be maintained. Approximately 700 vehicles per hour would need to be diverted to other streets such as Poni and Amana Streets, which would likely experience severe congestion. Other streets affected by the diverted vehicle volumes include (1) Kalākaua Avenue, which would likely experience congested conditions at the intersection with Makaloa Street, and (2) Ke'eaumoku Street, which could experience congestion at the intersections with Kapi'olani Boulevard and Makaloa Street. TheBus routes along Kāheka Street would also require rerouting.

In addition to the potential impacts from paving described in Table 4-5 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (nights) to complete. As summarized below, additional work shifts required for full-street-width paving versus partial-street-width paving would more than double the duration of paving activities.

Makaloa Street from Amana to Poni, partial-street-width	2 nights
Makaloa Street from Amana to Poni, full-street-width	5 nights

Pumehana Street Area. As described in Chapter 3, daytime ductline construction in this area would last approximately two months during the hours of 9:00 A.M. to 3:00 P.M. Streets would be closed to through-traffic one block at a time; however, local access would be allowed as long as the active work area is not blocking the

driveway. By 3:00 P.M., the open trench would be covered and the street opened to traffic until the next workday. A summary of potential traffic impacts and actions to minimize impacts for this daytime work is presented in Table 4-6.

Table 4-6. Potential Traffic Impacts and Actions to Minimize Impacts Pumehana Street Area

Potential Impacts	Possible Actions to Minimize Impacts
Closure of Pumehana Street to through-traffic for 33 to 35 work days, requiring diversion of about 1,000 vehicles per day to other routes.	• Restrict work area to allow through-traffic; this would extend the duration of construction from about 2 months to 3 months.
Closure of Lime Street to through-traffic for 6 to 7 work days, with 500 vehicles per day diverted to other routes.	• (same as above)
Closure of Fern Street to through-traffic for 7 work days, with 500 vehicles per day diverted to other routes.	• Construct manhole and ductline across Fern Street at night.
Closure of Date Street to through traffic for 7 work days, with 800 vehicles per day diverted to other routes.	• (same as Pumehana Street activities) • Construct manhole and ductline across Date Street at night and/or reconfigure work area to leave open lane on Date Street with flagman. OR • Extend work area along the 36-foot-wide Date Street and keep a 12-foot lane of Date Street open to traffic through the use of a flagman operation. A lane of Pumehana could also be kept open. • Shift the manhole location to reduce blockage by 2 to 3 days.
Impact on Lunalilo School traffic and parking.	• Conduct work during Lunalilo Elementary School summer break.
Restriction of on-street parking during daytime.	• If not being used by school, e.g., during summer, allow use of Lunalilo School parking lot for use by area residents.
Blockage of crosswalks.	• Stage construction to avoid blocking both sides of intersection at same time.
Paving	
Loss of lane due to paving.	• Restrict parking in work area to leave single lane open to traffic.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Restrict parking in work area to leave single lane open to traffic; stagger paving across street to allow one lane of traffic.

In addition to the potential impacts from paving described in Table 4-6 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (days) to complete. The full-street-width paving would add approximately half a day to the duration of paving.

Pumehana and Lime Streets, partial-street-width	1.3 days
Pumehana and Lime Streets, full-street-width	1.9 days

Date Street Area. As described in Chapter 3, trenching and ductline installation would occur over approximately five weeks, and work would be conducted during the day between 9:00 A.M. and 3:00 P.M. During trenching and ductline installation, one lane of traffic flow in each direction would be provided. Local access would be allowed along the mauka side of the street, as long as the active work area is not blocking the driveway. Driveway blockage would not be anticipated to exceed one day. During cable pulling and splicing activities, three lanes would be available for use. At about 3:00 P.M., the open trench would be covered and the street opened to traffic until the next workday. A summary of potential traffic impacts and actions to minimize impacts for this daytime work is presented in Table 4-7.

Table 4-7. Potential Traffic Impacts and Actions to Minimize Impacts Date Street Area

Potential Impacts	Possible Actions to Minimize Impacts
Delays to Koko Head-bound traffic by vehicles stopped to turn left into driveways or streets.	• Restrict left turns from the single Koko Head-bound lane during construction hours. Vehicles needing to turn left into the driveways on the mauka side of the street could travel mauka on Kapi'olani Boulevard and turn onto Mahi'ai Street to access Date Street and turn right into driveways.
Delays to 'Ewa-bound traffic by vehicles stopped to turn left into driveways or streets.	• Restrict left turns, with vehicles having to use alternative routes to turn right into driveways.
Delays to 'Ewa-bound traffic flow at Kapi'olani Boulevard intersection.	• Orient the work area to position the 'Ewa end of the area as far as possible from the Kapi'olani Boulevard intersection throughout the construction work. AND/OR • Avoid use of traffic cones on mauka-side of 'Ewa departure lane near the intersection of Date and Kapi'olani Boulevard. This would allow traffic to use the entire distance between the work area and intersection for stacking in both of the 'Ewa-bound traffic lanes.

Table 4-7. Potential Traffic Impacts and Actions to Minimize Impacts Date Street Area *(continued)*

Potential Impacts	Possible Actions to Minimize Impacts
Separation of traffic lane from curb bus stop during construction across Koko Head-bound lanes.	• If feasible, position traffic cones to create a bus "pull out" to access the normal bus stop. OR • Relocate bus stop location.
Blockage of crosswalk across Date Street at intersection with 'Ewa end of Lā'au Street.	• Maintain temporary crosswalk on Date Street, crossing the 'Ewa side of Lā'au Street. Stage the work to retain the temporary crossing location when the crossing on the Koko Head side of Lā'au Street and Date Street is blocked by construction.
Blockage of makai sidewalk on Date Street.	• Provide temporary pathway around work area.
Loss of detector loops at signalized intersections for approximately three to four weeks.	• HECO would coordinate with DTS to minimize impacts.
Paving	
Loss of lane due to paving.	• Conduct paving activities at night. Restrict parking on both sides of street to allow one travel lane in each direction.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Conduct paving activities at night. Restrict parking on both sides of street to allow one travel lane in each direction and stagger paving across width of street.

In addition to the potential impacts from paving described in Table 4-7 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (nights) to complete. As summarized below, full-street-width paving would more than double the duration of paving activities.

Date Street, partial-street-width	0.7 night
Date Street, full-street-width	1.9 nights

Winam Avenue Area. As described in Chapter 3, trenching and ductline installation would occur over approximately one month, and work would be conducted during the day between the hours of 9:00 A.M. and 3:00 P.M. For trenching and ductline installation along this narrow avenue, the street would be closed to through-traffic; however, local access would be allowed as long as the active work area is not blocking the driveway needed. During trenching and ductline installation along Mo'oheau Avenue, one lane of through-traffic would be maintained. A flagman operation would be used to direct the alternating flow of traffic through the single lane. A similar flagman operation would be used during cable pulling and splicing activities. At about 3:00 P.M., the open trench would be covered and the street

opened to traffic until the next workday. A summary of potential traffic impacts and actions to minimize impacts for this daytime work is presented in Table 4-8.

Table 4-8. Potential Traffic Impacts and Actions to Minimize Impacts Winam Avenue Area

Potential Impacts	Possible Actions to Minimize Impacts
Flagman delays on Mo'oheau Avenue, affecting about 2,800 vehicles per day.	• Perform work along Mo'oheau Avenue at night to reduce the number of vehicles delayed.
Daytime closure of Winam Avenue, requiring diversion of about 1,400 vehicles per day to parallel streets.	• To maintain a single lane for through-traffic, position equipment in a narrow line and have a flagman direct alternating traffic flow. This would increase the duration of construction from 12 to 13 days (with full street closure) to 20 to 40 days, and full street closures would still be required for short periods.
Blockage of bus access to stop at Paliuli Street due to flagman operation on Mo'oheau Avenue.	• Configure work area/transition zone to avoid impact, or relocate bus stop.
Closure of Ho'olulu Street intersection, requiring diversion of traffic to other routes.	• Configure work area to leave Ho'olulu Street intersection open, except when open trench is located within intersection (1-2 days).
Paving	
Loss of lane due to paving.	• Provide flagman operation to alternate traffic flow direction in the single open lane.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Stagger paving across lanes; provide flagman operation to alternate traffic flow direction in the single open lane.

In addition to the potential impacts from paving described in Table 4-8 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (days) to complete. The different work shifts required for full-street-width paving versus partial-street-width paving are summarized below:

Winam Avenue and Mo'oheau Street, partial-street-width	0.7 day
Winam Avenue and Mo'oheau Street, full-street-width	1.1 days

King Street Area. The Phase 2 alignment consists of the following roadway areas: part of Cooke Street between the Archer Substation and King Street, King Street (from Cooke Street to McCully Street), and McCully Street (from King Street through Young Street). Two installation methods are considered: (1) open trenching and (2) open trenching and directional drilling.

Table 4-9 summarizes the potential impacts and actions to minimize impacts of nighttime construction using the conventional open trenching installation method. Open trenching activities at night are not expected to cause major traffic delays.

Table 4-9. Potential Traffic Impacts and Actions to Minimize Impacts King Street Corridor (Open Trenching Option)

Potential Impacts	Possible Actions to Minimize Impacts
Closure of Cooke Street to through traffic.	• Place signs to reroute traffic via Kapi'olani Boulevard.
Traffic delays during special nighttime events at the Neal Blaisdell Center and other venues.	• Coordinate construction schedule and work hours with Neal Blaisdell Center and other event sites to minimize impacts.
Blockage of crosswalks by work area.	• Configure and stage movement of work area to block only one crosswalk at a time per intersection. • Provide a temporary crosswalk to replace mid-block or single crosswalks, if safety can be maintained and as appropriate.
Loss of detector loops at signalized intersections for approximately three to four weeks.	• HECO would coordinate with DTS to minimize impacts.
Paving	
Loss of lane due to paving.	• Restrict parking along Cooke Street, makai side of King Street for two to three block lengths, and along McCully Street.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Stagger paving across lanes • Restrict parking along Cooke Street, makai side of King Street for two to three block lengths, and along McCully Street.

In addition to the potential impacts from paving described in Table 4-9 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (nights) to complete. As summarized below, full-street-width paving would double the duration of paving activities from 10.5 nights to 20.7 nights.

Cooke Street, partial-street-width	0.7 night
Cooke Street, full-street-width	1.6 nights
King Street, partial-street-width	9.3 nights
King Street, full-street-width	18.3 nights
McCully Street, partial-street-width	0.5 night
McCully Street, full-street-width	0.8 night

Night work is preferred for trenching and installation of ductline in Phase 2. If these activities were to occur during the daytime, construction across major intersections would progress at a slower pace (six to eight days versus two to three nights), and higher daytime vehicular volumes would necessitate that no parking be allowed along the curbs of King Street, within three to four blocks around the work area. Traffic delays would be likely, along with the formation of queues near the following intersections: King Street and Ward Avenue, King Street and Ke'eaumoku Street, King Street and Kalākaua Avenue, and King Street and Punahou Street.

Table 4-10 summarizes potential traffic impacts when both open trenching and directional drilling methods are used. With the addition of directional drilling, there would be less disruption to surface streets during repaving. Rather than spending approximately 11 nights to repave the areas affected by the open trenching, only about 6 nights would be needed to repave the drill entry and exit areas. However, the directional drilling option would require that drilling equipment remain within the roadway 24 hours a day throughout the installation process, affecting peak hour periods of traffic for approximately three to four weeks at each of the manholes. Lane blockage would affect commute peak-hour traffic as well as traffic in the off-peak hours. In the afternoon peak hour, up to 3,300 vehicles would pass the drill site (see Figure 4-7). These vehicles would have to merge from six lanes (550 vehicles per lane) into four lanes (825 vehicles per lane). This lane-changing would likely result in slowing of traffic speeds and formation of traffic queues upstream of the lane blockage, thereby disrupting traffic conditions at nearby intersections. At the intersection of Kalākaua Avenue and King Street, directional drilling would result in the diversion of several hundred vehicles per hour to parallel routes such as Kapi'olani Boulevard and H-1 Freeway.

Table 4-10. Potential Traffic Impacts and Actions to Minimize Impacts King Street Corridor (Partial Directional Drilling Option)

Potential Impacts	Possible Actions to Minimize Impacts
Morning and midday traffic delays on King Street, South Street, Ward Avenue, and Punahou Street at the three work areas.	• Restrict on-street parking for three to four blocks at each work area between 6:30 A.M. and 3:30 P.M.
Afternoon peak hour delays on King Street at Ward Avenue, Kalākaua Avenue, and Ke'eaumoku Street.	• Relocate drill site work area farther from the intersection, which increases the number of work sites and duration of work. OR • Restripe King Street on mauka side of work area past drill site for four nine-foot lanes.

Table 4-10. Potential Traffic Impacts and Actions to Minimize Impacts King Street Corridor (Partial Directional Drilling Option) *(continued)*

Potential Impacts	Possible Actions to Minimize Impacts
Disruption to cross street bus routes during nighttime casing assembly and pullback.	• Delay start of work until after cessation of bus service and halt work before initial bus runs in the morning, which may increase number of nights needed for tasks. *AND/OR* • Revise bus schedules to avoid conflicts.
Blockage of crosswalks across King Street during assembly and pullback of casing at each pullback work area.	• Construct temporary pedestrian bridge over the assembled casing path. OR • Post advance warning signs to indicate alternative routes.
Paving	
Loss of lane due to paving.	• Conduct paving at night. • Restrict parking in work areas.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Conduct paving at night. • Stagger paving across lanes to allow traffic movement.

In addition to the potential impacts from paving described in Table 4-10 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (nights) to complete. As summarized below, full-street-width paving would increase the duration of work shifts from 6.3 nights to 16.1 nights.

Cooke Street, partial-street-width	0.7 night
Cooke Street, full-street-width	1.6 nights
King Street HDD sections, partial-street-width	2.3 nights
King Street HDD sections, full-street-width	8.4 nights
King Street trench sections, partial-street-width	2.8 nights
King Street trench sections, full-street-width	5.3 nights
McCully Street, partial-street-width	0.5 night
McCully Street, full-street-width	0.8 night

Operation

The Proposed Action involves the installation of underground circuits in the public right-of-way. After installation is completed and the circuits are operational, no impacts on traffic would occur other than infrequent maintenance and emergency repairs. Potential impacts on traffic would be infrequent and temporary and, therefore, not significant.

4.4.2.2 *Alternative Alignments*

Construction

Construction related traffic impacts for the alternative alignments were evaluated using 2006 conditions. These impacts would not be significant as they would be short-term and temporary, no more than two months duration in any one area. In most cases, the duration would be less than one month. Relative differences in traffic impacts are apparent when the number of days that traffic may be impacted along each alignment is compared. Table 4-11 shows that the alternative alignments could impact traffic for the longest periods. The Proposed Action is expected to involve the fewest number of days, as most of the alignment would use existing ductline and not require installation of new ductline.

Potential impacts of the proposed alternative alignments are summarized in Tables 4-12 and 4-13, along with possible actions to minimize impacts. In the case of No Action, no impacts on traffic would occur.

Table 4-11. Comparison of Alternatives Based on Number of Days/Nights Traffic Impacted[a]

Alternative	Number of Days	Number of Nights	Total
Proposed Action	25 to 35[b]	10 to 13	35 to 48
Alternative 1 (Kāheka–Kapi'olani)	55 to 65	5 to 6+	60 to 71+
Alternative 2 (Kalauokalani–Kapi'olani)	44 to 51	18 to 19+	62 to 70+

[a] Assumes repaving performed to comply with City and County of Honolulu Ordinance Section 17-3(e), and the City and County of Honolulu's policy for trenching work on City and County of Honolulu owned and maintained roadways, dated September 30, 2004. Based on these requirements, the single lane affected by excavation would be repaved.

[b] Based on two to three days per manhole and seven manholes, and Table S-1 in Appendix B.

Table 4-12. Potential Traffic Impacts and Actions to Minimize Impacts Alternative Alignment 1 (Kāheka–Kapi'olani)

Potential Impacts	Possible Actions to Minimize Impacts
Same impacts along Makaloa Street as described for Proposed Action.	• Same actions as described for the Proposed Action.
Traffic at Kāheka Street intersection at 92% of capacity with increased delays.	• Schedule ductline construction work near this intersection at night.
Increase in delays at other Kapi'olani Boulevard intersections.	• Schedule ductline construction work at night.
Blockage of bus stops along mauka side of Kapi'olani Boulevard.	• When blocked by trench area, shift bus stop along Kapi'olani away from trench area.
Blockage of crosswalks at Atkinson Drive and Kalākaua Avenue intersections.	• Construct ductline through this section at night when fewer pedestrians are present. AND/OR • Place advance signing to warn pedestrians of blockage and alternative routes.
Loss of detector loops at signalized intersections for three to four weeks.	• HECO would coordinate with DTS to minimize impacts.
Paving	
Loss of lane due to paving.	• Conduct paving at night. • Restrict parking in work area to allow additional travel lane.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Conduct paving at night. • Restrict parking in work area to allow additional travel lane. • Stagger paving across lanes.

In addition to the potential impacts from paving described in Table 4-12 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (nights) to complete. The different work shifts required for full-street-width paving versus partial-street-width paving, summarized below, show that work shifts would more than double:

Makaloa Street, partial-street-width	0.9 night
Makaloa Street, full-street-width	2.8 nights
Kāheka Street, partial-street-width	0.5 night
Kāheka Street, full-street-width	0.6 night
Kapi'olani Boulevard, partial-street-width	2.3 nights
Kapi'olani Boulevard, full-street-width	4.6 nights
Pumehana Street, partial-street-width	0.5 night
Pumehana Street, full-street-width	0.8 night

Table 4-13. Potential Impacts and Actions to Minimize Impacts Alternative Alignment 2 (Kalauokalani–Kapi'olani)

Potential Impacts	Possible Actions to Minimize Impacts
Same impacts along Makaloa Street as described for Proposed Action.	• Same actions as described for the Proposed Action.
Traffic delays in constructing ductline across Poni Street–Kāheka Street intersection.	• Construct at night.
Blockage of Kalauokalani Way crosswalks.	• Provide temporary walkways to bypass construction work areas.
Loss of detector loops at signalized intersections for three to four weeks.	• HECO would coordinate with DTS to minimize impacts.
Paving	
Loss of lane due to paving.	• Conduct paving at night. • Restrict parking in work area to allow additional travel lane.
Loss of multiple lanes associated with curb-to-curb paving policy.	• Conduct paving at night. • Restrict parking in work area to allow additional travel lane. • Stagger paving across lanes.

In addition to the potential impacts from paving described in Table 4-13 above, the City and County of Honolulu's curb-to-curb paving scenario would require additional work shifts (nights) to complete. As summarized below, full-street-width paving would more than double the duration of paving activities versus partial-street-width paving.

Makaloa Street, partial-street-width	2.2 nights
Makaloa Street, full-street-width	6.5 nights
Kalauokalani Way, partial-street-width	1.3 nights
Kalauokalani Way, full-street-width	1.9 nights
Kapi'olani Boulevard, partial-street-width	1.2 nights
Kapi'olani Boulevard, full-street-width	2.3 nights
Pumehana Street, partial-street-width	0.5 night
Pumehana Street, full-street-width	0.8 night

Operation

If emergency repairs or maintenance is necessary, temporary traffic disruption would occur. No significant impacts on traffic would be associated with the alternative alignments for the same reasons provided for the Proposed Action.

4.4.2.3 No Action

The No Action alternative would have no impact on traffic. To the extent that existing traffic control systems rely on electrical power from HECO, the reliability concerns discussed in Chapter 2 may have an impact if the EOTP is not in place.

4.5 PUBLIC HEALTH AND SAFETY

4.5.1 Noise Environment

The unit commonly used to describe loudness is the decibel (dB), which is measured on a logarithmic scale to encompass the extensive range of sound intensities. To approximate how the human ear hears sound, more weight is given to frequencies that are heard more easily. The method commonly used for weighting the frequency spectrum to mimic the human ear is the A-weighted sound level in decibels, or dBA. The minimum change in sound level that can be detected by most people is 3 dBA. An increase of 10 dBA is usually perceived as a doubling in loudness. Factors to be considered in determining noise levels are (1) the sound pressure in dBA, (2) the distance of the listener from the source, (3) attenuating or propagating effects of the medium between the source and the listener, and (4) the period of exposure. An adverse effect of noise is any temporary or long-term lowering of the physical, psychological, or social functioning of humans or human organs.[16]

An adult person's ear can tolerate an occasional noise level of up to 140 dB, but for children such an exposure should not exceed 120 dB. OSHA sets permissible noise exposure limits of 90 dBA for an eight-hour period for workers in 29 Code of Federal Regulations (CFR) 1910.[17] The Federal Highway Administration (FHWA) has determined that levels of highway traffic noise, typically ranging from 70 to 80 dBA at a distance of 50 feet, affect a majority of people by interrupting concentration or limiting the ability to carry on a conversation. The sound generated

[16] World Health Organization. Guidelines for Community Noise website. http://www.who.int/docstore/peh/noise/Comnoise-3.pdf, accessed June 22, 2004.

[17] World Health Organization. Occupational and Community Noise website. http://www.who.int/mediacentre/factsheets/fs258/en/, accessed June 22, 2004 and
Occupational Safety and Health Administration. Occupational Safety and Health Standards - CFR Chapter 29 Part 1910.

by a conversation between two people standing three feet apart is usually in the range of 60 to 65 dBA.[18]

Title 11, Chapter 46, of the Hawai'i Administrative Rules (HAR 11-46) defines maximum permissible sound levels and provides for protection, control, and abatement of noise pollution from stationary noise sources and agricultural, construction, and industrial equipment. Noise is defined in HAR 11-46 as "any sound that may produce adverse physiological or psychological effects or interfere with individual or group activities, including but not limited to communication, work, rest, recreation, or sleep." HAR 11-46 sets maximum permissible sound levels in dBA for excessive noise sources within different zoning districts. Table 4-14 below identifies the classification of zoning districts and the maximum permissible sound levels in dBA for day and night at the property line where the activity occurs. The maximum permissible nighttime noise is 10 dBA less than daytime, except in Class C zoning. The maximum permissible sound level for impulsive noise is defined by DOH as 10 dBA above the levels specified in Table 4-14. Maximum permissible sound levels are not to be exceeded more than ten percent of the time in a 20-minute period without a permit or variance.

Table 4-14. Maximum Permissible Sound Levels in dBA

Class	Zoning	Maximum Permissible Sound Level (dBA)	
		Daytime (7 A.M. to 10 P.M.)	Nighttime (10 P.M. to 7 A.M.)
Class A	Residential, conservation, preservation, public space, open space, or similar type.	55	45
Class B	Multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C	Agriculture, country, industrial, or similar type.	70	70

Source: HAR 11-46

4.5.1.1 *Existing Conditions*

The existing noise environment in the proposed project area is typical of an urban setting. Land uses are within the Class B zoning district, as identified in Table 4-14. The primary source of noise in the area is motor vehicles. Noise levels associated with motor vehicles vary and are dependent on traffic volume, speed, and the number of trucks in the flow of traffic. Generally, the loudness of traffic noise increases with heavier traffic volumes, higher speeds, and greater number of

[18] Corbisier, C. *Living with Noise in Public Roads*, Vol. 67, No. 1., July/August 2003. http://www.tfhrc.gov/pubrds/03jul/06.htm, accessed June 22, 2004.

trucks.[19] The noise level on a typical city street with automobile traffic averages 60 to 65 dBA; larger vehicles like heavy trucks and diesel buses may cause noise peaks ranging up to about 90 dBA.[20] The Phase 1 area ranges from relatively quiet residential streets like Fern Street and Hau'oli Street, which contain primarily single- and multi-family residences and residential traffic, to busy streets like Kalākaua Avenue and Kapi'olani Boulevard, which contain a mix of commercial and residential buildings and a traffic volume that includes trucks and buses. The Phase 2 area occurs primarily along South King Street, a busy street with a mix of commercial and residential buildings and heavy use by motor vehicles, including trucks and buses. Noise-sensitive areas include residences and schools.

The existing noise environment for the Alternative Alignments is similar to that of the Proposed Action. Land uses within the alternative alignments are also within the Class B zoning district. Traffic noise along the Kapi'olani Boulevard section of Alternative Alignments 1 and 2 is greater than that along Makaloa Street.

4.5.1.2 Potential Impacts and Actions to Minimize Impacts

4.5.1.2.1 Proposed Action

Construction

No significant impacts from noise would occur. Construction work would be conducted in compliance with applicable noise regulations.

Typical noise levels associated with common construction equipment can range from 80 to 95 dBA at 50 feet from the source, with some drilling equipment generating greater than 100 dBA. Noise levels would vary in location and duration and may be continuous (generator motors), fluctuating (crane operation), or impulsive (metal drill pipes banging together).[21] Noise sources associated with the types of construction activities planned, estimated duration, and methods to minimize potential impacts are identified in Table 4-15. Section 3.2.1 identifies the locations where these activities would occur.

19 U.S. Department of Transportation Federal Highway Administration. *Highway Traffic Noise*. http://www.fhwa.dot.gov/environment/htnoise.htm, accessed June 22, 2004.

20 West Virginia Department of Highways. http://www.wvcorridorh.com/engineer/noise.html, accessed June 22, 2004.

21 Typical noise levels in dBA, at 50 feet, as identified in Table 2 of the Federal Highway Administration paper, *Effective Noise Control During Nighttime Construction*. http://ops.fhwa.dot.gov/wz/workshops/accessible/Schexnayder_paper.htm, accessed June 22, 2004.

Table 4-15. Construction Noise Sources and Actions to Minimize Impacts

Construction Activity	Noise Sources and Noise Levels[1]	Actions to Minimize Impacts
Overhead Pole Replacement	Equipment motors – 88 dBA Backup alarms – 87 or 107 dBA Human voices – 70 dBA	Reduce equipment idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Establish crew communication procedures to minimize the need to shout over equipment.
Hand Trenching	Jackhammers – 88 dBA Equipment motors – 88 dBA Human voices – 70 dBA	Daytime work only. Fit jackhammers with manufacturer-approved exhaust muffler. Reduce equipment idling when not being used. Establish crew communication procedures to minimize the need to shout over equipment.
Ductline Construction (Conventional Trenching), Manhole Installation	Pavement cutting/excavating equipment – 85 dBA Cranes – 83 to 88 dBA Backup alarms – 87 or 107 dBA Human voices – 70 dBA	Reduce equipment idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Work during the day where possible. Establish crew communication procedures to minimize the need to shout over equipment.
Ductline Construction (Directional Drilling)	Drill rig – 108 dBA (at the source)[2] Cranes – 83 to 88 dBA Diesel generators – 81 to 84 dBA Slurry and separation equipment – 100 to 110 dBA (at the source)[2]	Reduce equipment idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Work during the day where possible. Establish crew communication procedures to minimize the need to shout over equipment. Fit generators with manufacturer-approved exhaust mufflers. Fit drilling with high noise reduction mufflers. Add special sound deadening housing around drill rig.
Existing Circuit Removal	Truck motors – 88 dBA Backup alarms – 87 or 107 dBA Human voices – 70 dBA	Reduce equipment idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Establish crew communication procedures to minimize the need to shout over equipment.
New Circuit Installation	Equipment motors – 88 dBA Backup alarms – 87 or 107 dBA Human voices – 70 dBA	Reduce equipment idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Establish crew communication procedures to minimize the need to shout over equipment.

Table 4-15. Construction Noise Sources and Actions to Minimize Impacts *(continued)*

Construction Activity	Noise Sources and Noise Levels[1]	Actions to Minimize Impacts
Paving	Paving equipment – 80 to 89 dBA Backup alarms – 87 or 107 dBA Human voices – 70 dBA	Reduce equipment idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Establish crew communication procedures to minimize the need to shout over equipment.
Substation Modifications	Truck motors – 88 dBA Human voices – 70 dBA Cranes – 83 to 88 dBA	Reduce truck idling when not being used. Use manually adjustable or self-adjusting backup alarms, and configure construction site to minimize the need to reverse. Establish crew communication procedures to minimize the need to shout over equipment.
Dewatering (may be needed during some trenching activities)	Pile driver (for sheet piles) – 101 dBA Human voices – 70 dBA	Install sheet piles in an active trench prior to initiating dewatering so it would not be a constant source of noise. Establish crew communication procedures to minimize the need to shout over equipment.
Transformer installation	Cement mixer – 85 dBA Human voices – 70 dBA	Fit equipment with manufacturer-approved exhaust muffler. Establish crew communication procedures to minimize the need to shout over equipment.

1 Typical noise levels in dBA, at 50 feet, as identified in Table 2 of the Federal Highway Administration paper, *Effective Noise Control During Nighttime Construction.* http://ops.fhwa.gov/wz/workshops/accessible/Schexnayder_paper.htm, accessed June 22, 2004.

2 Typical noise levels in dBA, at the source, as identified in: Power Engineers. August 4, 2004. Hawaiian Electric Company, Inc., East Oahu Transmission Project Phase 2 – 46kV Lines, Horizontal Drilling *Feasibility Study.*

Noise generated during construction activities is generally short in duration. For the construction options for both phases, contract provisions would determine acceptable work hours and identify methods to enforce compliance. Construction work would be conducted in compliance with State of Hawai'i noise control rules. Impacts on construction workers would be minimized by compliance with OSHA construction noise standards. A telephone hotline connected directly to the job site would be established so neighbors could contact construction personnel and immediately voice concerns about the project.

No significant noise impacts on schoolchildren are expected, as work and associated noise-generating equipment would be located at least 50 feet from the nearest classrooms, which are air conditioned with closed windows. Closed windows act as a noise buffer and can reduce indoor noise levels by 15 to 25 dBA. Scheduling

construction activities that occur near schools to coincide with school vacations would minimize noise impacts.

For construction activities that may produce excessive noise levels, a noise permit or noise variance, as applicable, would be obtained from the State of Hawai'i DOH. Approval of the permit or variance may require use of noise attenuation devices on construction equipment or further limits on construction hours and activities. Backup alarms on construction equipment may be disabled if other inaudible safety measures are used, as allowed by law. Scheduling noise-generating activities in residential areas only during the day and informing crew members about moderating voice levels would minimize noise impacts.

Operation

No significant impacts to noise receptors would occur with operation of the upgraded electrical system. The new 46-12kV transformer to be installed at the Makaloa Substation (Phase 1) would be designed and manufactured for low sound level classification and operate in compliance with State of Hawai'i noise control rules. The new 138-46kV transformers with associated cooling equipment to be installed at Kamoku Substation (Phase 1) and Archer Substation (Phase 2) would be designed and manufactured for standard sound level classification. Because Kamoku and Archer Substations are concrete-enclosed, transformer and cooling equipment noise is attenuated and these facilities operate in compliance with State of Hawai'i noise control rules.

Maintenance or emergency repair activities may generate short-term noise associated with vehicles, much like the existing vehicle traffic on roadways. No actions to minimize impacts are required.

4.5.1.2.2 Alternative Alignments

The analysis of potential construction-related noise impacts is the same for the Proposed Action. No significant impacts from noise would occur during construction or operation.

4.5.1.2.3 No Action Alternative

With no construction or operational activities under this alternative, no noise would occur.

4.5.2 Emergency Response

This section addresses potential effects on police, fire, and medical emergency responsiveness. Information is summarized from the *East Oahu Transmission Project Traffic Impact Study Final* (Wilbur Smith Associates December 2004), presented in Appendix B.

4.5.2.1 Existing Conditions

The HPD and Honolulu Fire Department (HFD) serve the entire island of O'ahu, with stations designated to serve smaller districts.

The Proposed Action and alternative alignments are mainly located in two police districts, Districts 1 and 7. District 1 serves downtown Honolulu from Liliha Street to Punahou Street, with offices in the main police station at Alapa'i and Beretania Streets, approximately two blocks mauka of the Cooke Street end of the Phase 2 alignment. Access to the main police station from King Street is on Kealamakai Street, near the intersection of Cooke and King Streets. Other entrances to the police station include the main entrance and parking facility on Beretania Street and an entrance from Hotel Street. District 7 serves the east side of O'ahu from Punahou Street to the easternmost point of the island, Makapu'u Point, excluding Waikīkī. The District 7 offices are located in the main police station. The Waikīkī area is in District 6, which encompasses Waikīkī to the eastern slopes of Diamond Head. The District 6 offices are also located in the main police station, with a substation on Kalākaua Avenue at Ka'iulani Avenue.

The project area is served by two HFD districts, Battalions 1 and 2, with six fire stations. HFD stations that are within or very close to the project area include the Pāwa'a Fire Station, which is adjacent to new ductline construction on Makaloa Street, and the McCully Fire Station on Date Street, approximately one block 'Ewa of the Phase 1 new ductline trenching proposed at the Kamoku Substation. Four other stations serve the project area: Central Fire Station on Beretania Street between Pali Highway and Fort Street; Makiki Fire Station on Wilder Avenue at Pi'ikoi Street; Waikīkī Fire Station on Kapahulu Avenue between Paki and Lē'ahi Avenue; and Kaimukī Fire Station on Koko Head Avenue makai of Pāhoa Avenue.

Major emergency medical facilities in the project area include Straub Hospital, located on King Street at Ward Avenue, and the Honolulu Clinic of the Kaiser Permanente health maintenance organization, located on King Street between Ward Avenue and Pensacola Street. Both Straub Hospital and the Kaiser Honolulu Clinic have urgent care services. Emergency vehicle access to Straub is from Hotel Street. Emergency vehicle access to Kaiser is from Young Street.

4.5.2.2 Potential Impacts and Actions to Minimize Impacts

4.5.2.2.1 Proposed Action

Construction

No significant impacts on emergency responses are expected under the Proposed Action. HECO would coordinate with emergency responders as needed. Emergency vehicle entrances to Kaiser Honolulu Clinic and Straub Hospital are on side streets not on the proposed project route; therefore, emergency access to these facilities would not be affected. Scheduling work at night would allow construction to occur at times when traffic volumes are low, and as a result, avoid or minimize impacts on emergency responders.

Construction would extend across the driveway of the Pāwa'a Fire Station on the northwest corner of the Makaloa Street intersection with Kāheka Street. The construction activity would be coordinated with the Fire Department to maintain the response capability of the equipment during the construction work, and access to the Pāwa'a Fire Station would not be impeded.

Operation

No impacts on emergency responses would occur from the operation of the Proposed Action.

4.5.2.2.2 Alternative Alignments

The analysis of potential impacts to emergency response and actions to minimize impacts for the alternative alignments is the same as for the Proposed Action. No significant impacts would occur from construction or operation.

4.5.2.2.3 No Action Alternative

Under the No Action alternative, no construction or operational activities would occur, and the electrical transmission reliability concerns and overload situations would not be addressed. In the event of outages, emergency responders would need to use backup sources of electricity. During extended outages, HFD and HPD may be called more frequently to assist in areas without power. Emergency rooms at Straub and Kaiser typically have standard procedures and backup electrical systems in place to deal with temporary outages. In the case of an island-wide power outage, No Action would significantly and adversely affect emergency responders and public health and safety.

4.5.3 Schools

4.5.3.1 Existing Conditions

School schedules typically include 177 to 180 days of instruction and 187 to 190 teacher workdays. More than half of the public schools have adopted single-track year-round or modified calendars. Multi-track year-round scheduling is applied at some schools to relieve overcrowding. Students at traditional calendar schools generally begin the third week in August, while students at year-round schools generally begin four, three, or two weeks earlier.[22]

Lunalilo Elementary School, located on the 'Ewa side of Pumehana Street between Citron and Fern Streets, is adjacent to the proposed Phase 1 project area. 'Iolani School, a private school serving kindergarten through 12th grade, is off Date and Kamoku Street near the Phase 1 Kamoku Substation work. See Figure 3-1.

Washington Middle School, located on the makai side of King Street at the Punahou Street intersection, and McKinley High School, located on the makai side of King Street at the Pensacola Street intersection, are adjacent to the proposed Phase 2 project area. The First Chinese Church of Christ in Hawai'i operates a preschool on its property between King Street and Young Street. See Figure 3-5.

4.5.3.2 Potential Impacts and Actions to Minimize Impacts

4.5.3.2.1 Proposed Action

Construction

No significant impacts from the Proposed Action on schools and their occupants would occur. Construction activities near Lunalilo Elementary School are likely to take place during the day to minimize noise impacts on nearby residents. However, if possible, scheduling construction activities during the summer vacation would avoid impacts to the school and occupants (the school currently operates on a traditional schedule, starting in late August and ending in early June). Should construction occur while school is in session, noise and dust impacts on building occupants would be minimized as the school buildings nearest the construction area are air conditioned and windows would remain closed. A special-duty HPD officer would be present on-site whenever construction activities are occurring.

22 State of Hawai'i, Department of Education Website, http://doe.k12.hi.us/about/intro_calendar.htm. Accessed May 7, 2004.

On Pumehana Street, on-street parking would likely be prohibited one block at a time for the duration of trenching activities. However, vehicular access to the school would be maintained throughout the construction period. Public access to work areas would be restricted to ensure pedestrian safety during construction.

Impacts to Washington Middle School from Phase 2 activities would differ depending on whether the conventional trenching option or horizontal directional drilling option is used. The trenching option would allow vehicular access to be maintained to the teacher's parking lot off of King Street during construction hours.

For the directional drilling option, the teacher's parking lot off of King Street would have to be temporarily relocated during construction. The school's parking lot and field would be used to lay out ductline and possibly directional drilling equipment. The Boys and Girls Club of Hawai'i uses the playing fields at Washington Middle School from the end of the school day until sunset, and all day during school vacations.

The estimated duration of impacts to Washington Middle School from the directional drilling option would be approximately two to four months, including set-up time. The longest period without scheduled classes at Washington Middle School is a three-week winter break. Scheduling a portion of the work during the school break would lessen the impact of work on the school. A special-duty HPD officer would be present on-site whenever construction activities are occurring.

Impacts to McKinley High School would also differ depending on the construction option chosen. For the trenching option, work would be confined to a single lane on King Street. Vehicular and pedestrian access to McKinley High School would be maintained during construction. For the directional drilling option, land near the corner of King and Pensacola Streets would be needed for staging of materials. Slurry extracted from the drill hole would be returned to an on-site settling and containment pit. Wet cuttings would then be separated from the slurry for disposal and the remaining slurry would be recycled into the drilling rig. According to the school's principal, the proposed activities would have little impact, provided the construction work area is fenced off. The nearest school building, the Science Building, is set back from King Street. It has air conditioning, so classroom windows would not open directly on the site of the drilling activity, although other buildings, further makai and towards downtown Honolulu, do depend on natural ventilation. The equipment staging area would be fenced off during the drilling phase to prevent access to the staging area. A special-duty HPD officer would be present on-site whenever construction activities are occurring.

Operation

No impacts to schools are expected from operation of the 46kV Phased Project.

4.5.3.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to schools is the same as for the Proposed Action. No significant impacts to schools from construction and operation would occur.

4.5.3.2.3 No Action Alternative

Under the No Action alternative, no construction or operational activities would occur, so there would be no impacts on schools. To the extent that existing schools rely on electrical power from HECO, the reliability concerns discussed in Chapter 2 may have an impact if the EOTP is not in place.

4.6 SOILS AND TOPOGRAPHY

4.6.1 Existing Conditions

The island of O'ahu was formed by the Wai'anae and the Ko'olau volcanoes. Following a long period of volcanic quiescence, volcanic activity produced a series of lava flows, cinder cones, and tuff cones, referred to as the Honolulu Volcanic Series.[23] The south and southwest areas of O'ahu have extensive coastal plains, such as the Honolulu coastal plain, which includes the Phase 1 and 2 locations. Lava flows in these coastal plains are interbedded with emerged reefs, likely formed during an interglacial stage with a high water stand. The coastal plain typically consists of silty and sandy soils overlying basalt bedrock, coralline reefs, or unconsolidated lagoon and beach deposits. Bedrock becomes more common in the shallow subsurface with increasing distance from the shoreline. Sedimentary rocks in the project area include alluvium and limestone (reefs and dunes).

Soils

The general soil association for the southern coastal plain of O'ahu is the Lualualei-Fill Land-'Ewa association. This association is characterized as deep, nearly level to moderately sloping, well-drained soils that have fine or moderately fine textured subsoil or underlying material, and areas of fill land. More specific soil types beneath the Phase 1 and 2 areas are described in Table 4-16.

[23] Macdonald, et al. 1983. *Volcanoes in the Sea, Second Edition*. University of Hawai'i Press, Honolulu.

Table 4-16. Soil Types

Soil Type	Location	Description
'Ewa silty clay loam 0 to 2 percent slopes	Phase 1: Makaloa Street, along the mauka side of Kapi'olani Boulevard and at the Kapahulu Substation. Alternative Alignment 1: Makaloa Street, Kalauokalani Way and Kapi'olani Boulevard. Alternative Alignment 2: Makaloa *Street and Kapi'olani Boulevard.*	Well-drained, developed in alluvium derived from basic igneous rock. Dark reddish-brown silty clay loam over dark reddish-brown and dark-red silty clay loam subsoil with subangular blocky structure. Moderately shallow coral limestone between 20 and 50 inches bgs. Moderate permeability, very slow runoff, erosion hazard no more than slight.
Pearl Harbor clay	Phase 1 and Alternative Alignments 1 and 2: Makaloa Substation.	Very poorly drained, developed in alluvium overlying organic material and occurs in level or nearly levels areas. Very dark gray, mottled clay over very dark gray and very dark grayish-brown, mottled clay with angular and subangular blocky structure. Muck or peat substratum at the water table, between 20 and 30 inches bgs. Very slow permeability, very slow to ponded runoff, erosion hazard no more than slight.
Kawaihāpai clay loam 0 to 2 percent slopes	Phase 1: Kalākaua Avenue, Kamoku Substation, Date Street, Kūhiō Substation. Alternative Alignment 1: Kalauokalani Way and Kapi'olani Boulevard. Alternative Alignment 2: along a segment of Kapi'olani Boulevard.	Well-drained, formed in alluvium derived from basic igneous rock in humid uplands. Dark-brown clay loam over very dark-brown stratified sandy loam. Stony and gravelly substratum between 22 and 32 inches bgs. Moderate permeability, slow runoff, erosion hazard no more than slight. Includes small areas of poorly drained soils and small areas of Jaucas soils. Some places subject to flooding.
Fill land, mixed	Phase 1: Kewalo Substation, along Lime and Pumehana Streets, Waikīkī Substation, 'Ena Substation, makai side of Kapi'olani Boulevard. Alternative Alignments 1 and 2: eastern end of the Kapi'olani Boulevard segment, Pumehana Street, and McCully Substation, Phase 2: along the eastern-most segment of the alignment, near McCully Street.	Surplus material from other areas such as ocean-dredged material, surplus excavated soils, garbage, and other material.
Molokai silty clay loam 3 to 7 percent slopes	Phase 1: Winam Avenue.	Well-drained, formed in material weathered from basic igneous rock. Dark reddish-brown silty clay loam over dark reddish-brown silty clay loam with prismatic structure. Soft, weathered rock substratum. Moderate permeability, slow to medium runoff, erosion hazard slight to moderate.

Table 4-16. Soil Types *(continued)*

Soil Type	Location	Description
Makiki clay loam 0 to 2 percent slopes	Phase 2: Along the majority of the alignment.	Well-drained, formed in alluvium mixed with volcanic ash and cinders. Dark-brown clay loam over dark-brown clay loam with subangular blocky structure with cinders and rock fragments. The depth to unweathered cinders or stony or gravelly alluvium ranges from 30 to more than 60 inches bgs. Moderately rapid permeability, slow runoff, erosion hazard no more than slight

Source: USDA, Soil Conservation Service. 1972. Soil Survey of Islands of Kaua'i, O'ahu, Moloka'i, and Lāna'i, State of Hawai'i.

A 2002 soils investigation conducted along a segment of Kapi'olani Boulevard, in the area where alternative routes were considered, consisted of one boring (drilled to 15.5 feet) and five probe holes (ranging from 11 to 27 inches in depth).[24] The subgrade soils were noted to consist of tan and grayish brown silty sand with coral fragments that extended to approximately 5 to 8.5 feet and underlain by gray silty sand with coral fragments. This is generally consistent with the soil classification data of this area, which includes shallow coral limestone. Groundwater was encountered at approximately 5 feet, and depth to groundwater is expected to vary with tidal fluctuations.

A 2004 soils investigation along the Phase 2 area, consisted of five soil borings; each extended to 30 feet in depth and exhibited horizontal variations.[25] Consistent with the USDA soil classification, fill material was found at the eastern end of the alignment, overlying clayey silt and silty sand. Soils observed between Ward Avenue and Ke'eaumoku Street included upper layers of silty sand, silty clay, and clayey silt. Coral was generally encountered between 8.5 and 15 feet. Coral varied from gravel-sized fragments with sand to silty sand with gravel to highly weathered coral. Groundwater was encountered between 10 and 15 feet below ground surface.

The sands in four borings (Ward Avenue, Pensacola Street, and Pi'ikoi Street) were classified as medium dense, dense, and very dense. The Ke'eaumoku Street sands were classified as loose to medium dense to very dense. The silty sand in the Punahou Street boring was classified as medium dense and loose. The upper layer silts and clays in the Ke'eaumoku Street and Punahou Street borings were classified as very stiff to hard.

[24] Ernest K. Hirata & Associates, Inc. August 30, 2002. *Soils Investigation Rehabilitation of Streets Kapiolani Boulevard from Ward Avenue to Kalakaua Avenue Honolulu, Hawaii.* Prepared for Engineers Surveyors Hawaii, Inc.

[25] Fewell Geotechnical Engineering, Ltd. May 19, 2004. *Draft Boring Logs Directional Drilling Feasibility Study King Street, Between Ward Avenue and Punahou Street East Oahu Transmission Line Honolulu, Oahu, Hawaii.*

Topography

The topography of the project area is relatively flat. The elevations of the Phase 1 area are generally between sea level and 10 feet above mean sea level (msl). The Phase 2 area elevations range from approximately 10 to 20 feet above msl. The proposed project is located in developed areas, generally within paved roadways. Asphalt and concrete, with underlying base course gravel fill, are the most likely surface materials.

4.6.2 Potential Impacts and Actions to Minimize Impacts

4.6.2.1.1 Proposed Action

Construction

No significant adverse impacts to soils and topography would occur. Construction staging areas may be established at schools or other sites where surface soils may be exposed. Potential short-term disturbance of surface soil would be minimized by implementing control measures such as: mechanical retardation and runoff control, sediment basins, and vegetation and/or mulch. Disturbances would be temporary, and existing grade and conditions would be restored as part of the project.

Excavation activities, both trenching and directional drilling, would temporarily disturb soils and affect topography. Existing grade and surfacing material would be restored with no long-term impact on erosion or soil stability. If required, HECO will submit a National Pollutant Discharge Elimination Systems (NPDES) construction stormwater permit application, and HECO will comply with all permit requirements including preparation and implementation of a best management practices (BMP) plan to address pollution prevention.

Operation

Operation of the upgraded electrical infrastructure would not impact the soils or topography within the project areas.

4.6.2.1.2 Alternative Alignments

The analysis of potential impacts to soils and topography for the alternative alignments is the same as for the Proposed Action. No significant impacts to these resources would occur during construction or operation.

4.6.2.1.3 No Action Alternative

Under the No Action Alternative, existing surface and subsurface conditions would not be modified, resulting in no impact to the soils or topography.

4.7 WATER RESOURCES

Water resources include groundwater and surface water systems in the vicinity of the Proposed Action and alternative alignments.

4.7.1 Existing Conditions

4.7.1.1 Groundwater

The project area overlies the Pālolo and Nu'uanu aquifer systems of the Honolulu aquifer sector. These are basal aquifers, containing fresh water in contact with seawater. The Phase 1 work west of Hau'oli Street and Phase 2 work along South King Street west of McCully overlies the Nu'uanu aquifer system. The upper aquifer is unconfined, sedimentary, and currently used. It has no listed utility for drinking water or ecological use, is moderately saline (1,000 to 5,000 milligrams per liter chloride), replaceable, and highly vulnerable to contamination. The lower aquifer is confined (bounded by impermeable or poorly permeable formations below groundwater surface) and occurs in flank deposits (horizontally extensive lavas). It is a freshwater aquifer (salinity less than 250 milligrams per liter chloride), currently listed as being used for drinking water, and is irreplaceable with a low vulnerability to contamination.[26]

In Phase 1, work east of Hau'oli Street overlies the Pālolo aquifer system. The upper aquifer is unconfined and sedimentary. It has potential for use but no listed utility, is moderately saline (1,000 to 5,000 milligrams per liter chloride), is replaceable, and has high vulnerability to contamination. The lower freshwater aquifer is confined and occurs in flank deposits. It is listed as currently used for drinking water, is irreplaceable, and has low vulnerability to contamination.

Most of the project area is located inland of the State of Hawai'i DOH-established Underground Injection Control (UIC) line, which runs along Pākī Boulevard, Ala Wai Boulevard to Kalākaua, Kapi'olani Boulevard to South Street, and then along King Street. The UIC program was established to protect the quality of underground sources of drinking water from pollution by subsurface disposal of fluids.[27] The UIC

26 Mink and Lau. 1990. *Aquifer Identification and Classification for O'ahu: Groundwater Protection Strategy for Hawai'i. Technical Report No. 179.*

27 Hawai'i Administrative Rules, Title 11, Chapter 23. September 22, 1992.

line is the boundary between non-drinking water aquifers (generally seaward of the UIC line) and underground sources of drinking water (generally inland of the UIC line). Drinking water wells are located upgradient from the project areas in the Kaimukī, Kapahulu, and Wai'alae Avenue areas. Numerous injection wells within the project vicinity are used for discharge of thermal effluent, carwash water, and rainwater.[28] The closest well, in the Date Street area, is upgradient from proposed work and does not have a listed major use.

On Kapi'olani Boulevard, near the proposed activities from Makaloa Substation to Pumehana Street (Phase 1), the depth to groundwater is approximately 5 feet bgs. Groundwater here is likely affected by tidal influence.[29] The depth to groundwater along South King Street (Phase 2) is approximately 16 to 18 feet bgs. These depths are approximately equivalent to elevation above sea level.

4.7.1.2 *Surface Water*

The project area is within the Ala Wai, Makiki, and Mānoa-Pālolo watersheds. The Ala Wai watershed encompasses Phase 1 and Phase 2 project areas, and the Makiki and Mānoa-Pālolo watersheds intersect portions of the Ala Wai watershed.

In the Phase 2 area, Makiki Stream is underground and part of the City and County of Honolulu's municipal separate storm sewer system (MS4) at the intersection of Kalākaua Avenue and South King Street and it emerges again within Phase 1 as open surface water at the intersections of Kalākaua Avenue with Makaloa Street and with Kapi'olani Boulevard.[30] Flow data for this stream is not available since it is not included in the U.S. Geological Survey (USGS) monitoring program.[31]

Storm water in the project area drains to the MS4 system, which has storm drain inlets along most of the roads in the project area. MS4 storm drains in Phase 1 and 2 areas outlet to Kewalo Basin, Ala Wai Boat Harbor, Makiki Stream, and Ala Wai Canal.

Notable surface waters in the project area include the Ala Wai Canal and the Mānoa-Pālolo Drainage Canal. The Ala Wai Canal, which had maintenance dredging completed in September 2003, is heavily used for water recreation such as paddling, kayaking, and rowing. Makiki Stream, Ala Wai Canal, and Mānoa-Pālolo Drainage

28 DLNR Commission on Water Resource Management. No Date. Well Locations, Marked On: USGS. 1983. Map O-13 (Honolulu Quadrangle) 7.2 minute series (topographic) and U.S. Department of Transportation and City and County of Honolulu, Department of Transportation Services. July 2003. *Final Environmental Impact Statement, Primary Corridor Transportation Project.*

29 Ernest K. Hirata & Associates, Inc. August 30, 2002. *Soils Investigation Rehabilitation of Streets Kapiolani Boulevard from Ward Avenue to Kalakaua Avenue, Honolulu, Hawai'i.*

30 USGS Map, Honolulu Quadrangle, 1998.

31 USGS. 2001. *USGS Water Resources Data, Hawai'i and Other Pacific Areas, Water Year 2000, Volume 1, Hawai'i.* Water-Data Report HI-00-1.

Canal are classified as Class 2 inland waters, which are defined in HAR 11-54. Class 2 waters are recommended for agricultural and industrial water supply, compatible recreation, shipping, navigation, and propagation of fish and aquatic life. These waters may not receive any discharge that has not received the best degree of treatment, and no new sewage or industrial discharges are permitted in such waters.

The Ala Wai Canal has been listed by the DOH as impaired for chlorophyll a, enterococci, nitrogen, total phosphorous, and turbidity. The Mānoa-Pālolo Drainage Canal has been listed as impaired for chlorophyll a, fecal coliform, nitrogen, total phosphorus, and turbidity. Makiki Stream has been listed as impaired for nitrogen and total phosphorus.[32] This classification indicates that these waters do not presently meet applicable water quality standards. In addition, the Ala Wai Canal is not expected to meet those standards despite any foreseeable implementation of potential pollution actions to minimize impacts or control measures. The DOH has issued an ongoing fish advisory against consumption of fish from the Ala Wai Canal due to contamination (i.e., lead, pesticides).

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the Proposed Action and alternative alignments are located in Zones X, A, and AO. The National Flood Insurance Program (NFIP) regulates development within Zones A and AO (Special Flood Hazard Areas).

No wetlands are identified within the project area.

4.7.2 Potential Impacts and Actions to Minimize Impacts

The Proposed Action and the alternative alignments would not involve area-wide dewatering for construction and would not result in a net increase in impervious surfaces. Therefore, neither a net decrease in infiltration to groundwater nor a net increase in surface water runoff would occur.

4.7.2.1 Proposed Action

Construction

Groundwater. No significant impacts to drinking water or groundwater would result from the Proposed Action. Because drinking water wells near the project are upgradient, the closest being approximately 1,750 feet, more than 0.25 mile, from the proposed Date Street work, no significant adverse impacts on drinking water resources are anticipated. In the Phase 1 area, where groundwater is as shallow as five feet bgs, groundwater may be encountered during trenching, and construction

[32] Hawai'i DOH. June 16, 2004. *2004 List of Impaired Waters in Hawai'i.* Final.

dewatering may be required. In the Phase 2 area, where groundwater is approximately 16 to 18 feet bgs, trenching activities are not likely to encounter groundwater. Directional drilling, considered in Phase 2, would likely intersect the shallow basal aquifer.

Phase 1 excavations may encounter groundwater. Given the expected high permeability of the soils, excavations below groundwater would be sealed, and dewatering would take place within the sealed excavation. This would minimize the potential for area-wide groundwater subsidence, thereby reducing potential effects on structural foundations near the work area. The sealing methods for excavations below groundwater could involve the use of bentonite clay mudseals and sheetpiles.

If required, dewatering activities would be localized and water removal would be temporary and minimal, so groundwater levels would not be affected beyond the immediate project area. Water removed from construction excavation would not be discharged to storm drains or other surface waters. It would be pumped into forward trenches to allow for infiltration into the water table. No impact to groundwater would occur.

If a NPDES permit is determined to be required for construction dewatering, the appropriate application would be submitted and HECO would comply with all permit requirements.

If contaminated groundwater were encountered during dewatering, appropriate responses in compliance with State law and guidance would be implemented.

Surface Water. No significant impacts to surface water would result from the Proposed Action. Construction activities and equipment generally have the potential to introduce pollutants (e.g., erodible soil and petroleum products) to the project vicinity that could be carried by storm water runoff into the City and County of Honolulu's MS4 system. Work in the vicinity of the MS4 system would be coordinated with the City and County of Honolulu to ensure that storm drain lines and intakes are properly protected and not impacted by the HECO construction. A BMP plan would be developed to address pollution prevention for construction work as a requirement for NPDES construction stormwater permit coverage, if coverage is required.

As the NFIP regulates development in FIRM Zones A and AO, project areas within these Special Flood Hazard Areas would comply with applicable Title 44 CFR and City and County of Honolulu requirements. Compliance with applicable requirements would be insured through City and County of Honolulu review of the construction drawings for the project.

Operation

No significant adverse impacts to groundwater or surface waters would be associated with operation of the improvements. Lines would be maintained through existing manholes and other established access points. Maintenance SOPs would address potential spills of fluids that could pollute surface waters. Groundwater and potential drinking water sources would not be exposed to maintenance activities.

4.7.2.2 Alternative Alignments

The analyses of potential construction and operational impacts to drinking water, groundwater, and surface water from the alternative alignments are the same as those discussed under the Proposed Action. No significant impacts to groundwater, drinking water, or surface water during construction or operation would occur.

4.7.2.3 No Action Alternative

Under the No Action Alternative, water resources would not be affected.

4.8 AIR QUALITY

4.8.1 Existing Conditions

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS), 42 U.S. Code (USC) §7409, 40 CFR Part 50, for the following pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM-10), particulate matter up to 2.5 microns in diameter (PM-2.5), ozone (O_3), and lead (Pb). NAAQS criteria, based on air monitoring data for the above pollutants, are used to designate all air regions within the U.S. into air quality categories for each pollutant: attainment, nonattainment, and unclassifiable. Regions that do not meet the NAAQS are classified as nonattainment; regions where air monitoring data results are better than the standard are classified as attainment. These standards, along with the State AAQS, provide the basis for air pollution control rules and permitting procedures. The island of O'ahu and the State of Hawai'i are in attainment of Federal and State standards.

4.8.2 Potential Impacts and Actions to Minimize Impacts

4.8.2.1 Proposed Action

Construction

No significant impacts to air quality would be associated with the Proposed Action. Project related emissions would be short-term and temporary. Emissions would result from fossil fuel-powered generators and motors of heavy construction equipment and fugitive dust. If required, permits for generators with the potential to affect air quality would be obtained pursuant to HAR 11.60.1. Fugitive dust would be minimized as required by HAR 11.60.1-33.

Operation

No impacts to air quality from the operation of the Proposed Action would occur.

4.8.2.2 Alternative Alignments

The analysis of potential construction impacts to air quality from the alternative alignments is the same as for the Proposed Action. No significant impacts to air quality from construction or operation would occur.

4.8.2.3 No Action Alternative

Under the No Action Alternative, there would be no impact on air quality.

4.9 CULTURAL RESOURCES

4.9.1 Archaeological Resources

Archaeological resources consist of cultural deposits, including subsurface features such as pits, pavements, or earth ovens, and human remains. Assessment of the potential for encountering archaeological resources includes conducting research into the land use history of an area and reviewing reports of previous archaeological investigations in the area. The results of the assessment are used to determine the potential of encountering archaeological sites or deposits during the course of construction. It is possible that some areas will have a low potential to contain subsurface archaeological resources, while other areas may have a higher potential

to contain subsurface resources. An archaeological assessment was prepared in August 2004 by Pacific Legacy, Inc. (Appendix C1), and was updated by a supplemental letter report from Pacific Legacy, Inc. in December 2004 (Appendix C1). A summary of this report is provided below.

4.9.1.1 Existing Conditions

Phases 1 and 2 of the proposed project are located on the Honolulu and Waikīkī plains which include Kalua'Ōlohe and Kapahulu, all within the ahupua'a of Honolulu and Waikīkī. Legendary and early historic accounts describe this area as containing habitation sites, wet and dry land agriculture, artesian freshwater springs, salt making ponds, marsh lands, and various types of fish and duck ponds. After early contact, population decrease and migration left much of this area fallow. Over time, habitation sites increased, grazing of livestock occurred, and eventually, the present urban landscape developed.

Archaeological and archival research in the vicinity of the project areas suggest the presence of subsurface archaeological resources in three areas: a buried traditional fishpond, Loko Upu, documented on historical maps as being just west of the Makaloa Substation; a complex of three fishponds possibly located on the HECO Ward Avenue property; and the area within the King Street right-of-way near the Catholic Cemetery, between Cooke Street and Ward Avenue, where it is possible that human burials may extend mauka of the current boundaries of the cemetery. The locations of the two fishponds have not been confirmed through archaeological investigation.

4.9.1.2 Potential Impacts and Actions to Minimize Impacts

4.9.1.2.1 Proposed Action

Construction

The archaeological assessment (Appendix C1) indicates that there are three areas that may have archaeological resources: the HECO Ward Avenue property (a possible complex of three fishponds); the area within the King Street right-of-way (where human burials may extend mauka of the current boundaries of the cemetery); and west of Makaloa Substation (the traditional pond Loko Upu). In the process of subsurface construction activities in these areas, subsurface archaeological resources may be encountered. Generally, any subsurface archaeological features encountered during construction and any inadvertent burials found will be treated in accordance with law.

Operation

Once the ductlines, manholes, and circuits are in place, no additional subsurface disturbance is anticipated, with the exception of potential future emergency work to replace broken sections of ductline. Emergency construction work would include trenching in the same areas that would have already been excavated as part of the Proposed Action; hence, no impacts during operation are expected.

4.9.1.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to archaeological resources from the alternative alignments is the same for the Proposed Action. No significant impacts to archaeological resources from construction or operation would occur.

4.9.1.2.3 No Action Alternative

In the absence of construction and operation of the 46kV Phased Project, there would be no impacts to archaeological resources from the No Action Alternative.

4.9.2 Traditional Cultural Practices

A Cultural Impact Assessment (CIA) was prepared in August 2004 by Pacific Legacy, Inc. (Appendix C2). State law requires that environmental assessments and environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and state. A summary of the traditional cultural practices (TCPs) identified in the Pacific Legacy report is provided below.

4.9.2.1 Existing Conditions

Phases 1 and 2 of the proposed project are located on the Honolulu and Waikīkī plains which include Kalua'Ōlohe and Kapahulu, all within the ahupua'a of Honolulu and Waikīkī. There is no evidence of TCPs in the project area. The Proposed Action and alternative alignments are in a developed urban area. The TCPs during pre- and early post-contact Hawai'i ceased with the transition to the existing urban center. Legendary and historic accounts characterize the land area as having habitation sites, wet and dry land agricultural areas, freshwater artesian wells, salt making ponds, marshlands, and various types of fish ponds. An early account describes the area as wetlands, developed into a system of fishponds and taro ponds in the 15th century, and containing habitation sites with cultivated fields by the end of the 18th century. Historic accounts indicate that around 1828, the fishponds and

taro pond fields were abandoned, likely due to population decline and destructive livestock foraging. In the early 19th century, the present-day King Street alignment was a footpath along which a tavern and estates with herds of goats and sheep were constructed. A house in the King Street vicinity was used as a hospital in the mid-19th century. During the years of the Great Mahele, around 1845, much of the land in the area was awarded or sold to foreign persons or Hawaiian ali'i. As immigration increased in the 20th century, much of the land was resold in parcels of diminishing size. Characteristics of the project area for the alternative alignments are the same as those described under the Proposed Action.

4.9.2.2 Potential Impacts and Actions to Minimize Impacts

4.9.2.2.1 Proposed Action

Construction

No significant impacts on TCPs are anticipated from the Proposed Action because no TCPs have been identified in the project area. If subsurface features related to TCPs during pre- and early post-contact Hawai'i are encountered during construction, they will be treated in accordance with law.

Operation

Once the ductlines, manholes, and circuits are in place, no additional subsurface disturbance is anticipated, with the exception of potential future emergency work to replace broken sections of ductline. Emergency construction work would include trenching in the same areas that would have already been excavated as part of the Proposed Action; hence, no impacts during operation are expected.

4.9.2.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to TCPs from the alternative alignments is the same as for the Proposed Action. No significant impacts on TCPs from construction and operation would occur.

4.9.2.2.3 No Action Alternative

No significant impacts on TCPs would occur from the No Action Alternative.

4.9.3 Historic Resources

State historic properties are identified in HAR 13-198 as any building, structure, object, district, area, or site that is significant in the history, architecture, archaeology, or culture of the State, its communities, or the nation. National historic properties meet criteria identified in 36 CFR Part 60.4. Historic sites that meet eligibility criteria may be listed on the appropriate State or National Register of Historic Places, or both. Archaeological sites are discussed in section 4.9.1. This section addresses buildings, structures, and sites other than archaeological resources that are designated as historic properties.

4.9.3.1 Existing Conditions

Three historic sites along the Phase 2 King Street alignment—Thomas Square Park, Linekona School, and McKinley High School—have been placed on the State and National Registers of Historic Places because of their local and national significance. These are described below.

Thomas Square Park, located on the northeast corner of the King Street and Ward Avenue intersection, was placed on the Hawai'i Register of Historic Places on March 23, 1972, and assigned identification number 80-14-9990. The park was placed on the National Register of Historic Places in 1974. Its historic significance is tied to events in 1843. After British forces overstepped their bounds by seizing government buildings in Honolulu and forcing King Kamehameha III to cede the islands to England, Queen Victoria sent Admiral Richard Thomas to the islands to restore sovereignty. Thomas Square Park is the location where, in 1843, ceremonies were held restoring the Hawaiian Kingdom.

Linekona School, located on Victoria Street across from Thomas Square, was placed on the Hawai'i Register of Historic Places on December 17, 1979, and assigned identification number 80-14-1339. The school was placed on the National Register of Historic Places in 1979. Linekona School does not border the Phase 2 alignment. Linekona School is historically significant as a well-preserved school complex and an example of turn-of-the-century architectural eclecticism applied to a public building in Hawai'i. The school is also significant in the history of education in Hawai'i, as it was for a number of years the only public school in Hawai'i offering instruction in English.

McKinley High School, located on the makai side of King Street at the intersection with Pensacola Street, was placed on the Hawai'i Register of Historic Places on May 3, 1980, and assigned identification number 80-14-9926. It was placed on the National Register of Historic Places in 1980. The leading public school in Hawai'i in the 1920s and 1930s, McKinley High School offered the public a level of education that, at the time, was generally only available at private schools. It is also

architecturally significant as an example of Spanish Colonial revival architecture in Hawai'i.

4.9.3.2 Potential Impacts and Actions to Minimize Impacts

4.9.3.2.1 Proposed Action

Construction

No significant impacts to historical resources from the Proposed Action would occur. Construction activities would take place within public rights-of-way or substations. For the directional drilling option considered for Phase 2, the sidewalk and grassy area along King Street in front of McKinley High School was evaluated as a staging site for the drilling materials. This activity would not affect the school buildings, and the site sidewalk and grassy area would be restored to its original condition after completion of construction.

Operation

No significant impacts to historic properties are expected from operation of the 46kV Phased Project.

4.9.3.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to historic resources from the alternative alignments is the same as for the Proposed Action. No significant impacts to historic resources from construction or operation would occur.

4.9.3.2.3 No Action Alternative

No significant impacts to historic properties would occur from the No Action Alternative.

4.10 VISUAL AND AESTHETIC RESOURCES

4.10.1 Existing Conditions

Visual resources include scenic vistas, scenic overlooks, unique topography, or visual landmarks having scenic value. Mature trees, discussed in Section 4.11, can

be contributing elements to this resource. The City and County of Honolulu's Development Plan (DP) defines public views as "views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural feature, heritage resources, and other landmarks, and view corridors between significant landmarks."[33] Impacts to visual resources are based on the degree and duration of disturbance to the visual quality of an area.

The proposed project area consists of existing streets in a mixed-use urban setting. Building types range from single-family homes to high-rise residential and commercial buildings. Roadways are from two to six lanes in width. The wider, busier roads, including King Street, Kapi'olani Boulevard, Date Street, and Makaloa Street, generally run in the 'Ewa–Koko Head or east-west direction. Many of the mauka-makai streets, including Pumehana Street, Winam Avenue, and Cooke Street, are smaller, residential streets. Landscaping along the roadways is inconsistent. A grassy median strip with trees is present on Kalākaua Avenue. Open spaces are present along sections of the roadways as parks, such as Thomas Square, school grounds (McKinley High School), and areas associated with large buildings (Neil S. Blaisdell Center and the Department of Agriculture building along King Street). Views are generally confined to the viewer's immediate surroundings.

For Alternative Alignment 1, Kāheka Street is a sparsely landscaped, two-lane road that runs mauka-makai, fronted by mixed residential and commercial properties. For Alternative Alignment 2, visual resources for Kalauokalani Way are similar to those for Kāheka Street.

4.10.2 Potential Impacts and Actions to Minimize Impacts

4.10.2.1 Proposed Action

Construction

No significant impacts on visual and aesthetic resources would be associated with the Proposed Action. Construction related activities would be temporary. HECO will coordinate with its arborist and the City and County of Honolulu Department of Parks and Recreation (DPR) to avoid affecting root structures of trees along the Proposed Action alignment.

33 City and County of Honolulu. Revised Ordinances of Honolulu, *Chapter 24, Development Plans.*

Operation

No significant impacts on visual and aesthetic resources would occur. The subtransmission lines would be underground with no visual obstructions.

4.10.2.2 *Alternative Alignments*

The analysis of potential construction and operational impacts to visual resources from the alternative alignments is the same as for the Proposed Action. No significant impacts to visual resources from construction or operation would occur.

4.10.2.3 *No Action Alternative*

Under the No Action Alternative, no potential impacts on visual resources would occur.

4.11 BIOLOGICAL RESOURCES

4.11.1 Existing Conditions

The area affected by the Proposed Action and alternative alignments consists of existing paved City and County of Honolulu streets and adjacent sidewalks or landscaping. No threatened or endangered species or their habitats are known to exist here. No exceptional trees have been identified along the considered alignments where trenching or directional drilling would occur. Exceptional trees are defined as "a tree or grove of trees with historic or cultural value, or which by reason of its age, rarity, location, size, esthetic quality or endemic status has been designated by the city council as worthy of preservation" by ROH 41-13, Protective Regulations for Exceptional Trees.[34] Exceptional trees identified along the project route are mahogany trees (*Swietenia mahogani*) along the Kalākaua Avenue median; however, these occur in areas where circuits would be installed in existing ductlines. Other large trees along the route identified by the City and County of Honolulu DPR Division of Urban Forestry as either private or City and County of Honolulu-owned, but not designated as exceptional, include monkeypod trees (*Samanea saman*) along Makaloa Street and rainbow shower trees (*Cassia x nealiae*) along King Street.[35]

---

[34] Revised Ordinances of Honolulu, Chapter 41. http://www.co.honolulu.hi.us/refs/roh/41a1_25.htm. Accessed June 25, 2004.

[35] City and County of Honolulu, Department of Parks and Recreation. June 14, 2004. Personal communication with Mr. Stanley Oka and Belt Collins Hawaii.

Animals common to urbanized areas of Honolulu are mainly alien birds, rodents, mammals, and insects.

4.11.2 Potential Impacts and Actions to Minimize Impacts

4.11.2.1 Proposed Action

Construction

Construction activities within existing streets would have no effect on biological resources in the area. HECO would coordinate with its arborist and the City and County of Honolulu DPR to avoid affecting root structures of trees along the Proposed Action alignment. If landscaped areas, e.g., grassy areas fronting McKinley High School and Washington Middle School are affected, they would be restored by HECO.

Operation

Operational activities would have no effect on biological resources.

4.11.2.2 Alternative Alignments

The analysis of potential construction and operational impacts to biological resources from the alternative alignments is the same as for the Proposed Action. No significant impacts to biological resources from construction or operation would occur.

4.11.2.3 No Action Alternative

With no construction or operation, no impacts would occur.

4.12 SOCIOECONOMIC ENVIRONMENT

This section describes the socioeconomic characteristics of the project area, including demographics, residential characteristics, employment and income, economic activities, and energy use, and assesses construction-related and operational impacts of the Proposed Action, Alternative Alignments, and No Action Alternative.

4.12.1 Existing Conditions

4.12.1.1 Demographics

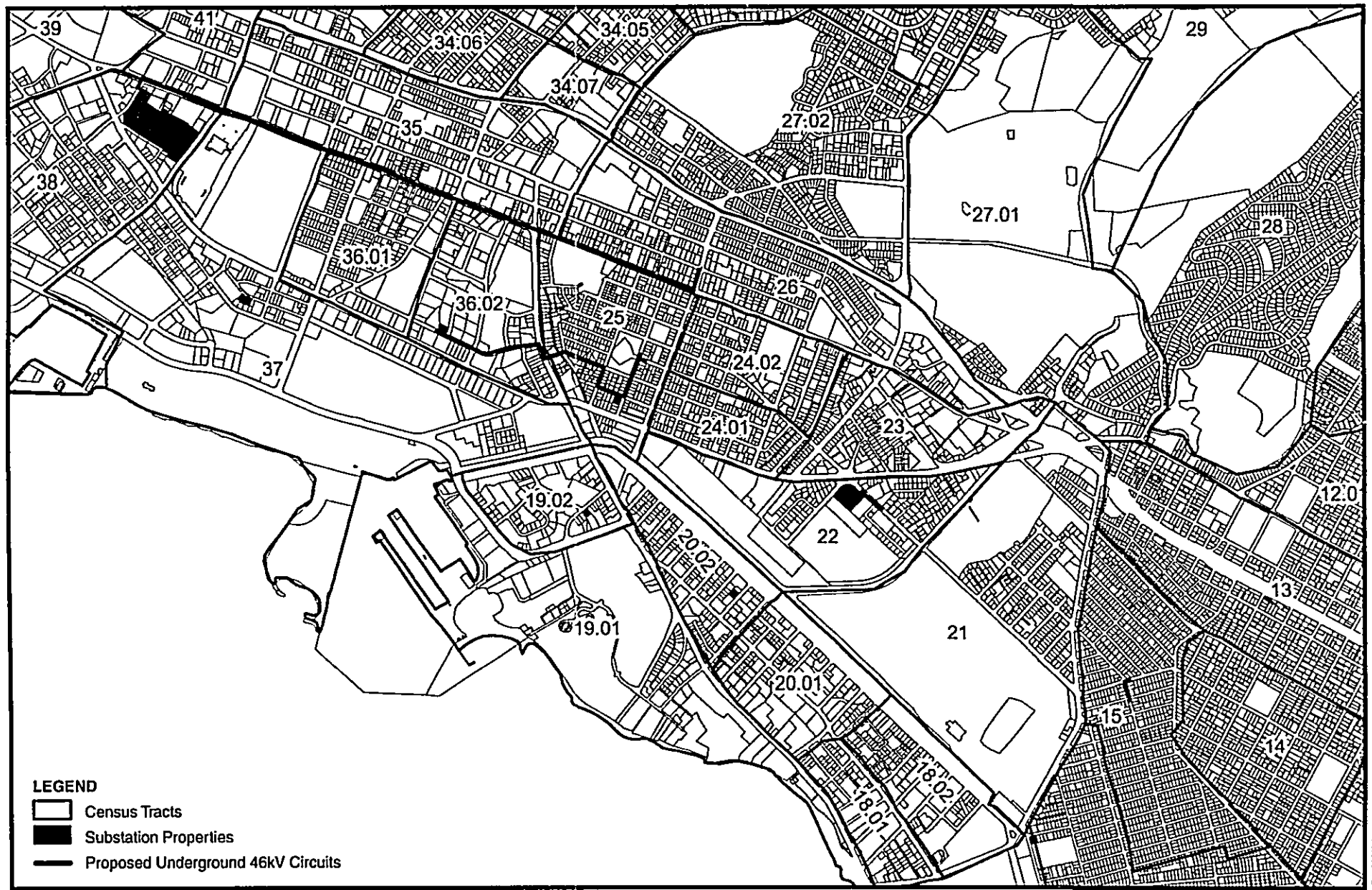
The proposed project area is located in O'ahu Census Tracts 16, 25, 26, 35, 36.01, 36.02, 37, and 38 (Figure 4-8). In 2000, the population of these census tracts totaled 33,237 people. The population in these tracts has been stable, increasing a total of approximately one percent over the 20 years between the 1980 and 2000 census counts. In the 1990s, the rate of population growth in the proposed project area (as defined by the census tracts listed here) exceeded that of the island as a whole.

Population projections for the City and County of Honolulu show that the Primary Urban Center, which extends from Pearl City to Kāhala and in which the proposed project area is situated, is expected to experience higher rates of growth than in the past decades. The annual rate of growth between 2000 and 2025 is projected to be in the range of 0.6 percent. Since the Primary Urban Center is already extensively developed, population growth will likely be accommodated in higher density residential projects in existing residential areas, through infill or replacement.

Census data indicate that the population in the proposed project area differs from the island as a whole. Households are smaller; average household size is 1.95 persons per household compared to 2.95 for the entire island. Two-thirds of the homes in the project area are occupied by renters, compared to less than half (46 percent) for the island as a whole. And the project area population is older, with a mean age of 44 years compared to 37 years island-wide.

4.12.1.2 Residential Characteristics

Residential uses account for approximately half of the buildings fronting the Phase 1 alignment and the alternative alignments, whereas only about three percent of the buildings fronting the Phase 2 alignment are in residential use. These are a mix of housing types ranging from single-family homes to high-rise condominiums. Many are two- and three-story apartment buildings.



NORTH

0 1000 2000

SCALE IN FEET

Figure 4-8
CENSUS TRACTS

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

4.12.1.3 Employment and Income

The proposed project area has a lower rate of labor force participation (55 percent employed) than O'ahu as a whole (65 percent employed). This reflects the generally older population in the project area. With fewer workers, mean household incomes are much lower: $45,889 (project area) versus $65,439 (island-wide). Per capita income in the project area is higher than for the island as a whole ($23,995 versus $21,998).

4.12.1.4 Businesses in the Project Area

An inventory was conducted of structures fronting the proposed and alternative alignments to estimate the number and types of ground-level businesses with the potential to be affected by in-road construction activities. The inventory also identified hours of business in cases where this information was clearly posted. Table 4-17 is a summary of the inventory.

Table 4-17. Business Inventory

	Proposed Action Phase 1	Phase 1 Alternative Alignment 1	Phase 1 Alternative Alignment 2	Proposed Action Phase 2
Ground Level Businesses				
Gas station	0	0	0	5
Grocery store	3	3	2	0
Office: not likely to have visitors	1	1	0	6
Office: service (bank, dentist, etc.)	20	16	18	51
Other retail	10	9	4	70
Restaurant	16	11	11	47
Vacant storefront	0	0	0	6
TOTAL	50	40	35	185
Hours Posted				
Normal business hours	14	13	13	62
Open evenings	5	4	1	16
Open after 10 PM	4	5	3	9
Open 24 hours	2	2	2	0
TOTAL	25	24	19	87

The ground-level businesses along the proposed and alternative alignments are primarily a mix of retail, offices that provide services, and restaurants.

About half of the businesses had their hours of business clearly posted. Of these, most had normal business hours (generally between 9:00 A.M. and 6:00 P.M.). About a quarter of the businesses along the Phase 1 route and along the alternative alignments were open late at night or all night. Along the Phase 2 route, only 10 percent of the businesses were open late.

The Hawai'i Convention Center is located on both of the alternative alignments.

4.12.1.5 *Construction Activity*

In the 1980s, government construction spending accounted for as much as 30 percent of all construction. As of 2003, the share of government spending on construction had dropped to 15 percent. Roadway construction projects have taken place in recent years on most streets in the project area.

A 1994 study of government spending by development plan area suggested that spending per capita was appreciably higher for the older, established communities of O'ahu than for the new growth areas in 'Ewa and Central O'ahu. While the project area has been relatively stable in terms of population and development, it is likely to experience new residential, commercial, and institutional developments in the vicinity that have been announced or are now underway.

4.12.1.6 *Energy Use*

As O'ahu's sole electric utility, HECO responds to demand for about 7.5 billion kilowatts of power annually. Commercial users account for most of the energy use. Residential energy use has been growing, especially when measured in terms of demand per resident. While energy use trend statistics are not specifically available for the project area, regional data from HECO suggests that the distribution of energy use has changed little over the last decade.

4.12.2 Potential Impacts and Actions to Minimize Impacts

4.12.2.1 *Proposed Action*

Construction

No significant adverse socioeconomic impacts would be associated with the Phase 1 and Phase 2 construction activities.

Population Impacts. Population impacts arise when a project attracts new residents to the island or region. There would be no measurable change in population due to

short-term construction. With no population change and no permanent new employment, no housing impacts are expected.

Impacts on Project Area Residents. Project area residents would not experience any significant economic impacts during the Phase 1 and Phase 2 construction. Management measures would assure vehicular and pedestrian access to and from residential properties. Other potential impacts on residents—such as noise and traffic—are discussed in other sections of this document.

Impacts on Employment and Income. The Proposed Action would involve approximately 106 direct jobs in the course of construction. Using the State of Hawai'i Input-Output Model multipliers for engineering, electrical work, and other construction (i.e., not residential or commercial building construction), indirect and induced jobs associated with the project can be estimated. Since these jobs are found throughout the economy, indirect and induced incomes are estimated on the basis of average wages in the island economy. Table 4-18 shows that the total wages associated with project construction would be about $11.1 million (2004 dollars).

Table 4-18. Construction-related Employment and Incomes

	Phase 1 Proposed Action	Phase 1 Alternative 1	Phase 1 Alternative 2	Phase 2
Construction Employment				
Direct Jobs	38	54	54	68
Indirect Jobs	26	36	36	45
Induced Jobs	32	45	45	57
TOTAL	96	134	135	170
Wages				
Direct Jobs	$2,258,000	$3,173,000	$3,206,000	$3,197,000
Indirect Jobs	$909,000	$1,268,000	$1,282,000	$1,613,000
Induced Jobs	$1,138,000	$1,591,000	$1,608,000	$2,023,000
TOTAL	$4,305,000	$6,032,000	$6,096,000	$6,833,000

Note: A "job" is a year's full-time equivalent of work. The number of people actually engaged in the work will likely be much greater, with specialty contractors working only part of the time. Direct jobs are estimated from preliminary HECO construction cost estimates. Indirect and induced jobs are based on the Hawai'i State Input-Output model (DBEDT 2002), combining ratios for engineering, electrical work, and other construction. Wages for indirect and induced workforce are from the Department of Labor and Industrial Relations (DLIR) (2003), updated to 2004 in proportion to increases in the Consumer Price Index (DBEDT 2004).

Impacts on Businesses in the Project Area. To assess the potential economic impact of construction activity on businesses in the project area, HECO commissioned interviews of businesses elsewhere in Honolulu located near currently ongoing and recently completed projects involving in-road construction. The objective was to learn how nearby in-road construction affects small business revenues and activities. A total of 33 interviews were conducted with owners, managers, and employees of businesses on the east side of Honolulu. Comments received from these interviews are summarized below:

- Many respondents accepted that the construction was needed and that some short-term impact was inevitable.
- Several anticipated that road improvements would eventually lead to more customers and revenues.
- Some respondents reported short-term loss of income. These businesses typically depended on the sidewalk and roadway access more than most, for example, restaurants that set up tables outside and merchants that depended on walk-in traffic.
- Noise and dust were mentioned as problems.
- Concern for pedestrian safety on sidewalks was also mentioned.

Although the projects experienced by the 33 respondents may differ from the Proposed Action in terms of construction methods and duration, as well as management measures implemented, the comments received are useful in suggesting measures to avoid or minimize the impacts noted.

A total of 63 restaurants are located along the proposed alignment (16 restaurants in Phase 1 and 47 in Phase 2). Few of the restaurants along King and Makaloa are open to the street. An exception is the food court in front of Daiei near Makaloa Street. This food court is not comparable to the restaurants described by the interview respondents because it fronts a noisy, congested parking lot, and project construction would occur on the far side of the lot.

As mentioned in the interviews, loss of revenue appeared to be associated with restricted vehicular or pedestrian access. Appropriate management measures during construction would assure that access to small businesses such as small grocery and convenience stores with drive-by and pedestrian customers would not be blocked. Such measures would also minimize impacts on fast food outlets and gas stations, which depend on open vehicular access, as well as service-oriented offices such as banks and dentists. The management of traffic, noise, and dust (air quality) impacts is covered in other sections of this document.

Fiscal Impacts. The City and County of Honolulu depends on property taxes as its largest single source of revenues. The Proposed Action is not expected to affect

property taxes since it would not result in any increase or reduction of values or amenities for any taxable properties.

If HECO's construction work can be coordinated with City and County of Honolulu projects, there is a potential for repaving to be done simultaneously for both projects, resulting in a modest saving to the City and County of Honolulu in the cost of future capital improvements. The City and County of Honolulu's former curb-to-curb repaving policy would have transferred the cost of repaving to the utility, saving the City and County of Honolulu some part of the cost of future capital improvements. If the City and County of Honolulu's former policy were followed, the overall cost of the 46kV Phased Project is estimated to increase by approximately $5.3 million.

The State of Hawai'i derives revenues from several tax streams, notably excise and income taxes. Table 4-19 provides an estimate of revenues for the state associated with the Phase 1 and Phase 2 construction. The total income stream for the state is estimated to be slightly below $2 million (2004 dollars).

Table 4-19. State Revenues Associated With Construction (Millions of 2004 Dollars)

	Phase 1 Proposed Action	Phase 1 Alternative 1	Phase 1 Alternative 2	Phase 2
Construction-Related Wages	$4.3	$6.0	$6.1	$6.8
Revenues for Contractors[1]	$11.3	$13.4	$13.5	$11.5
Excise Taxes on				
Construction Spending	$0.45	$0.54	$0.54	$0.46
Construction-Related Workforce Spending[2]	$0.12	$0.16	$0.16	$0.18
CORPORATE INCOME TAX[3]	$0.02	$0.02	$0.02	$0.02
PERSONAL INCOME TAX[4]				
Construction-Related Workforce Incomes	$0.24	$0.33	$0.34	$0.38
TOTAL	$0.83	$1.05	$1.06	$1.04

Notes:

1 Construction will involve both HECO personnel and outside contractors. This calculation uses current estimates of the amount of work to be performed by outside contractors, and estimates of materials costs.

2 Direct, indirect and induced construction workforce spending; disposable income estimated from historical averages (DBEDT 2003).

3 Ratio of revenues to corporate income tax estimated as 0.25%, (Department of Taxation 1991).

4 Ratio of taxes paid to incomes estimated as 5.5%, based on historical data (DBEDT 2003)

Operation

With completion of the project, economic impacts on HECO rate payers are expected in the form of rate increases. Based on current estimates of project cost, the incremental rate impact per month for the typical residential customer would be an increase of $0.73 in 2008, the year after Phase 1 is installed. After Phase 2 is installed in 2010, the rate impact for a typical residential customer's bill would be an increase of $0.93. With curb-to-curb repaving, the incremental rate impact per month would be higher: $0.74 in 2008 and $1.02 in 2010. These increases would only go into effect if the Public Utilities Commission approves a rate increase.

No other socioeconomic impacts would be associated with operation of the proposed improvements.

4.12.2.2 *Alternative Alignments*

Construction

No significant adverse socioeconomic impacts would be associated with construction of the alternative alignments.

Population Impacts. Similar to the Proposed Action, no population impacts are expected.

Impacts on Project Area Residents. Project area residents would not experience any significant economic impacts during construction. Management measures would assure vehicular and pedestrian access to and from residential properties.

Impacts on Employment and Income. The alternative alignments for Phase 1 would have higher construction costs and involve more jobs than under the Proposed Action. Total wages associated with project construction would be about $6.6 million (2004 dollars) for the Alternative Alignment 1 and $6.7 million for Alternative Alignment 2 (compared to $4.7 million for Phase 1 of the Proposed Action). The number of direct jobs would be 63 for each alternative alignment, compared to 44 direct jobs for Phase 1 of the Proposed Action.

Impacts on Businesses in the Project Area. The inventory of businesses along the alternative alignments shows fewer ground-level businesses in the project vicinity, compared to Phase 1 of the Proposed Action. The Hawai'i Convention Center is located on both alternative alignments. Management measures during construction would minimize impacts along these alignments, similar to the Proposed Action.

Fiscal Impacts. The alternative alignments would have no effect on City and County of Honolulu revenues. The cost savings to the City and County of Honolulu if its former curb-to-curb repaving policy was followed would be approximately the same as under the Proposed Action—about $5.3 million.

As shown in Table 4-19, revenues to the State would be higher under each Phase 1 alternative ($1.14 million for Alternative Alignment 1 and $1.15 million for Alternative Alignment 2) than under the Proposed Action ($0.89 million for Phase 1).

Operation

The analysis of potential socioeconomic impacts for the alternative alignments is the same as for the Proposed Action. No significant socioeconomic impacts would occur from operations along the alternative alignment.

4.12.2.3 No Action Alternative

With No Action, there would be no construction-related impacts relative to socioeconomics. The operational impact of the No Action Alternative would be the potential for economic losses experienced by businesses, government, residents, and others due to an increase in power outages.

The Proposed Action is intended to provide added reliability to the eastern and windward portions of O'ahu, which represent 56 percent of HECO's total load. Under No Action, the transmission problems described in Chapter 2 would not be addressed, thereby increasing the risk of overload situations and concerns.

4.13 ELECTRIC AND MAGNETIC FIELDS (EMF)

4.13.1 Introduction

In 2003, HECO gathered public comments for new proposed line initiatives. Surveys showed that EMF was a public concern, with a majority feeling somewhat concerned (17.2 percent), quite a bit concerned (4.7 percent), or very concerned (34.4 percent). A number of people expressed questions and concerns including: (1) how EMF is measured; (2) the effect of nearness to the EMF sources; (3) the latest understanding of health hazards related to EMF; and (4) the honesty of HECO's portrayal of EMF levels (3Point 2003). The following section provides information on EMF relating to the Proposed Action. This section includes:

- An overview of electric and magnetic fields;
- A review of current standards, guidelines and policies related to EMF;
- A review of evaluations of EMF research by national and international scientific organizations; and

- A summary of the Magnetic Field Evaluation prepared by Enertech Consultants of Santa Clara, Inc. (Enertech) describing the existing and projected magnetic field levels (Appendix D1).

In the United States, there are presently no federal standards for occupational or residential exposure to 60 Hz EMF.

HECO looks to the Department of Health's position of "prudent avoidance" for guidance in this area. Briefly, prudent avoidance consists of taking reasonable, practical, simple and relatively inexpensive actions to reduce exposure to EMF. For the new power lines in the Proposed Action, HECO will optimize placement of multiple circuit cables to achieve partial cancellation of EMF, resulting in reduced EMF levels.

4.13.2 EMF Overview

4.13.2.1 Sources of EMF

There are many natural sources for electric and magnetic fields. They appear throughout nature and in all living things. The earth has a strong magnetic field created by the rotation of its inner core. Atmospheric forces cause large electric fields at the earth's surface during thunderstorm activity. Certain minerals in the earth's crust, particularly iron and its compounds, have magnetic properties and give rise to magnetic fields. At the human level, the body itself is a strong source of internal electric fields. All cells in the body maintain large natural electric fields across their outer membranes. These naturally occurring fields are at least 100 times more intense than those that can be induced by exposure to common electric power-frequency fields.

Since the development of commercial and domestic uses of electricity in the last century, many manmade sources of EMF have been added to the natural sources, including from the electric power systems that generate and deliver electricity to industry, offices, and homes. On O'ahu, 138kV transmission lines form the island's transmission system. These 138kV transmission lines terminate at substations, where step-down transformers reduce the voltage for distribution purposes. The power is then carried shorter distances over various types of subtransmission and distribution lines at voltages of 46kV and below to the ultimate users. By the time the power is delivered to the residential user, its voltage has been reduced to the household level of 120/240 volts. The Proposed Action would be operated at 46kV. In contrast, transmission lines in operation in the mainland United States range in voltage up to 765kV.

Electric and magnetic fields are not only from transmission and distribution power lines, but also from the distribution and use of that power inside buildings. One

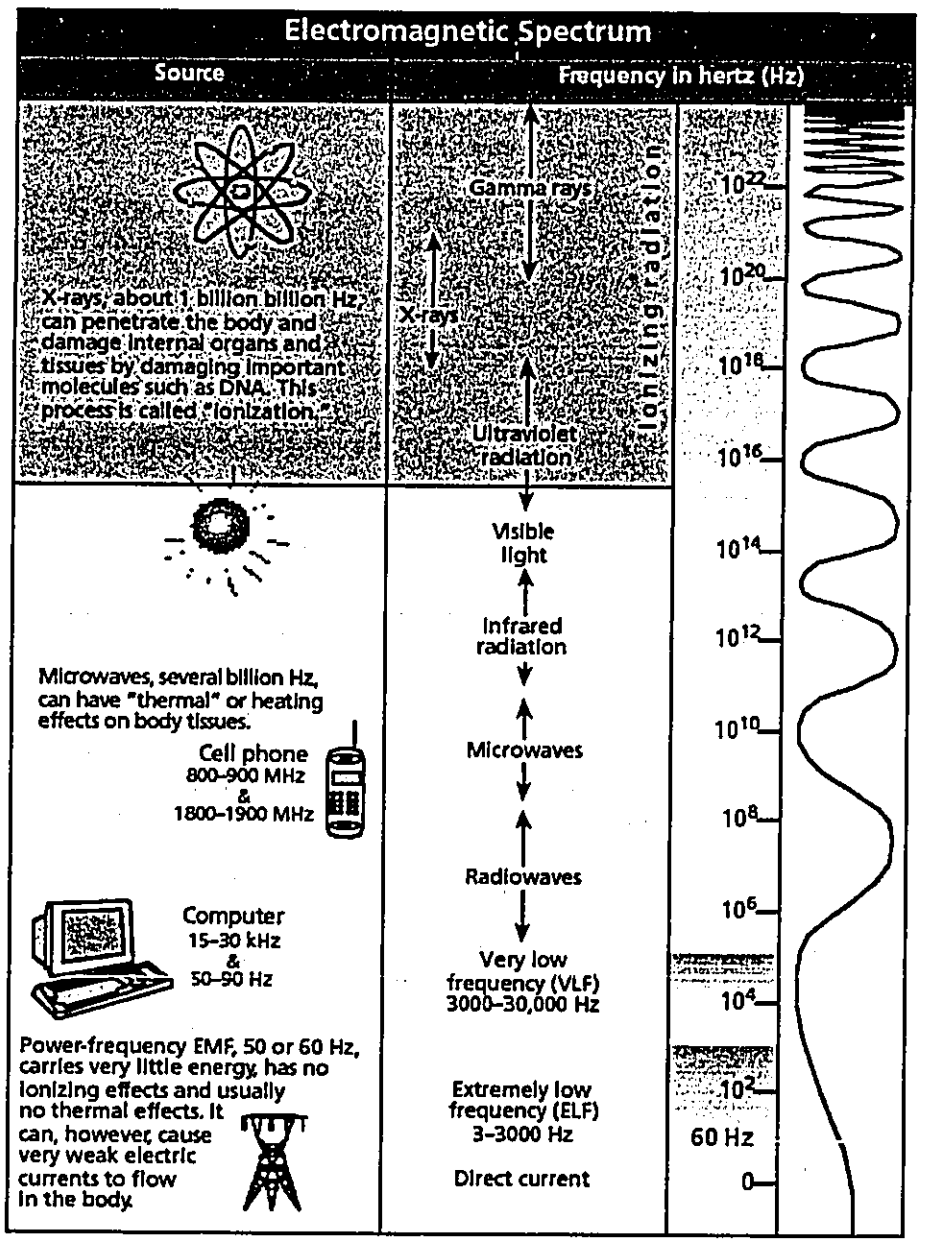
common source of such fields is the building wiring, which delivers the electricity to the individual rooms in which it is used for lighting, climate control, or operating appliances. Although the magnetic fields from wiring in modern buildings are usually low, wiring in older buildings can make significant contributions to the average magnetic field in homes and buildings. Another source, often overlooked, are the "ground currents" that flow through the water pipes, gas lines, or steel framing typically used for grounding the wiring system of a building. Magnetic fields produced by ground currents can contribute substantially to the overall magnetic field in homes.

A third common source of EMF is electric equipment and appliances. For industry, this means all machines and tools powered by electricity—virtually all industrial machinery in use today. In the office, this means fluorescent light fixtures and equipment such as computers, video display terminals, printers, copiers, typewriters, and fax machines. In the home, this means television sets, videocassette recorders, compact disc players, radios, table lamps, vacuum cleaners, power tools, air conditioners, electric shavers, hair dryers, clothes washers and dryers, irons, electric ovens and ranges, refrigerators and freezers as well as toasters, coffee makers, food processors, and all other small kitchen appliances.

Power frequency electric and magnetic fields are different from other types of energy such as x-rays, visible light, microwaves and radiowaves. For example, cellular telephones communicate by emitting high-frequency electric and magnetic fields similar to those used for radio and television broadcasts. Microwave ovens produce 60-Hz fields of several hundred milligauss (mG), but they also create microwave energy inside the oven that is at a much higher frequency (about 2.45 billion Hz) (NIEHS 2002). These radio frequency and microwave fields are quite different from the extremely low frequency EMF produced by the underground power lines in this Proposed Action as shown on Figure 4-9.

4.13.2.2 *Electric Fields*

Electric fields are a result of the voltage or electric potential on an object. Any object with an electric charge on it has a voltage at its surface caused by the accumulation of more electrons on that surface as compared to another object or surface. The voltage effect is not limited to the surface but exists in the space surrounding the object. The change in voltage over distance is known as the electric field. The units describing an electric field are volts per meter (V/m) or kilovolts per meter (kV/m). The electric field is stronger near a charged object and decreases rapidly with distance from an object.



The wavy line at the right illustrates the concept that the higher the frequency, the more rapidly the field varies. The fields do not vary at 0 Hz (direct current) and vary trillions of times per second near the top of the spectrum.

Note that 10^4 means 10 x 10 x 10 x 10 or 10,000 Hz.
1 kilohertz (kHz) = 1,000 Hz
1 megahertz (MHz) = 1,000,000 Hz

Figure 4-9
ELECTROMAGNETIC SPECTRUM

Source: National Institute of Environmental Health Sciences, 2002

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

Electric fields are a common phenomenon. Static electric fields can result from taking off a sweater or walking across a carpet. Most household appliances and other devices that operate on electricity create electric fields. Appliances need not be in operation to create an electric field. An electric field occurs whenever an appliance is connected to an electrical outlet.

Electric fields are shielded by objects in the environment, especially objects that conduct electricity. For example, buildings, tall fences, and even trees can partially shield electric fields originating from nearby power lines.

4.13.2.3 Magnetic Fields

An electric current flowing in any conductor (for example, electric equipment, household appliance) creates a magnetic field. This magnetic field is the region of space in which the moving electrical charge is capable of exerting, at a distance, a magnetic force over any other moving charge. The magnetic field is different from the electric field. For example, the magnetic field does not have a beginning or an end, but forms closed, continuous loops of force around the source of the field. However, like the electric field, the strength of the magnetic field also diminishes with distance. In contrast to electric fields, magnetic fields can pass through most objects and can be blocked only by special shielding materials. Also unlike electric fields, magnetic fields are caused by a flow of current and can be generated only when a device is in operation.

The magnetic fields under transmission lines are relatively low in comparison with fields measured near many household appliances and other common electrical equipment. In fact, the most intense magnetic fields in the home are found near appliances (particularly those with small motors or transformers such as hairdryers and fluorescent light fixtures). However, users generally spend only brief periods of time around these household appliances (with the exception of television sets, home computers, fans, and air conditioners).

Magnetic fields produced by these appliances are generally not the main source of background magnetic field levels. Although household appliances can produce higher, more concentrated magnetic fields, they originate from a single point. Line sources, such as power lines, produce lower, less concentrated magnetic fields, but are distributed along the line. Magnetic fields decrease rapidly with distance from the source. Fields that originate from a single point source drop off more rapidly than fields that originate from a line source. The magnetic fields of a large number of typical household appliances have been measured and reported in several previous studies. Table 4-20 shows typical values of magnetic fields associated with household appliances as measured by the Illinois Institute of Technology Research Institute for the U.S. Navy (Gauger 1985). The strength or intensity of a magnetic field is primarily proportional to its current.

Table 4-20. Typical Magnetic Field Values for Household Appliances

Appliance	Magnetic Field (mG)	
	12 Inches Away	Maximum
Electric Range	3-30	100-1,200
Electric Oven	2-5	10-50
Garbage Disposal	10-20	85-1,280
Refrigerator	0.3-3	4-15
Clothes Washer	2-30	10-400
Clothes Dryer	1-3	3-80
Coffee Maker	0.8-1	15-250
Toaster	0.6-8	70-150
Crock Pot	0.8-1	15-80
Iron	1-3	90-300
Can Opener	5-250	10,000-20,000
Mixer	6-100	500-7,000
Blender, Popper, Food Processor	6-20	250-1,050
Vacuum Cleaner	20-200	2,000-8,000
Portable Heater	1-40	100-1,100
Fans, Blowers	0.4-40	20-300
Hair Dryer	1-70	60-20,000
Electric Razor	1-100	150-15,000
Color Television	9-20	150-500
Fluorescent Light Fixture	2-40	140-2,000
Fluorescent Desk Lamp	6-20	400-3,500
Circular Saws	10-250	2,000-10,000
Electric Drill	25-35	4,000-8,000

Source: Gauger 1985.

The most commonly used units of measurement of the strength of a magnetic field, or more accurately, the magnetic flux density are the tesla (T) or gauss (G), where 1 T = 10^4 G. Because the range of magnetic fields encountered is usually quite small, the fields are generally described in units of microtesla (1 μT = 0.000001 T) or milligauss (1 mG = 0.001 G).

4.13.2.4 *Electric and Magnetic Field Standards, Guidelines, and Policies and Governmental Publications*

In Hawai'i, general transmission line safety standards are imposed by the State of Hawai'i Public Utilities Commission General Order Nos. 6 (Rules for Overhead

Electric Line Construction) and 10 (Rules for Construction of Underground Electric and Communications Systems). On issues not covered by General Orders 6 and 10, the National Electrical Safety Code may be used as guidance. These rules primarily address the electrical safety of the public but do not specifically address EMF. Although a few States within the United States have set non health-related standards for levels of electric and magnetic fields, neither the federal government nor any of the State governments have developed health-related standards specifically for 60-hertz EMF. However, several State and national agencies have developed guidelines and policies to assist in the siting of future transmission lines and to aid in developing research into the potential effects of electric and magnetic fields. Some of the more relevant guidelines and policies relating to EMF are outlined below.

State of Hawai'i Department of Health. On January 19, 1994, the Hawai'i State Department of Health (DOH) issued a statement entitled "DOH Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources." This statement replaces an earlier one issued on April 3, 1991. The statement reads as follows:

> *The Department of Health, in response to continuing but inconclusive scientific investigation concerning EMF from low-frequency power sources, recommends a "prudent avoidance" policy. "Prudent avoidance" means that reasonable, practical, simple, and relatively inexpensive actions should be considered to reduce exposure.*
>
> *A cautious approach is suggested at this time concerning exposure to EMF around low-frequency sources, such as electric appliances and power lines. The existing research data on possible adverse health effects, including cancer, are inconclusive and not adequate to establish or quantify a health risk. For example, the biological mechanisms that might underlie any apparent relationship between EMF and cancer have yet to be clearly defined. Also, some epidemiological studies suggest that, if these fields increase the risk of cancer, it is a very small increase. Other epidemiological studies suggest that there is no increased risk.*
>
> *The Department of Health will continue to collect and evaluate information on possible health hazards associated with electric and magnetic fields. If adequate data ever become available to establish what levels may be harmful, appropriate standards will be established.*

State of Hawai'i Public Utilities Commission. On April 7, 1994, the Hawai'i PUC issued *Decision and Order No. 13201* approving the Waiau-CIP Transmission Lines, Part 2, Project. In reaching its decision, the PUC considered the potential adverse health effects from the project's magnetic fields. Extensive testimony by national

experts of different viewpoints was submitted during the evidentiary hearing and related proceedings. The PUC's decision on this issue is contained in its *Decision and Order*.

> *Based upon a thorough examination of all of the evidence presented in this docket with regard to the possible health effects of exposure to EMF, we find that a causal link between EMF and adverse health effects has yet to be established by those in the scientific community who have been researching this matter. A few studies, such as the Swedish studies mentioned above, appear to have established an association between EMF exposure and the occurrence of certain cancers. However, the results of these studies have yet to be accepted by the scientific community as proof that exposure to EMF causes cancer or other diseases.*
>
> *In the absence of more definitive evidence on the health effects of EMF exposure, we find that we cannot order HECO to place the Waiau-CIP Part 2 transmission lines underground as a result of EMF concerns. We will, however, expect HECO to exercise "prudent avoidance" with respect to EMF.*

The PUC's position in the *Decision and Order* adopted the following explanation of prudent avoidance put forth by the EPA in its *Questions and Answers About Electric and Magnetic Fields (EMF)*:

> *Prudent avoidance is an approach to making decisions about risks. This decision-making process is based on judgment and values, can be applied to groups and individuals, and can be considered for all aspects of our lives, not just EMFs. Prudent avoidance applied to EMFs suggests adopting measures to avoid EMF exposures when it is reasonable, practical, relatively inexpensive and simple to do. This position or course of action can be taken even if the risks are uncertain and even if safety issues are unresolved.*

U.S. EPA. The U.S. EPA issued a booklet *Questions and Answers About Electric and Magnetic Fields (EMF)* (402-R-92-009) in December 1992. This document stated that neither the EPA nor any other federal regulatory agency has established a standard for EMF, because the scientific evidence is inadequate to determine if magnetic fields are harmful, and if they are, at what levels.

Swedish National Electric Safety Board. The Swedish National Electrical Safety Board (NESB) in November 1995 stated, "Our knowledge regarding how weak magnetic fields affect humans is not sufficient to set any limit values." The NESB, which is responsible for establishing a Swedish public EMF policy, decided not to set EMF exposure limits. However, it did recommend that a certain amount of

caution be exercised. The NESB suggested the following guidelines for community planning and development efforts:

- Strive to design and site new power lines and electrical installations in such a way that magnetic fields are reduced.
- Avoid building homes, schools, day care centers, and similar facilities in proximity to existing power lines that produce significant magnetic fields—but only if alternative sites are available.
- Work to limit high-level fields in existing homes, schools, and workplaces.

International Non-Ionizing Radiation Committee Guidelines. The International Commission on Non-Ionizing Radiation Protection of the International Radiation Protection Association published "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (Up to 300 GHz)" in the April 1998 issue of *Health Physics*. The organization confirmed the guidelines after considering evidence in laboratory and epidemiological studies of both occupational and general populations. Its conclusion is that the data related to cancer does not provide a basis for health risk assessment of human exposure to power frequency fields. The guidelines are summarized in Table 4-21.

Table 4-21. Guidelines on Limits of Exposure to 50/60-Hz Electric and Magnetic Fields

Exposure Characteristics	Electric Field Strength (kV/m)	Magnetic Flux Density (mG)
General Public Exposure	4.16	830
Occupational Exposure	8.3	4,160

Source: International Radiation Protection Association. 1998.

National Institute of Environmental Health Sciences (NIEHS)/National Institutes of Health (NIH). In June 2002, the NIEHS and the NIH published a brochure entitled, "*EMF Electric and Magnetic Fields Associated with the Use of Electric Power, Questions and Answers*." This brochure evaluates potential health effects from EMF, describes the results of EMF research, discusses typical magnetic exposures in homes and workplaces, describes standards and guidelines and presents the findings and recommendations of major EMF research reviews.

Transmission Line Standards in Other States. A few states have some form of electric field limits, and two states (Florida and New York) have magnetic field limits. These states established limits primarily to keep future installations from exceeding present conditions. These limits are not based on any established health-based conclusions. These limits (summarized in Table 4-22) are all based on field strengths within or at the edge of transmission line rights-of-way. The widths of

these rights-of-way vary greatly, according to the voltage of the lines and the regulatory requirements of each state.

Table 4-22. State Regulations that Limit Field Strengths on Transmission Line Rights-of-Way (ROW)

	Electric Field Limits
Montana	1 kV/m at edge of ROW in residential areas 7 kV/m maximum for highway crossings
Minnesota	8 kV/m maximum in ROW
New Jersey	3 kV/m at edge of ROW
New York	1.6 kV/m at edge of ROW 7 kV/m maximum for highway crossings 11 kV/m maximum for private road crossings 11.8 kV/m maximum in ROW
Oregon	9 kV/m maximum in ROW
Florida	2 kV/m maximum for 500kV lines at edge of ROW 8 kV/m maximum for 230kV and smaller lines in ROW 10 kV/m maximum for 500kV lines in ROW
Magnetic Field Limits	
New York	200 mG (maximum load) at edge of ROW
Florida	150 mG for 230kV and smaller lines at edge of ROW 200 mG for 500kV lines (maximum load) at edge of ROW 250 mG for double-circuit 500kV lines at edge of ROW

Source: Enertech Consultants. 1985.

4.13.2.5 *Health Effects of Electric and Magnetic Fields*

Overview

Public concern regarding possible health risks from residential and occupational exposure to low-strength, low-frequency electric and magnetic fields produced by power lines and electrical appliances has generated considerable debate among scientists and public officials. The concern over power frequency magnetic fields began with an epidemiological study of childhood leukemia, conducted by Wertheimer and Leeper in Denver, Colorado, in 1979. Until this study, no association between magnetic fields and human health had been reported. Since then, some epidemiology studies have reported similar associations while others have not.

Epidemiology is the study of patterns of health and disease in human populations. Interpretation of epidemiological studies regarding potential causal relations between exposures and health outcomes is a complex process and relies upon a wide range of supporting data. Although there have been studies that reported positive associations between magnetic fields and human health effects, the number of well-designed studies supporting this association are not sufficient in themselves to conclude that the association is causal. Other explanations, such as systematic bias, have not been ruled out.

Mechanistic and animal toxicology studies have failed to demonstrate any consistent pattern of biological effects, including increased cancers in animals. This lack of connection between human data (epidemiology) and the experimental data (mechanistic and animal) weakens the belief that this association is actually due to EMF.

The NIEHS has stated,

> *The NIEHS believes that the probability that ELF-EMF [Extremely-Low-Frequency EMF] exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal, scientific support that exposure to this agent is causing any degree of harm.... The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard.* [NIEHS, 1999, p.36]

In 1999, the National Academy of Sciences National Research Center (NRC), after reviewing and evaluating the research conducted under the DOE/NIEHS National EMF Research and Public Information Dissemination (EMF-RAPID) Program, stated,

> *The results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger.... In view of the negative outcomes of the EMF-RAPID replication studies, it now appears even less likely that MFs [Magnetic Fields] in the normal domestic or occupational environment produce important health effects, including cancer.* [NRC, 1999, pp.78 and 8]

Evaluations of EMF Research By National and International Scientific Organizations

Scientific and regulatory organizations in the United States have reached conclusions regarding EMF. Scientists have been convened by several organizations to work together to review the scientific information on EMF. These panels included

representatives from diverse organizations, who had expertise in several different scientific disciplines including the biological sciences (toxicology, genetics, epidemiology, cancer biology) and the physical sciences (physics or engineering).

In 1992, Congress mandated an EMF research program, which was managed by NIEHS. In 1998, the NIEHS convened a Working Group to evaluate the results of this research program and other EMF research. They concluded that the epidemiologic data was limited, but they categorized EMF as possibly carcinogenic. Using the methods routinely applied by of the National Toxicology Program (NTP) of the NIH, the NIEHS concluded that EMF exposure would not be listed in the NTP Report on Carcinogens as a "known human carcinogen" or as "reasonably anticipated to be a human carcinogen."

The NIEHS prepared a report to the U.S. Congress and concluded that the probability that EMF is a health hazard is relatively small and evidence is insufficient to warrant aggressive regulatory actions (NIEHS 1999). They suggested that "the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards" (p. 38).

The epidemiological and laboratory data published after the NIEHS report was completed in 1998 have provided additional evidence that EMF does not contribute to childhood cancer. For example, a large (more than 1,000 cases) and well-designed epidemiologic study of childhood leukemia was conducted in England by the United Kingdom Childhood Cancer Study investigators (UKCCS 1999). These researchers reported no increased risk of leukemia in those children with average annual exposures to EMF from 2 mG up to 4 mG in the home and school. No statistically significant increase was found for children whose exposure was above 4 mG, that is, a small increase was reported but chance could not be excluded as an explanation. Investigators at the National Cancer Institute reported no association between childhood leukemia and EMF in their study (Linet et al. 1997), and a reanalysis using a different measure of exposure also found no evidence of cancer risk (Kleinerman et al, 2000). In addition, the majority of studies of breast cancer have not supported an association with residential EMF (Gammon et al, 1998; Forssén et al, 2000; Kabat et al, 2003; London et al, 2003; Schoenfeld et al. 2003).

Laboratory studies published after the NIEHS report, some of which were part of the research program and available for review by the NIEHS, provide evidence for a lack of carcinogenicity, or provide no basis to conclude that EMF affects the development or promotion of cancer (e.g., Babbitt et al, 1998; Anderson et al, 1999; Boorman et al, 1999; McCormick et al, 1999; Morris et al, 1999; Mandeville, 2000).

Several organizations outside of the United States have sponsored comprehensive reviews of EMF research by multidisciplinary groups of scientists. The International Agency for Research on Cancer (IARC), the International Commission on Nonionizing Radiation Protection (ICNIRP), the Health Council of the Netherlands

(HCN), the National Radiological Protection Board of Great Britain (NRPB) have all convened large groups of independent scientists with different expertise (epidemiologists, toxicologists, biologists, neurobiologists, physicists, etc.) to review the body of literature surrounding EMF and health. Each organization has produced a report that is available to the public.

Reviews of the scientific research regarding EMF and health by the HCN were published in 2000 and updated in 2001 and 2004. ICNIRP published its review in 2003. The NRPB published reviews in 2001 and 2004, which included comprehensive discussions of the individual research studies.

IARC reviewers evaluated the animal data and concluded that they were "inadequate" to support a risk for cancer. The scientists stated that the EMF data does not merit the category "carcinogenic to humans" or the category "probably carcinogenic to humans," nor did they find that "the agent is probably not carcinogenic to humans." Many hypotheses have been suggested to explain possible carcinogenic effects of electric or magnetic fields; however, no scientific explanation for carcinogenicity of these fields has been established (IARC 2002).

The Working Group concluded that the epidemiologic studies do not provide support for an association between childhood leukemia and residential magnetic fields at intensities less than 4 mG. Overall, magnetic fields were evaluated as "possibly carcinogenic to humans" (Group 2B), based on the statistical association of higher-level residential magnetic fields with childhood leukemia. Other agents and mixtures have been classified as 2B as well, including coffee, pickled vegetables, and gasoline engine exhaust.

In the rating system used by IARC, the recognition of an association between exposure and cancer in epidemiology studies is considered "limited evidence" of carcinogenicity. A rating of "limited evidence" for epidemiology studies, even without any evidence from laboratory studies that an exposure might pose a cancer risk, requires that the exposure be categorized as a "possible carcinogen," even though chance, bias and confounding cannot be ruled out with reasonable confidence (IARC, 2002).

The IARC Working Group did not regard the association between magnetic fields and childhood leukemia as reflecting a causal association because there was insufficient evidence from epidemiology studies that magnetic fields caused cancer in humans, insufficient evidence that magnetic fields caused cancer in laboratory studies of animals, and no evidence for a mechanism to lead to cancer.

The assessments by the NIEHS, IARC, ICNIRP, NRPB, and HCN agree that there is little evidence that EMF is associated with adverse health effects, including most forms of adult and childhood cancer, heart disease, Alzheimer's disease, depression, and reproductive effects. However, all of the assessments concluded that epidemiology studies in total suggest a possible association between magnetic fields

at higher exposure levels (annual average greater than 4 mG) and childhood leukemia. All agree that the experimental laboratory data do not support a causal link between EMF and any adverse health effect, including leukemia, and have not concluded that EMF is, in fact, the cause of any disease. These organizations have not recommended exposure limits or required measures to reduce exposures since they have not concluded that a causal relationship between EMF and adverse health effects exists.

Other organizations have provided perspectives on EMF and health. These include a report from the California EMF Program and a more recent summary from the NIEHS.

In response to a request from the California Public Utilities Commission, three scientists from the California EMF program (two epidemiologists and a physicist) reviewed the scientific research regarding EMF and health (Neutra et al. 2002). The scientists agree that EMF is not a universal carcinogen. They evaluated data regarding 13 health conditions and concluded that the epidemiologic data provided little support for an association of EMF with nine of the conditions. For the rest, they expressed the belief "that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's disease, and miscarriage." Their median "confidence ratings" for these conditions, however, were not high enough to indicate any strong certainty or "high probability" that EMF was a cause of these conditions.

At the time the conclusions of the California EMF Program became available, the NIEHS published a brochure on questions and answers on EMF and health (NIEHS 2002). The status of EMF and health is summarized by NIEHS as:

> *Over the past 25 years, research has addressed the question of whether exposure to power-frequency EMF might adversely affect human health. For most health outcomes, there is no evidence that EMF exposures have adverse effects. There is some evidence from epidemiology studies that exposure to power-frequency EMF is associated with an increased risk for childhood leukemia. This association is difficult to interpret in the absence of reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia* (p. 57).

The NIEHS also noted that:

> *At the current time in the United States, there are no federal standards for occupational or residential exposure to 60-Hz EMF* (p. 57).

4.13.2.6 Other Transmission Line Electrical Factors

Overhead high-voltage transmission lines can sometimes produce impacts on the surrounding environment related to audible noise, and radio or television interference. These potential factors are explained below.

Corona. Corona is the physical manifestation of energy loss and can transform energy into very small amounts of light, sound, radio noise, chemical reaction, and heat. Because energy loss is not economical, corona has been studied since the early part of this century. Consequently, it is well understood by engineers and steps to minimize it are major factors in overhead line design. The line designer can control corona with good design practices, and it is usually not a problem for lines rated at 230kV and lower. Corona does not occur with underground lines, such as those proposed for this project.

Audible Noise. During corona activity, overhead transmission lines (mainly 345kV and above) generate a small amount of sound energy. This audible noise from the line can barely be heard in fair weather conditions on the higher-voltage lines and usually not at all on lines at 46kV. During foul weather, water drops collect on the conductor and increase corona activity so that a crackling or humming sound may be heard near the line. This noise is caused by small electrical discharges from the water drops. Audible noise decreases rapidly with distance from the line. Audible noise does not occur with underground lines, such as those proposed for this project.

Radio and Television Interference. Overhead transmission lines do not, as a general rule, interfere with normal radio or television reception. As described above, corona discharges can sometimes generate unwanted electrical signals. There are two potential sources of interference: corona and gap discharges. Corona may affect AM radios; gap discharge can affect television and radio reception. Corona activity is minimized by proper line design and, therefore, is almost never a source of interference, especially on lines with voltage lower than 230kV. Radio and television interference does not occur with underground lines, such as those proposed for this project.

Gap discharges on overhead lines are a very different problem. They are caused by electrical discharges between broken or poorly fitting hardware (e.g., insulators, clamps, and brackets). Hardware is designed and installed to be problem-free, but gunshot damage, wind motion, or corrosion damage sometimes can create a gap discharge condition. When this condition develops, intermittent gaps at connection points between hardware items allow small electrical discharges to occur between the gaps. This phenomenon is not limited to transmission lines and can often be found on distribution lines. The discharges act as small transmitters at frequencies that may be received on some radio and television receivers. Gap discharge sources can be located by HECO engineers and repaired. Underground lines, such as the lines proposed for this project, will not produce gap discharges.

Computer Monitors. Only monitors that use cathode ray tubes or CRTs to project an image are subject to interference from magnetic fields. Liquid crystal display (LCD), also called flat panel monitors are not susceptible to interference. Interferences with typical CRT computer monitors, which appear as a faint shimmering, can be detected at magnetic field levels of about 10 mG and above. If the Proposed Action is implemented, the highest magnetic field at the nearest edge of any building to the Proposed Action is much less than this threshold. The magnetic fields continue to decrease with distance. Therefore, no significant impact on CRT computer monitors is anticipated if the project is implemented.

Ozone. Ozone is another possible byproduct of higher-voltage overhead transmission lines (345kV and above). Ozone (0_3) can be formed from charged air molecules through the combination of three oxygen atoms. Ambient ozone levels in rural areas are typically around 10 to 30 parts per billion (ppb) at night and may peak during the day at around 100 ppb. In urban areas, concentrations greater than 100 ppb are common. Cities like Los Angeles may peak at 500 ppb. The National Ambient Air Quality Standard for oxidants (of which ozone is usually 90 to 95 percent) is 120 ppb, not to be exceeded as a peak concentration on more than 1 day a year. 46kV underground lines, such as the lines proposed for this project, will not produce ozone.

Cardiac Pacemakers. One concern associated with high-voltage transmission lines (usually 345kV or higher) has been the possibility of interference with cardiac pacemakers. There are two general types of pacemakers: asynchronous and synchronous. The asynchronous pacemaker pulses at a predetermined rate. It is practically immune to interference because it has no sensing circuitry and is not exceptionally complex. The synchronous pacemaker pulses only when its sensing circuitry determines pacing is necessary. Interference may result from the transmission line electric field, which may cause a spurious signal on the pacemaker's sensing circuitry. However, when these pacemakers detect a spurious signal, such as a 60-hertz signal, they are programmed to revert to an asynchronous or fixed pacing mode of operation. Cardiovascular specialists do not consider prolonged asynchronous pacing to be a problem. Some pacemakers are designed to operate that way. Periods of operation in this mode are commonly induced by cardiologists to check on pacemaker performance. Therefore, although an overhead transmission line electric field may interfere with the normal operation of some pacemakers, the result of the interference is of a short duration and not harmful. Underground lines, such as the lines proposed for this project, will not generate electric fields and will not interfere with cardiac pacemakers. The magnetic fields from this line are far below 1,000 mG threshold limit value set by the American Conference of Governmental Industrial Hygienists for cardiac pacemakers and similar medical electronic devices.

Construction

Since magnetic field levels will not change until the new power lines are energized when the Proposed Action is in operation, there will be no effect during construction.

Operation

Magnetic field levels will change when the new power lines are energized when the Proposed Action is in operation. There will, however, be no effect during operation on CRT computer monitors or cardiac pacemakers. Because the proposed lines will be underground, there will be no corona, ozone, audible noise or radio and television interference during operation.

No-Action Alternative. Because no changes to the electrical subtransmission or distribution system would occur with this alternative, electric and magnetic field levels would remain the same as those described under the year 2009 without the project, as described in the Magnetic Field Evaluation (Appendix D1).

4.13.3 Magnetic Field Evaluation for the Proposed Action

Enertech prepared a Magnetic Field Evaluation for the Proposed Action in June 2004 (Appendix D1), and also prepared an Addendum in December 2004 (Appendix D2). The following summarizes the results of Enertech's Magnetic Field Evaluation.

Existing magnetic field levels from HECO facilities are typical of levels from similar facilities throughout the State of Hawai'i.

Magnetic field measurements were conducted at eleven selected segments along portions of the proposed project to characterize field strengths due to existing electrical facilities. Existing magnetic field levels along these segments range from a few tenths of a mG to over 25 mG, depending upon location. Existing electric facilities surveyed included 12kV, 25kV, 46kV, and 138kV power line facilities.

The difference in projected magnetic field levels between the existing and proposed power line configurations under 2009 forecasted loading can decrease slightly, remain unchanged, or increase depending upon the project segment.

In addition to field measurements, magnetic field levels were also calculated for 2009 forecasted normal and Pūkele outage conditions for eleven different project segments. The difference in projected magnetic field levels between the existing and proposed power line configurations under 2009 forecasted loading can decrease slightly, remain unchanged, or increase depending upon the project segment. For the segment on King Street between Ward Avenue and Victoria Street, where no 46kV

power lines presently exist (identified as Segment "I" in Appendix D1), the projected magnetic field generally remains unchanged since the proposed underground 46kV power lines would only be utilized under Pūkele outage conditions. For the segment on Date Street east of Kamoku Substation where modifications to an existing overhead 46kV power line are proposed (identified as Segment "E" in Appendix D1), the range of projected magnetic field levels decreases slightly since the 2009 forecasted load is somewhat lower for the proposed configuration than for the existing configuration. At all other segment locations, the projected magnetic field increases due to the proposed power line configuration under 2009 forecasted loading conditions. While the largest magnetic field increases typically occur within street locations, projected magnetic field levels can also increase at sidewalk locations. Under proposed 2009 Pūkele outage conditions, the projected magnetic field increases at all segment locations.

The levels described in Enertech's Magnetic Field Evaluation (Appendix D1) are within the range of magnetic field levels found at numerous locations in the local environment. The line locations are mainly in the street, and the forecasted increases occur predominantly in the street and sidewalk, and so would be mostly a source of brief intermittent exposure to the population. Magnetic field levels decrease with distance from the source, and the projected magnetic field levels beyond the sidewalks for any of the segments evaluated by Enertech are well within the range of levels commonly encountered in the local area and in other communities.

If the project is implemented, the proposed underground circuits would have little effect on EMF levels at nearby institutions; EMF levels will be in the range of common everyday levels.

A magnetic field assessment was performed to evaluate present and future levels at various institutions along the proposed project. Several institutions are located near portions of the proposed project, including day care centers, pre-schools and schools, hospitals, churches, and retirement homes. Distance measurements were taken to determine the closest building edge to the proposed project. Using these distance measurements, the projected magnetic fields for 2009 loading conditions were evaluated for each of these institutions. Six different institutions are located within 100 feet of the proposed project. The two closest institutions are the Kaplan Test Preparation Center and the Lunalilo Elementary School. For the Kaplan Test Preparation Center, projected 2009 magnetic field levels of 0.0 mG with the existing power line configuration would increase about 1.1 mG with the proposed configuration under normal loading. For the Lunalilo Elementary School, projected 2009 magnetic fields of about 4.0 mG with the existing power line configuration would decrease to about 3.3 mG with the proposed configuration under normal loading (due to some field cancellation). Four other institutions within 100 feet would have no projected magnetic field under normal operating conditions, since the underground power lines are only loaded during Pūkele outage conditions (and even

then the projected field at the closest building edge is less than 1 mG). There are five additional institutions located within 200 feet of the proposed project. Of these, two institutions have projected magnetic fields of about 0.6 or less under Pūkele outage conditions, and three institutions would have no projected magnetic field under normal operating conditions (since the underground power lines are only loaded during Pūkele outage conditions and have negligible projected field influence of about 0.1 mG). Beyond 200 feet, the projected magnetic field influence from the proposed project is negligible.

The magnetic field levels projected by Enertech for six selected public institutions within 100 feet of the proposed route indicated either no influence of the fields or a minimal increase. For example, the projected magnetic field under normal operating conditions is less than 4 mG at a corner of the Lunalilo Elementary School, which represents no increase over the existing configuration.

The proposed substations, manholes, and risers of the East O'ahu Transmission Project will be similar to existing facilities and have very low EMF levels at a relatively short distance away.

Another aspect of the proposed East O'ahu Transmission Project is the installation of new transformers within certain substations, manholes in the streets, and risers on wooden poles at sidewalk locations. The magnetic field from a substation transformer or manhole is typically reduced by about 90 percent at a distance of about 20 feet away from the facility (for transformers, magnetic fields due to these sources are typically reduced to ambient levels at the substation perimeter). For this project, the closest property line is at least 30 feet away from any proposed substation transformer location. For risers, the magnetic field is typically reduced by over 90 percent at a distance of about 3 feet away from the riser.

There are a wide variety of EMF levels and sources encountered in everyday life that are comparable to EMF due to electric power facilities.

In addition to measuring and calculating magnetic fields for electrical facilities associated with the proposed project, magnetic field measurements of everyday environments were performed at ten different locations in Honolulu. These measurements were performed to provide a range of magnetic field levels encountered in everyday locations and for comparison with the magnetic field levels associated with the proposed East O'ahu Transmission Project. Measured magnetic fields ranged from 0.1 mG to over 99 mG in everyday environments. Many of these magnetic field sources are common appliances and electrical devices, such as refrigeration units in supermarkets, electric stoves in food preparation areas, library security gates, escalators, vending machines, display counters, video games, cash registers, and ATM machines.

Construction

Since magnetic field levels will not change until the new power lines are energized when the Proposed Action is in operation, magnetic field levels will remain unchanged during construction.

Operation

Magnetic field levels will change when the Proposed Action is in operation. Although magnetic field levels in 2009 may decrease slightly, remain unchanged, or increase depending upon the segment, none of these changed magnetic field levels would have a significant impact on human health or the environment.

No-Action Alternative

Because no changes to the electrical subtransmission or distribution system would occur with this alternative, electric and magnetic field levels would remain the same as those described under the year 2009 without the project, as described in the Magnetic Field Evaluation (Appendix D1).

4.13.4 Prudent Avoidance

HECO has adopted strategies consistent with the Department of Health's prudent avoidance approach in routing and designing transmission lines.

Optimizing Cable Placement and Phasing Arrangement

Reduction of EMF levels can be achieved for multiple circuit power lines with similar loads by optimizing the cable placement and phasing arrangement within the cable ducts. Optimized placement of multiple circuit cables can achieve a partial cancellation of EMF and result in reduced EMF levels when circuits are similarly loaded. The maximum EMF cancellation occurs when all circuits have identical loads and their individual phases are placed in an optimum manner in adjacent ducts. In general, multiple circuits will not always have simultaneous identical loads, so that EMF reduction is less when circuit loads are not the same.

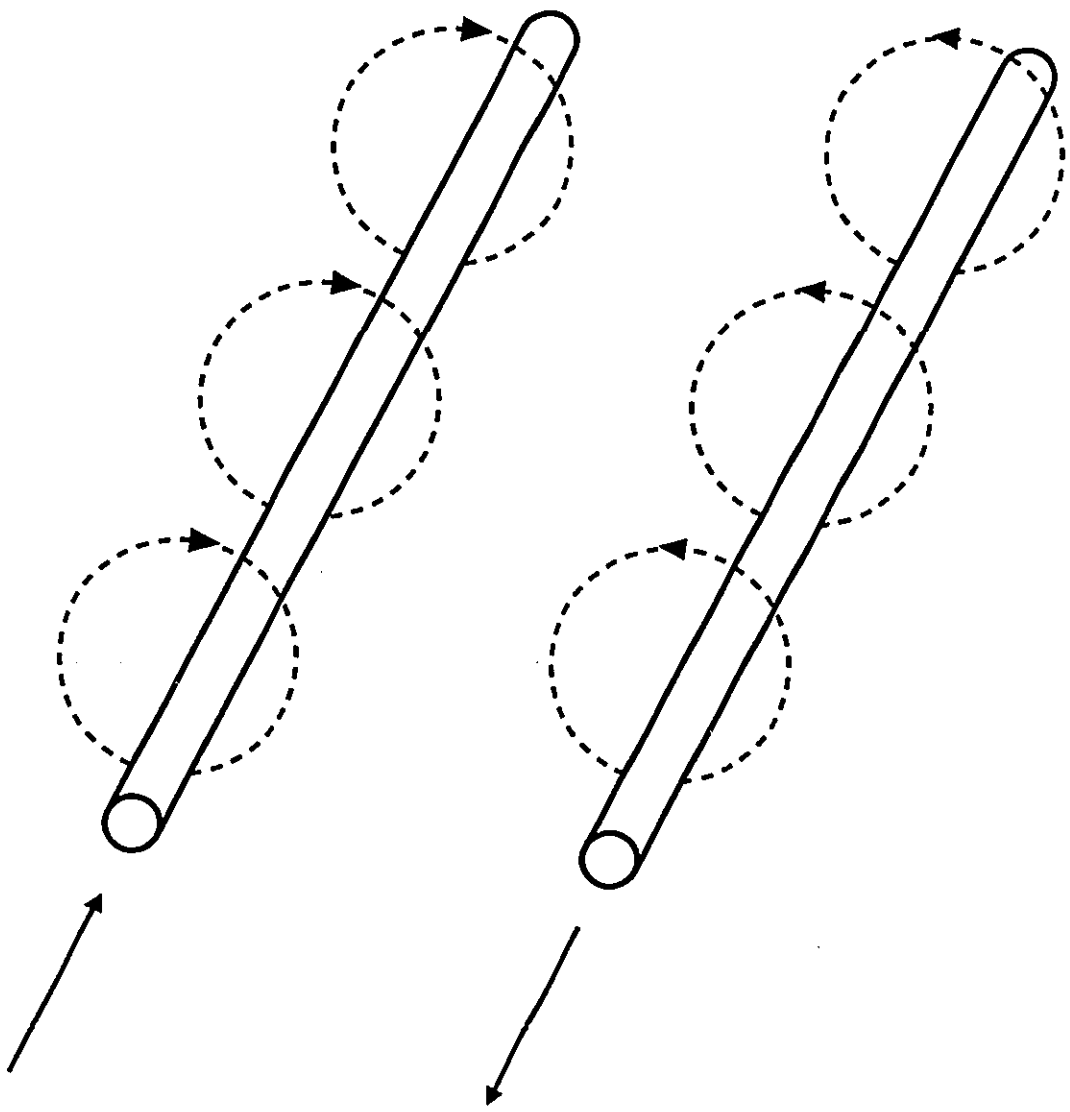
Figure 4-10 shows how magnetic fields circle the electric current that gives rise to them. Two wires with equal and opposite currents create magnetic fields in opposing directions that partially cancel at locations to either side of the wires.

Enertech studied a variety of cable placements and phasing arrangements for the 46kV circuit cable sections to determine the optimum phase configuration for EMF reduction. For the 46kV double circuit configuration, the optimized configuration is to arrange each circuit horizontally within the duct, with one circuit directly above

the other circuit, and with unlike or opposite phasing. For the 46kV triple circuit configuration, the optimized configuration is to arrange each circuit vertically within the duct, with one circuit directly adjacent to the other circuit, and with a specific phasing arrangement. When the circuits do not have identical loading, the cancellation effect is less; therefore, the calculations for identical circuit loading provide an upper bound for EMF reduction. The optimum phasing option is not available for the single circuit 46kV cables because there is no adjacent circuit to create the partial EMF cancellation.

Enertech's calculated results for multiple circuit 46kV cables show that use of optimum phase placement in the cable ducts can reduce EMF levels by a maximum amount of about 87 percent when all circuits have identical loads. The EMF levels can be characterized for the Normal and Emergency loading cases by the calculated maximum level above the underground cable and at a distance of 50 feet away for circuits with assumed identical loads. For the *double circuit* 46kV cable sections with optimized phasing and identical circuit loads, the maximum EMF level above the cable ranges from 16.2 mG (Normal) to 19.6 (Emergency); at 50 feet away, the EMF level is about 0.1 mG for both load cases. For the *triple circuit* 46kV cable sections with optimized phasing and identical current loads, the maximum EMF level above the cable ranges from 19.3 mG (Normal) to 23.8 mG (Emergency); at 50 feet away, the EMF level is about 0.1 mG for both load cases.

HECO has applied prudent avoidance in its engineering design for ductlines with multiple circuits by optimizing the cable placement and phasing arrangement within the cable ducts. Reduction of EMF levels has been achieved in the engineering design for these new ductlines by utilizing horizontal ductbanks with reversed phasing in the two following locations: (1) the segment of Phase 1 of the Proposed Action between Poni Street and McCully Substation; (2) the segment of Phase 2 on King Street between Cooke Street and McCully Times Supermarket.



Magnetic fields circle the electric current that gives rise to them. Two wires with equal and opposite currents create magnetic fields in opposing directions that partially cancel at locations to either side of the wires.

Figure 4-10
DIAGRAM OF CABLE AND CURRENT CONFIGURATIONS FOR MAGNETIC FIELD CANCELLATION
Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

HECO will continue to identify and implement actions to reduce EMF levels wherever possible. Utilization of phasing arrangements to optimize reduction of EMF levels will be analyzed for the following segments where new circuits will be placed near existing underground or overhead lines: (1) the segment of Phase 1 on Makaloa Street between Amana Street and Poni Street; (2) the segment of Phase 1 on Pumehana Street between Lime and Date Streets; and (3) the segment of Phase 1 on Winam Avenue between Ho'olulu Street and Mo'oheau Avenue; and (4) for the two 46kV lines exiting Kamoku Substation and running east and west on Date Street. In each of these areas, the existing circuits may or may not be configured in a manner which would allow implementation of phasing to achieve magnetic field cancellation with the new underground circuits. HECO will use computer modeling which examines factors such as the physical and electrical properties of existing overhead and underground circuits, including proximity to new circuits, loading of the existing and future power lines and current direction to determine whether, and to what extent, cancellation of magnetic fields can be achieved. HECO will phase the new circuits to achieve cancellation of magnetic fields in those areas where prudent avoidance measures can be implemented.

Along all other project segments, EMF exposure cannot be prudently avoided by optimizing cable placement and phasing arrangements because the configuration of lines in existing ducts and overhead circuits prevents implementation of phasing to achieve reduction in EMF.

Route Planning

HECO has also implemented prudent avoidance in the route planning for the Proposed Action. EMF levels from power lines drop off rapidly with distance, meaning that reduction of EMF levels might be achieved by locating the lines closer to the middle of the roadways to reduce EMF levels at the near edge of the roadways. This requires detailed engineering and consultation with the City and County of Honolulu permitting agencies to determine if physical space is available to locate the 46kV ductlines closer to the middle of the roadways and whether locating the lines there would cause conflicts with future facilities planned by government or private entities.

Prudent avoidance of EMF has been considered in the routing of the proposed lines. Along King Street between Cooke Street and McCully Times Supermarket, the power line will be located away from the makai curb. Along all other project segments, the power lines cannot be located near the center of the street due to constraints imposed by existing utilities.

Chapter 5

Other Considerations

CHAPTER 5
OTHER CONSIDERATIONS

5.1 SECONDARY AND CUMULATIVE IMPACTS

5.1.1 Secondary Impacts

As defined by HAR 11-200-2, the term "secondary impacts" means those impacts caused by the action that are later in time or farther removed in distance but still reasonably foreseeable. They may include effects related to induced changes in land use patterns and population density or growth rate, and related effects on air, water, or other natural systems, including ecosystems.

The Proposed Action and alternative alignments involve the installation of subtransmission lines and related substation improvements to address several transmission problems that can affect system reliability. This action and its alternatives respond to growth that is already occurring or planned within the City and County of Honolulu and, therefore, are not growth-inducing. No secondary impacts have been identified and none are anticipated.

5.1.2 Cumulative Impacts

"Cumulative impacts" are defined in HAR 11-200-2 as environmental impacts resulting 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. As such, all the impacts on affected resources could be considered cumulative. Because it is not practical to analyze the cumulative effects of an action on the universe, the list of environmental effects must focus on those that are truly meaningful. Cumulative effects analysis should "count what counts," not produce superficial analyses of a long laundry list of issues that have little relevance to the effects of the proposed action or the eventual decisions.[1] Under the Proposed Action and alternatives, cumulative impacts could result when combined with the effects of

[1] Council on Environmental Quality. January 1997. *Considering Cumulative Effects Under the National Environmental Policy Act.*

other construction projects during the same period of time or at different times, either within the same roadway alignment or in the same project vicinity (defined by the geographic boundary for the resource it affects, as described below). In certain cases, projects cumulatively affecting a similar resource, e.g., landfill capacity, can be geographically distant.

Other actions considered in this cumulative impact analysis were identified by defining the cumulative impact study timeframe and geographic boundaries. The initial time frame used in this analysis was determined by considering the period of effect caused by the Proposed Action and alternative alignments, a period from mid 2006 to early 2009. Through pre-assessment consultations, which help to provide focus for the analysis, projects identified since 2002 were identified and the timeframe was subsequently expanded to a period of 10 years, from 2002 through 2011. Because the cumulative impacts analysis is evaluating the cumulative impacts on resources, geographic boundaries are specific for each of the potentially affected resources of the Proposed Action and alternatives. Reasonable geographic boundaries for the Proposed Action and alternatives for each resource follow:

- Land Use: Immediate geographic area of Proposed Action and alternatives
- Infrastructure: Immediate geographic area of Proposed Action and alternatives
- Solid Waste: Disposal facilities affected by Proposed Action and alternatives
- Traffic: Communities where in-road construction of the Proposed Action and alternatives would occur (Ala Moana, Waikīkī, McCully, Mō'ili'ili, and Kapahulu)
- Noise: Within an approximate one square block from the Proposed Action and alternatives
- Emergency Response: Communities where in-road construction of the Proposed Action and alternatives would occur (Ala Moana, Waikīkī, McCully, Mō'ili'ili, and Kapahulu), and emergency response facilities in the path of the Proposed Action and alternatives
- Schools: Immediate geographic area of Proposed Action and alternatives
- Soils and Topography: Immediate geographic area of Proposed Action and alternatives
- Groundwater Resources: Underlying aquifer
- Surface Water Resources: City and County of Honolulu MS4 system and State waters
- Air Quality: Immediate geographic area of Proposed Action and alternatives

- Cultural Resources: generally from Beretania Street to Ala Moana/Ala Wai Boulevards in a mauka-makai direction, and from Cooke Street to Kapahulu Avenue in an 'Ewa–Koko Head direction; and in the area near the intersection of Winam Avenue and Mo'oheau Avenue, east of Kapahulu Avenue.
- Visual and Aesthetic Resources: view planes in Ala Moana, Waikīkī, McCully, Mō'ili'ili, and Kapahulu
- Biological Resources: Immediate geographic area of Proposed Action and alternatives
- Socioeconomic Environment
  - Population: Communities where in-road construction of the Proposed Action and alternatives would occur (Ala Moana, Waikīkī, McCully, Mō'ili'ili, and Kapahulu)
  - Electrical Reliability: the areas of O'ahu (Honolulu District, Ko'olau Poko, Ko'olau Loa, Hawai'i Kai, Kailua, and Kāne'ohe) where electrical transmission system reliability would be affected
  - Businesses and Residents: Immediate geographic area of Proposed Action and alternatives
- EMF: Immediate geographic area of Proposed Action and alternatives

In addition to pre-assessment consultations with City and County of Honolulu departments, the following resources were used to identify other actions for consideration in this cumulative impact analysis:

- the bi-monthly *Environmental Notice* of the Office of Environmental Quality Control (OEQC), and
- the records of the City and County of Honolulu's Utility Coordination Committee, of which HECO is a member.

Past, present, and reasonably foreseeable future actions with impacts that are considered in this EA are described as follows:

- **Archer–Kewalo 138kV transmission line project.** In November 1992, HECO filed an application with the PUC (Docket No. 7526) requesting approval to commit funds for Item BT-467, Installation of Kewalo A and B 30/40/50 MVA Transformers. In this docket, the Archer-Kewalo project involved the purchase and installation of a 138kV/25kV transformer and related substation equipment at the existing Kewalo Substation, two 138kV underground transmission lines between the Archer and Kewalo Substations, 25kV underground distribution lines, and fiber optic cable. The need for the Archer-Kewalo project was to meet and accommodate load

growth demands in the Kaka'ako, Ala Moana, and Waikiki areas by providing the necessary substation infrastructure to service the new demand. Construction of the Archer-Kewalo project started in October 1996 and was completed in February 2003. The Archer-Kewalo project is today a part of HECO's existing Southern 138kV Transmission Corridor.

- **Kewalo–Kamoku 138kV transmission line project.** In February 1993, HECO filed an application with the PUC (Docket No. 7602) requesting approval to commit funds for Item BT-476, Installation of Kewalo-Kamoku 138kV Transmission Line. In this docket, the Kewalo-Kamoku project involved the purchase and installation of a 138kV/25kV transformer and related substation equipment at the existing Kamoku Substation, an underground 138kV transmission line between the Kewalo and Kamoku Substations, 25kV underground distribution lines, and fiber optic cable. The need for the Archer-Kewalo project was to meet and accommodate load growth demands in the Kaka'ako, Ala Moana, and Waikiki areas by providing the necessary substation infrastructure to service the new demand. Construction of the Kewalo–Kamoku 138kV transmission line project began in July 1996 and was completed in September 2002. The Archer-Kewalo project is today a part of HECO's existing Southern 138kV Transmission Corridor.

- **City and County of Honolulu's BRT project.** A section of the BRT line, on Kapi'olani Boulevard between Kāheka Street and Kalākaua Avenue, is in the vicinity of the Proposed Action and Alternative Alignments 1 and 2, as shown on Figure 1-3 of Appendix B, *Traffic Impact Study*. A section of the BRT line, on King Street between Cooke and Pensacola Streets, coincides with the Phase 2 alignment as shown on Figure 1-3 of Appendix B, *Traffic Impact Study*. On King Street, plans include a semi-exclusive BRT lane along the makai curb (shared with vehicles turning right into driveways and cross streets) and an exclusive contra-flow lane for 'Ewa-bound BRT buses in the mauka curb. Implementation dates for the BRT on King Street, between Cooke and Pensacola Streets, are not known.

- **City and County of Honolulu's roadway resurfacing projects.** Resurfacing of McCully Street and a section of King Street from South Street to McCully Street took place during 2003-2004. Roadway rehabilitation projects along King Street from University to Old Wai'alae Avenue, Pi'ikoi Street from Ala Moana Boulevard to Matlock Avenue, Queen Street 'Ewa of Ward Avenue, Ke'eaumoku Street from Kapi'olani Boulevard to Kinau Street, and University Avenue above Kapi'olani Boulevard were also planned for 2004 and 2005. Rehabilitation projects on various Waikīkī roadways have been programmed through 2006.

- **Board of Water Supply's Honolulu District water system improvements (new 42-inch and 24-inch mains).** Funding is planned for fiscal years 2005 and 2007 or 2008, with installation on Beretania and King Streets.
- **Other BWS projects.** The following BWS projects occurred in 2003:
  - Diamond Head Water System Improvements on Kapahulu Avenue, and
  - Kalākaua Avenue Water System Improvements.

The following are planned for 2005:

- Mō'ili'ili Water System Improvements on Date Street, Kapi'olani Boulevard, and Kamoku Street,
- Pensacola Street Water System Improvements, along the length of Pensacola Street,
- Kaka'ako Water System Improvements, makai of Kapi'olani Boulevard,
- Ward Avenue 12-inch and 8-inch mains, along Ward Avenue from Waimanu to Kinau Street,
- Ala Moana Boulevard 12-inch main, along Ala Moana Boulevard from Ward Avenue to Atkinson Drive,
- Waikīkī Water System Improvements, Part V, between Ala Wai Boulevard and Kūhiō Avenue,
- Kalākaua Avenue 16-inch main, on Kalākaua Avenue from Young Street to Kapi'olani Boulevard, and
- Kapi'olani Boulevard Water System Improvements, along Kapi'olani Boulevard.

The following are planned for 2006:

- Kona Street 8-inch main, on Kona Street from Waimanu Street to Atkinson Drive, and
- Mō'ili'ili Water System Improvements, along University Avenue.

The following is planned for 2007:

- Mō'ili'ili Water System Improvements, Part II, which will occur in the following areas:
  - on Beretania Street from Isenberg Street to University Avenue,
  - on Dole Street from Wilder Avenue to University Avenue,
  - on Isenberg Street from Bingham Street to Beretania Street,
  - on McCully Street from King Street to Date Street,

- on Wilder Avenue from Metcalf Street to H-1 Freeway.

- **The City and County of Honolulu's wastewater projects:**
  - Kalākaua Avenue Sewer Reconstruction Project: expected to occur in 2006; would parallel the Proposed Action underground subtransmission lines for one block on Kalākaua Avenue, between Makaloa Street and Fern Street.
  - Mō'ili'ili Sewer Rehabilitation project: scheduled to start some time between 2007 and 2009.
- **Young Street and Wilder Street improvements.** Master Plans have been completed for these projects, but no funds have been appropriated for design and construction. Future improvement projects along Young Street and Wilder Avenue are proposed but not yet funded. Because the timing of these projects is uncertain, they are not considered reasonably foreseeable future actions for purposes of this cumulative impact analysis.
- **WalMart/Sam's Club complex.** The construction of a shopping center and parking structure on approximately 10 acres on the 'Ewa side of Ke'eaumoku Street is planned for completion in 2004.
- **McCully-Mō'ili'ili Beautification Master Plan.** An Environmental Assessment was prepared in 2002 that identified the top priority beautification projects for the McCully-Mō'ili'ili neighborhood. Projects identified in the master plan include planting street trees and improving sidewalks, curbs, gutters, and storm drainage. The beautification projects were planned to begin in 2002.
- **U.S. Army Corps of Engineers/DLNR Ala Wai Watershed Improvement Project.** The Army Corps of Engineers is preparing an EIS for a proposed project to protect Waikīkī and surrounding areas from flooding and to restore the ecosystems of the Ala Wai Canal and tributaries. Ecosystem restoration actions being investigated include stream channel reconstruction, stream bank revegetation and reinforcement, sedimentation basin and dam construction, debris catchment and energy dissipation, and better maintenance accessibility. Other measures being evaluated for flood control include dredging the Ala Wai Canal deeper and widening the portion makai of the McCully Street bridge, removing flow obstructions such as some bridge supports, and building floodwalls or berms along the Ala Wai Canal and lower reaches of Mānoa-Pālolo Canal and Makiki Stream. As this project is in the early planning stages, this is not considered reasonably foreseeable future action for purposes of this cumulative impact analysis. The draft EIS for the project is anticipated to be completed in 2005.

- **HECO's Ala Wai Canal circuit relocation project.** HECO is planning to relocate two existing 46kV circuits that cross the Ala Wai Canal in the area fronting Kai'olu Street by year-end 2007 to accommodate anticipated construction of the above mentioned DLNR/U.S. Army Corps of Engineers Ala Wai Canal Watershed Improvement Project. HECO is presently examining relocation options, including installation of the circuits deeper in the canal at the location of the existing canal crossing. This project, which is independent of the EOTP, will not require construction within the roadway alignment of the Proposed Action. Limited construction activity for this project during the 2007 time frame is anticipated in the area surrounding the existing 46kV circuit crossing and possibly nearby roadways.

Land Use

No adverse cumulative impacts would occur from implementation of the Proposed Action or alternatives, as there would be no associated land use changes, and the activities would support and be consistent with the State and City and County of Honolulu land use plans.

Infrastructure

New underground subtransmission lines may constrain the availability of underground space for future utility lines. Because public roadways usually offer the most practical solution to the routing of utilities, capacity is limited by two factors: the width of the roadway right-of-way, and the number of existing utilities (at-grade and underground). At some point, the total number of utilities (water lines, sewer lines, electrical, and telecommunications cable) under a given roadway would preclude the addition of any other utilities.

With respect to water and wastewater system improvements, HECO would coordinate scheduling with the City and County of Honolulu to minimize construction in the same area at the same time. In reviewing the past, present, and reasonably foreseeable projects listed above, no adverse cumulative impacts would occur from the Proposed Action or alternatives.

Solid Waste

In addition to the Proposed Action and alternatives, solid waste would be generated during street resurfacing, construction of the BRT system, and construction of the BWS projects. Types of solid waste may include excavated soil, asphalt, and transite (asbestos cement) ductlines/conduits. The quantity of waste from these projects is unknown. For the Proposed Action and alternatives, the majority of the excavated soil would be sold for reuse in other construction projects and the asphalt would be

recycled, minimizing the cumulative impact of solid waste generation from this project.

Roads and Traffic

The Proposed Action and its alternative alignments would represent another in-road construction project affecting motorists in the area. Generally, multiple lane closures on the same roadway could increase traffic delays. While contractors are restricted from conducting construction activities during peak A.M. and P.M. traffic periods, construction during non-peak periods, including nighttime hours, may result in multiple lane closures and frustrating traffic delays and/or rerouting. The City and County of Honolulu Department of Planning and Permitting's coordination of multiple construction projects in the same area would reduce impacts to traffic. Because the BRT project could be in operation while the Proposed Action is under construction, cumulative impacts on traffic were evaluated for the section of Kapi'olani Boulevard between Kāheka Street and Atkinson Drive during Phase 1, and the section along King Street between Cooke and Pensacola Streets during Phase 2. Table 5-1 summarizes the potential cumulative impacts on traffic with the BRT project.

Table 5-1. Additional Traffic Impacts and Actions to Minimize Impacts with BRT

Potential Impacts	Potential Actions to Reduce Impacts
Phase 1: Makaloa	
No impact from BRT	None required
Phase 1 Alternative Alignment: Kāheka–Kapi'olani Corridor	
Traffic at intersection of Kāheka Street and Kapi'olani Boulevard exceeding intersection capacity by 7 percent with delays greater than 80 seconds may cause traffic to divert to parallel streets.	• Shift construction to nighttime in this section.
Work area would block pedestrian access from mauka curb to BRT platform and curb bus stop at Atkinson Drive.	• Construct this section at nighttime to lessen impact. OR • Provide temporary crosswalk and access from 'Ewa end of platform, which may not be fully accessible. • Temporarily move curb bus stop outside of affected area.
Phase 1 Alternative Alignment: Kalauokalani–Kapi'olani Corridor	
Little impact from BRT.	None required

Table 5-1. Additional Traffic Impacts and Actions to Minimize Impacts with BRT *(continued)*

Potential Impacts	Potential Actions to Reduce Impacts
Phase 2: King Street Area (Open Trenching Option–Preferred)	
With BRT, there would be traffic delays at Ward Avenue or Pensacola Street during ductline construction.	• Delay start of nighttime work in these areas until lower traffic activity at 9 P.M. • Allow temporary through-traffic use of Koko Head-direction BRT lane during nighttime work hours (by City and County of Honolulu).
BRT lanes and bus stops would be blocked by repaving work.	• Obtain City and County of Honolulu waiver of requirement to resurface the BRT lanes. OR • Temporarily operate Koko Head-direction BRT in general traffic lane, and re-route the 'Ewa-direction BRT buses, with relocation of bus stops. OR • Repave only during hours BRT line not in service.
With BRT and daytime trenching (not preferred), traffic delays at Ward Avenue and Pensacola Street are anticipated.	• Construct section from Archer Lane to Pensacola Street at nighttime.
Phase 2: King Street Area (Partial Directional Drilling Option)	
With BRT, lengthy delays and severe congestion would occur at intersections near work areas during afternoon peak hour.	• Construct Phase 2 prior to BRT operation. OR • Temporarily relocate 'Ewa direction BRT buses to Kapi'olani Boulevard, and open mauka curb lane to Koko Head traffic for duration of work between Cooke and Pensacola Streets.
With BRT, Ward Avenue intersection would exceed intersection capacity during all three peak traffic periods, and Pensacola Street intersection would operate at 93 percent capacity during afternoon peak.	• Temporarily relocate 'Ewa direction BRT buses to Kapi'olani Boulevard, and open mauka curb lane to Koko Head traffic for duration of work between Cooke and Pensacola Streets.
BRT lanes and bus stops would be blocked by repaving work.	• Obtain City and County of Honolulu waiver of requirement to resurface the BRT lanes. OR • Temporarily operate Koko Head-direction BRT in general traffic lane, and re-route the 'Ewa-direction BRT buses, with relocation of bus stops. OR • Repave only during hours BRT line not in service.

Table 5-1. Additional Traffic Impacts and Actions to Minimize Impacts with BRT *(continued)*

Potential Impacts	Potential Actions to Reduce Impacts
Phase 2: King Street Area (Partial Directional Drilling Option) *(continued)*	
With BRT, makai curb lane (BRT lane) would be blocked during trenching of ductline at the intersection with Cooke Street.	• Construct Phase 2 prior to BRT operation. OR • Merge buses into general traffic. OR • Construct this section only during hours BRT line not in-service.

Public Health and Safety

Noise. Concurrent projects could exacerbate noise. State of Hawai'i noise control rules would need to be followed, minimizing cumulative noise impacts from this project.

Emergency Response. Multiple projects in the same area could affect the routes that emergency responders take to reach certain locations. HECO would continue to communicate and coordinate with emergency responders to minimize disruption to their activities.

Schools. No other projects would affect schools during the construction phases of the Proposed Action.

Soils and Topography

No cumulative impacts on soils or topography would result from the various projects planned during the same period. The surface of the sites would be restored to pre-construction conditions.

Water Resources

Cumulative impacts to water resources are possible if multiple subsurface construction projects requiring dewatering occur in the same area. However, cumulative impacts would be minimized because dewatering would be confined to the area of trenching, and engineering controls would be implemented to eliminate the need for area-wide dewatering. Applicable State and City and County of Honolulu permit requirements would also minimize impacts to water from dewatering activities.

Air Quality

Cumulative impacts on air quality would be short-term and temporary. Compliance with existing DOH rules would minimize fugitive dust and emissions.

Cultural Resources

While cultural resources may be encountered for those projects with subsurface activity, the primary cultural concern is the potential for encountering human burials. All projects are subject to State requirements governing the inadvertent discovery of human remains; and no cumulative impacts from the project or its alternatives are expected.

Visual and Aesthetic Resources

The Proposed Action would have no impact on visual and aesthetic resources; therefore, no cumulative impacts on these resources would occur.

Biological Resources

The Proposed Action would have no impact on biological resources; therefore, no cumulative impacts on these resources would occur.

Socioeconomic Environment

No cumulative socioeconomic impacts are expected during construction or operation. For the Proposed Action and alternative alignments, the only direct construction-related impact identified is the potential for small businesses to lose revenues if customer access is blocked. Appropriate management measures would assure pedestrian and vehicular access to businesses along the alignments. In the case of multiple in-road projects in the same vicinity, impacts would be minimized through close coordination with other utilities and implementation of management measures.

EMF

The Magnetic Field Evaluation (Appendix D) prepared by Enertech projects changes to magnetic field levels if the project is implemented. As discussed in Chapter 4, the difference in projected magnetic field levels between the existing and proposed power line configurations under 2009 forecasted loading can decrease slightly, remain unchanged, or increase depending upon the project area. In addition, if the project is implemented, the proposed underground circuits would have little

effect on EMF levels at nearby institutions and EMF levels would be in the range of common everyday levels.

5.2 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

A commitment of resources is considered irreversible when it precludes restoration of those resources to their pre-project condition. Use, consumption, destruction, or degradation of resources resulting from implementation of the proposed project, such that the resource cannot be retrieved or replaced in any form, is considered an irretrievable commitment of resources. Most resource commitments for the Proposed Action are temporary and would only occur during construction. Irreversible and irretrievable resource commitments include:

- construction materials, including materials that make up the ductlines, circuits, manholes, overhead poles, transformers, and other associated materials;
- soil that would be excavated and disposed;
- available space in the construction and demolition landfill;
- money;
- manpower; and
- energy in the form of direct consumption of fossil fuel for vehicles.

There is no irrevocable commitment or loss or destruction of any natural or cultural resources.

5.3 SUMMARY OF PERMITS AND APPROVALS

Government permits, approvals, and consultations that may be required for this project were identified during the pre-assessment consultation process and the development of this document are included in Table 5-2. This reference table is a list of permits and approvals that may eventually be required.

Table 5-2. Summary of Government Permits and Approvals

Permit, Consultation, or Concurrence	Regulatory Agency
Federal	
None required	Not applicable
State	
PUC Review and Approval	PUC
NPDES, HAR 11-55	DOH-Clean Water Branch
Community Noise Permit, Noise Variance, HAR 11-46	DOH-Noise, Radiation, and Indoor Air Quality Branch
Rules Governing Procedures for Historic Preservation Review to Comment on Section 6E-42, HRS, and Burial Sites and Human Remains, HAR 13-300	DLNR-State Historic Preservation Division
HCDA review	HCDA
City and County of Honolulu	
Dewatering Discharge Permit (in conjunction with NPDES permit)	City Department of Environmental Services
Conditional Use Permit – Minor	City Department of Planning and Permitting (DPP)
Construction Plan Review; Excavation Permit; Grubbing, Grading, and Stockpiling Permit; Building Permit	City DPP
Street Usage Permit	City Department of Transportation Services

5.4 SUMMARY OF POTENTIAL IMPACTS AND MANAGEMENT AND DESIGN CONSTRAINTS

Table 5-3 summarizes the potential impacts of the Proposed Action, alternative alignments, and No Action. Planned management and design constraints used to prevent significant adverse impacts are also identified.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
LAND USE				
	No adverse impacts. Proposed Action is consistent with applicable State and City and County of Honolulu land use plans and requirements. *Management Constraints:* HECO will obtain necessary permits (i.e., Conditional Use Permit – Minor).	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
INFRASTRUCTURE				
Electrical	No adverse impacts. During construction, there could be brief interruptions in some areas during electrical disconnection and connection. *Management Constraints:* HECO will notify those affected by power interruptions.	Same as the Proposed Action.	Same as the Proposed Action.	Potential for adverse impacts associated with a loss of power to areas of East O'ahu and possibly entire island.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
INFRASTRUCTURE *(continued)*				
Potable Water	No adverse impacts. *Management Constraints:* HECO will research available records, conduct field explorations, and coordinate with BWS to confirm locations of water lines to avoid conflicts.	Same as the Proposed Action.	Same as the Proposed Action.	Potential for adverse impacts associated with a loss of power and subsequent loss of water distribution.
Wastewater	No adverse impacts. *Management Constraints:* HECO will research available records, conduct field explorations, and coordinate with the responsible City and County of Honolulu agency to confirm location of sewer lines to avoid conflicts.	Same as the Proposed Action.	Same as the Proposed Action.	Potential for adverse impacts associated with a loss of power and subsequent loss of treatment capacity.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
INFRASTRUCTURE *(continued)*				
Drainage	No adverse impacts. *Management Constraints:* HECO will research available records, conduct field explorations, and coordinate with the responsible City and County of Honolulu agency to confirm location of drainage lines to avoid impacts.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
Communications	No adverse impacts. *Management Constraints:* HECO will research available records, conduct field explorations, and coordinate with communications companies to confirm location of communication lines to avoid conflicts.	Same as the Proposed Action.	Same as the Proposed Action.	Potential for adverse impacts associated with a loss of power and subsequent loss of some communications capacity.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
INFRASTRUCTURE *(continued)*				
Solid Waste	No adverse impacts. Solid wastes will be generated during construction. The material to be excavated during trenching would be sold for reuse at other construction sites. The material to be excavated by directional drilling and the potentially contaminated soil that may be excavated during trenching that would not be sold for reuse can be accommodated at the PVT construction and demolition landfill. If construction activities encounter existing contaminated soil, contaminated waste may be disposed. *Management Constraints:* Solid wastes generated during construction will be reused, recycled, or disposed according to applicable government requirements. Contaminated or hazardous wastes, if encountered, would be disposed of in accordance with applicable laws.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
TRAFFIC				
	No adverse impacts. Impacts during construction would be temporary, with no area affected longer than two months and, in most cases, less than one week. With the directional drilling option in Phase 2, the presence of equipment within the roadway 24 hours a day would affect peak hour periods of traffic. *Management Constraints:* In non-residential areas, scheduling work during nighttime hours, providing flagmen to help direct traffic, and working during hours of no bus service would minimize traffic impacts.	Same as the Proposed Action. *Management Constraints:* Scheduling work near intersections during nighttime hours, and relocating bus stops where possible would minimize traffic impacts.	Same as the Proposed Action. *Management Constraints:* Scheduling work near intersections during nighttime hours, and relocating bus stops where possible would minimize traffic impacts.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
PUBLIC HEALTH AND SAFETY				
Noise	No adverse impacts. Noise levels from construction equipment could exceed maximum permissible sound levels. Such occurrences would be short-term and performed under a DOH-issued noise permit or variance. *Management Constraints:* Applying various controls to construction work such as conducting work during specific hours would minimize noise impacts.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
Emergency Response	No adverse impacts. Emergency response time during day or night construction is not anticipated to exceed travel time standards. *Management Constraints:* Coordination and communication with emergency responders would ensure ingress and egress across construction areas and minimize impacts to emergency responders.	Same as the Proposed Action.	Same as the Proposed Action.	In the event of increased electrical outages, the Honolulu Fire and Police Departments may receive increased calls to assist in areas without power.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
PUBLIC HEALTH AND SAFETY (continued)				
Schools	No adverse impacts. Construction activities would occur adjacent to Lunalilo Elementary, Washington Middle School, and McKinley High School. Potential traffic, noise, and pedestrian safety impacts would be avoided or minimized through implementation of management constraints. Areas of Washington Middle School and McKinley High School campuses may be used for construction staging activities. *Management Constraints:* Scheduling work during school vacations, fencing off construction work areas, and communication with school administration would minimize impacts to schools.	Same as the Proposed Action.	Same as the Proposed Action.	To the extent schools rely on electrical service, an interruption of service associated with an overload and related outages could affect school operation.
GEOLOGY, TOPOGRAPHY, AND SOILS				
	No adverse impacts. During construction, soils and topography would be temporarily disturbed. *Management Constraints:* Incorporation of erosion control measures into construction practices would minimize impacts to geology, topography and soils.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
WATER RESOURCES				
Groundwater	No adverse impacts. Dewatering may be required during Phase 1 trenching, but would have only a localized, minimal, and temporary effect on groundwater levels. Drinking water resources would not be affected. *Management Constraints:* Dewatering, if required, would be conducted in accordance with applicable law.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
Surface Water	No adverse impacts. Pollutants associated with construction activities could run off via storm water to the City and County of Honolulu's MS4 system. *Management Constraints:* If best management practices to prevent introducing pollutants to surface waters are implemented during construction and storm drain lines and intakes in the project vicinity are protected, then impacts to surface waters would be minimized.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
AIR QUALITY				
	No adverse impacts. Air emissions from fossil fuel-powered generators, heavy-duty construction equipment, and fugitive dust would be short-term. *Management Constraints:* If all applicable permit requirements and HAR 11-60, 1-33 are followed, then impacts to air quality would be minimized.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
CULTURAL RESOURCES				
Archaeological Resources	No adverse impacts. Archaeological sites may be inadvertently encountered during construction excavation. *Management Constraints:* Any subsurface archaeological features encountered during construction, and any inadvertent burials found, will be treated in accordance with the law.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
CULTURAL RESOURCES *(continued)*				
Traditional Cultural Practices	No adverse impacts. There is no evidence of traditional cultural practices in the project area.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
Historic Resources	No adverse impacts. Buildings at McKinley High School, listed on the State and National Register of Historic Places, would not be affected by construction activities fronting the school. Two other historic sites in the vicinity, Thomas Square and Linekona School, would not be affected.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.
VISUAL AND AESTHETIC RESOURCES				
	No adverse impacts. Construction activities would be temporary, and underground subtransmission lines would not affect view planes.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
BIOLOGICAL RESOURCES				
	No adverse impacts. Construction would occur within existing paved and heavily disturbed urban areas, where no threatened or endangered species or their habitat are found. No exceptional trees were identified along the project alignment. Tree roots and landscaping may be affected. *Management Constraints:* Coordination with HECO's arborist and the City and County of Honolulu's Department of Parks and Recreation to avoid impacting root structures of trees would minimize impacts to biological resources.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
SOCIOECONOMIC ENVIRONMENT				
	No adverse impacts. Impacts on revenues of ground-level businesses located along the alignment would be minimal with implementation of management measures. *Management Constraints:* If businesses are informed of construction activities, and provided coned access routes and signs indicating that businesses are open, and special-duty police officers and flagmen are present to direct traffic, impacts to the socioeconomic environment would be minimized. Work will be conducted at night in certain commercial areas.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

Table 5-3. Summary of Potential Impacts and Management and Design Constraints *(continued)*

Issue or Resource	Proposed Action (reuses approximately 2,450 feet of existing ductline)	Alternative Alignments Between Makaloa and McCully Substations		No Action
		Alternative Alignment 1 (requires new ductline throughout entire alignment)	Alternative Alignment 2 (requires new ductline throughout entire alignment)	
ELECTRIC AND MAGNETIC FIELDS (EMF)				
	No adverse impacts. EMF levels would be in the range of common everyday levels. *Management Constraints:* Routing subtransmission lines close to the middle of roadways, phasing the cables to cancel magnetic fields, and placing subtransmission lines underground would prudently avoid exposure to EMF levels.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts.

5.5 FINDING OF NO SIGNIFICANT IMPACT DETERMINATION

5.5.1 Applicant

The applicant is the Hawaiian Electric Company, Inc (HECO).

5.5.2 Approving Agency

The approving agency is the State of Hawai'i Public Utilities Commission (PUC).

5.5.3 Brief Description of the Proposed Action

HECO is proposing to install underground subtransmission lines and transformers in the eastern district of the Primary Urban Center within the City and County of Honolulu. Subtransmission lines or electrical circuits, which are used to transmit electricity, would be designed for a nominal rating of 46 kilovolts (kV). Transformers would step down electrical energy from 138kV lines to 46kV lines or from 46kV lines to 12kV lines, which allows higher voltage electricity (needed for transmission) to be distributed locally for use by the consumer. Additional equipment upgrades, such as circuit breakers, switchgear, and protective relays, are also proposed and would be installed in existing substations. Because the installation and the use of 46kV circuits would be implemented in two phases, the Proposed Action is referred to as the East O'ahu Transmission Project (EOTP) 46kV Phased Project.

5.5.4 Determination and Reasons Supporting Determination

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

No irrevocable commitment or loss or destruction of any natural or cultural resource would result from the Proposed Action and alternative alignments. The Proposed Action and alternative alignments would occur in existing rights-of-way or structures. There is the possibility of encountering two buried fishponds and burials associated with the Catholic Cemetery on King Street. A plan for documenting and properly treating these resources during the course of construction excavations will be developed and implemented by HECO.

(2) Curtails the range of beneficial uses of the environment.

The proposed utility installation project would not curtail the range of beneficial uses of the environment. Underground subtransmission lines would not restrict beneficial uses of the environment.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in HRS Chapter 344 and any revisions thereof and amendments thereto, court decisions, or executive orders.

The Proposed Action and alternative alignments are consistent with the State's long-term environmental policies, goals, and guidelines as expressed in HRS Chapter 344, in that it serves to (1) increase the reliability of electrical power so that the social and economic requirements of the people of Hawai'i can be met and (2) enhance the quality of life. While the Proposed Action and alternative alignments are designed to avoid impacts to resources by undergrounding subtransmission lines and eliminating visual impacts, the action is proposed in response to community growth and does not initiate changes in population, types of economic activities, and community planning.

(4) Substantially affects the economic or social welfare of the community or State.

The Proposed Action and alternative alignments would not substantially affect the economic or social welfare of the community or the State. No permanent new employment or increase in new residents would occur. Costs associated with the project would be distributed among all HECO customers; therefore, specific populations would not be disproportionately impacted.

Short-term impacts to businesses from loss of revenues during construction would be minimized by providing access routes through the project area with signage; conducting open trenching and paving at night in commercial areas; and having special-duty police officers or flagmen present to assist with the flow of traffic through the project area.

Short-term impacts of construction on residents would be minimized by management measures that include informing residents and businesses of upcoming construction activities, allowing residents vehicular access to closed streets, and scheduling activities to minimize impacts to residents.

(5) Substantially affects public health.

The Proposed Action and alternative alignments would not substantially affect public health. During construction, noise levels and air emissions would comply with State rules so that public health and welfare are not jeopardized, and emergency responders would not be significantly affected. The projected EMF levels from these

projects are within the range of magnetic field levels found at numerous locations in the local environment. Magnetic field levels decrease with distance from the source, and the projected magnetic field levels beyond the sidewalks are well within the range of levels commonly encountered in the local area and in other communities. That there would be no impact to human health is further supported by evaluations of EMF research by national and international scientific organizations.

(6) Involves substantial secondary impacts, such as population changes or effects on public facilities.

The Proposed Action and alternative alignments respond to growth that is already occurring or planned within the City and County of Honolulu and, therefore, are not growth-inducing. Because the project would not induce growth, no secondary impacts such as those resulting from increases in population and their subsequent effects on schools and other public facilities have been identified or are anticipated.

(7) Involves a substantial degradation of environmental quality.

No substantial degradation of environmental quality would result from the Proposed Action and alternative alignments. Construction activities would be limited to installation of new ductline and manholes in existing rights-of-way and upgrades to substations and would not involve use of materials or cause emissions to air, water, or ground that could substantially degrade environmental quality.

(8) Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

The Proposed Action and alternative alignments would not have a considerable cumulative effect on the environment or involve a commitment for larger actions. Cumulative impacts could result from the incremental effect of the Proposed Action or alternative alignments, plus other construction projects during the same period of time. These impacts are temporary and will not have a considerable effect upon the environment or involve a commitment for larger action.

(9) Substantially affects a rare, threatened, or endangered species, or its habitat.

No rare, threatened, or endangered species or their habitats are found in the project vicinity. The project is located within existing roadway rights-of-way and existing substations.

(10) Detrimentally affects air or water quality or ambient noise levels.

The State of Hawai'i is in an attainment area for all criteria air pollutants. The Proposed Action and alternative alignments would not have a significant effect on

air quality. Air emissions for construction activities are localized and temporary and would be minimized as required by HAR 11-60.1.

The Proposed Action and alternative alignments would not have a significant effect on water quality. Construction activities are localized, temporary and will be conducted in compliance with State law. If needed, dewatering would be localized and would not have a significant impact on groundwater.

The Proposed Action and alternative alignment would not have a significant effect on ambient noise levels. In certain cases, HECO may apply for a noise permit or variance when noise levels are anticipated to exceed the noise levels in HAR 11-46. Approval of the permit or variance may require additional noise attenuation devices on construction equipment or further limits on construction hours and activities.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

The Proposed Action and alternative alignments are not located in a tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. The Proposed Action and alternative alignments are not likely to affect or suffer damage by being located in a flood plain. Construction in areas of the project located in flood plains will not occur during heavy rains Underground circuits and related equipment are designed to operate under water.

(12) Substantially affects scenic vistas and view planes identified in County or State plans or studies.

The Proposed Action and alternative alignments would not substantially affect scenic vistas and view planes because the activities would occur generally underground or inside substation properties.

(13) Requires substantial energy consumption.

Energy consumed to operate construction equipment would not be substantial. The Proposed Action and alternative alignments do not require an increase in generating capacity.

5.5.5 Name, Address, and Phone Number of Contact Person for Further Information

Mr. Kerstan J. Wong

Hawaiian Electric Company, Inc.

P.O. Box 2750

Honolulu, Hawai'i 96840-0001

(808) 543-7059

Chapter 6

Public Participation

CHAPTER 6
PUBLIC PARTICIPATION

6.1 PRE-ASSESSMENT CONSULTATIONS

The following agencies and organizations were contacted prior to drafting the EA to solicit input. Meetings and phone conversations were conducted with some of the agencies or organizations are summarized in Table 6-1.

Table 6-1. Pre-Assessment Consultations

Contact Name	Organization	Meeting Dates
STATE AGENCIES		
Ms. Mary Lou Kobayashi, Acting Director	State of Hawai'i, Department of Business, Economic Development & Tourism, Office of Planning	No meeting conducted. Both the Office of Planning and the Strategic Industries Division reviewed the summary information for the EOTP EA and concluded that a pre-assessment consultation meeting was not needed.
Ms. P. Holly McEldowney, Administrator (acting)	State of Hawai'i, Department of Land and Natural Resources, State Historic Preservation Division	April 15, 2004 meeting with staff.
Mr. Glenn Yasui, Highways Administrator	State of Hawai'i, Department of Transportation, Highways Division	No meeting conducted. Planning Engineer indicated that no meeting was necessary.
Mr. Laurence Lau, Esq., Deputy Director	State of Hawai'i, Environmental Health Administration	March 19, 2004 meeting with staff of the Noise, Radiation and Indoor Air Quality Branch.
Mr. Clyde Nāmu'o, Administrator	State of Hawai'i, Office of Hawaiian Affairs, Support Services	April 15, 2004 meeting with staff.
CITY AND COUNTY AGENCIES		
Mr. Clifford Jamile, Manager and Chief Engineer	City and County of Honolulu, Board of Water Supply	March 18, 2004 meeting with staff.
Mr. Tim Steinberger, P.E.	City and County of Honolulu, Department of Design & Construction	March 18, 2004 meeting with staff.

Table 6-1. Pre-Assessment Consultations *(continued)*

CITY AND COUNTY AGENCIES *(continued)*		
Mr. Frank Doyle, P.E., Director	City and County of Honolulu, Department of Environmental Services	March 16, 2004 phone conversation with staff.
Mr. William Balfour, Jr., Director	City and County of Honolulu, Department of Parks and Recreation	March 30, 2004 meeting.
Mr. Eric Crispin, AIA, Director	City and County of Honolulu, Department of Planning and Permitting	March 11, 2004 meeting.
Ms. Cheryl Soon, Director	City and County of Honolulu, Department of Transportation Services	March 18, 2004 meeting with staff.
Mr. Larry Leopardi, P.E., Director	City and County of Honolulu, Facility Maintenance Department	March 18, 2004 meeting.
Chief Attilio Leonardi	City and County of Honolulu, Honolulu Fire Department	No meeting conducted. HFD declined preconsultation meeting but requested a copy of Draft EA for comment during public comment period.
Mr. Glen Kajiyama, Interim Chief	City and County of Honolulu, Honolulu Police Department	April 1, 2004 meeting with staff.
FEDERAL AGENCIES		
None	None	Federal agencies with areas of jurisdiction were not identified for the proposed project.
POTENTIAL INTERVENERS		
Senator Carol Fukunaga	Hawai'i State Legislature District 11	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Representative Scott Saiki	Hawai'i State Legislature District 22	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Councilmember Ann Kobayashi	Honolulu City Council District 5	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Ms. Darlene Nakayama	Hoolaulima o Pālolo	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Ms. Daisy Murai, Secretary	Kapahulu Neighbors	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Mr. Henry Curtis, Vice President for Consumer Issues	Life of the Land	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.

Table 6-1. Pre-Assessment Consultations *(continued)*

POTENTIAL INTERVENERS *(continued)*		
Dr. Jeremy Lam, President	Malama o Mānoa	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Ms. Karen Iwamoto, President	Pālolo Community Council	Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
Ms. Michelle Matson		May 11, 2004 phone conversation.
Ms. Carolyn Walther		Declined meeting. Requested public scoping meeting, which is not part of the EA process under HAR 11-200.
INTERESTED PARTIES		
Mr. Mike Polovcin, Director of Operations, SMG Inc.	Hawai'i Convention Center	March 22, 2004 meeting.
Mr. Clyde Igarashi, Principal	Lunalilo Elementary School	May 21, 2004 meeting.
Mr. Milton Shishido, Principal	McKinley High School	April 28, 2004 meeting.
Mr. Michael Harano, Principal	Washington Middle School	May 4, 2004 meeting.

6.2 DRAFT EA COMMENTS AND RESPONSES

The availability of the Draft EA and anticipated Finding of No Significant Impact (FONSI) were announced in the September 8, 2004, issue of the *The Environmental Notice*, published by the OEQC. Copies of the Draft EA were distributed to the agencies, public officials, citizen groups, individuals, and libraries listed in Table 6-2.

Table 6-2. Distribution List

Name	Organization
Ms. Michelle Matson	
Ms. Carolyn Walther	
Mr. Jim Tollefson	Chamber of Commerce of Hawaii
Mr. Clifford Jamile, Manager & Chief Engineer	City and County of Honolulu, Board of Water Supply
Mr. Timothy Steinberger, Director	City and County of Honolulu, Department of Design & Construction

Table 6-2. Distribution List *(continued)*

Name	Organization
Mr. William Balfour, Jr., Director	City and County of Honolulu, Department of Parks and Recreation
Mr. Eric Crispin, AIA, Director	City and County of Honolulu, Department of Planning & Permitting
Mr. Frank Doyle, Director	City and County of Honolulu, Environmental Services Department
Mr. Larry Leopardi, Director	City and County of Honolulu, Facility Maintenance Department
Chief Attilio Leonardi	City and County of Honolulu Fire Department
Chief Boisse Correa	City and County of Honolulu Police Department
Ms. Cheryl Soon, Director	City and County of Honolulu, Transportation Services Department
Mr. Mike Polovcin, Director of Operations	Hawaii Convention Center
Mr. Murray Towill	Hawaii Hotel Association
The Honorable Scott Nishimoto	Hawaii State Legislature – House of Representatives, District 21
The Honorable Scott Saiki	Hawaii State Legislature – House of Representatives District 22
The Honorable Kirk Caldwell	Hawaii State Legislature – House of Representatives District 24
The Honorable Brian Schatz	Hawaii State Legislature – House of Representatives District 25
The Honorable Ken Hiraki	Hawaii State Legislature – House of Representatives District 28
The Honorable Brian Taniguchi	Hawaii State Legislature – Senate District 10
The Honorable Carol Fukunaga	Hawaii State Legislature – Senate District 11
The Honorable Gordon Trimble	Hawaii State Legislature – Senate District 12
The Honorable Les Ihara, Jr.	Hawaii State Legislature – Senate District 9
The Honorable Ann Kobayashi	Honolulu City Council 5th District
The Honorable Rod Tam	Honolulu City Council 6th District
Ms. Darlene Nakayama	Hoolaulima O Palolo
Ms. Daisy Murai, Secretary	Kapahulu Neighbors
Librarian	Hawaii State Library Hawaii Documents Center
Librarian	McCully-Moiliili Library
Librarian	Waikiki-Kapahulu Library
Mr. Henry Curtis, Vice President for Consumer Issues, Executive Director	Life of the Land, and Community Advisory Committee
Dr. Jeremy Lam, President	Malama o Manoa and Community Advisory Committee

Table 6-2. Distribution List *(continued)*

Name	Organization
Mr. James Mee	National Association of Industrial and Office Properties
Mr. John Steelquist, Chair	Neighborhood Board #10 - Makiki/Lower Punchbowl/ Tantalus and Community Advisory Committee
Mr. John Breinich, Chair	Neighborhood Board #11 - Ala Moana/Kakaako and Community Advisory Committee
Mr. Lester Fukuda, Chair	Neighborhood Board #3 - Waialae/Kahala and Community Advisory Committee
Mr. Michael Abe, Chair	Neighborhood Board #4 - Kaimuki and Community Advisory Committee
Mr. Kenneth Chang, Vice Chair	Neighborhood Board #5 - Diamond Head/ Kapahulu/ St Louis Heights and Community Advisory Committee
Ms. Karen Ah Mai, Chair	Neighborhood Board #5 - Diamond Head/ Kapahulu/St Louis Heights
Ms. Darlene Nakayama, Chair	Neighborhood Board #6 – Palolo
Mr. Traver Carroll	Neighborhood Board #6 - Palolo and Community Advisory Committee
Mr. John Thomas Heinrich, Chair	Neighborhood Board #7 - Manoa and Community Advisory Committee
Mr. Ronald Lockwood, Chair	Neighborhood Board #8 - McCully/Moiliili and Community Advisory Committee
Mr. Robert Finley, Chair	Neighborhood Board #9 - Waikiki
Mr. David McCulloch	Neighborhood Board #9 - Waikiki and Community Advisory Committee
Mr. Darrick Miyata	Oceanic Cable
Ms. Karen Iwamoto, President	Palolo Community Council
Mr. Clyde Igarashi, Principal	Lunalilo Elementary School
Mr. Milton Shishido, Principal	McKinley High School
Mr. Michael Harano, Principal	Washington Middle School
Dr. Pat Hamamoto, Superintendent of Education	State of Hawaii Department of Education, Office of the Superintendent
Mr. Laurence Lau, Esq., Deputy Director	State of Hawaii Department of Health, Environmental Health Administration
Ms. P. Holly McEldowney, Administrator (acting)	State of Hawaii Department of Land and Natural Resources, State Historic Preservation Division
Mr. Peter Young, Chairperson	State of Hawaii Department of Land and Natural Resources
Mr. Rodney Haraga, Director	State of Hawaii Department of Transportation

Table 6-2. Distribution List *(continued)*

Name	Organization
Mr. Glen Yasui, Administrator	State of Hawaii Department of Transportation, Highways Division
Mr. Maurice Kaya, Division Head	State of Hawaii Department of Business, Economic Development & Tourism, Energy, Resources & Technology Division
Ms. Mary Lou Kobayashi, Acting Director	State of Hawaii Department of Business, Economic Development & Tourism, Office of Planning
Mr. John Cole, Executive Director	State of Hawaii Department of Commerce and Consumer Affairs, Division of Consumer Advocacy
Ms. Haunani Apoliona, Chairperson	State of Hawaii Office of Hawaiian Affairs
Mr. Clyde Namu'o, Administrator	State of Hawaii Office of Hawaiian Affairs, Support Services
Ms. Catherine Awakuni, Esq., Commission Council	State of Hawaii Public Utilities Commission
Mr. James Moncur, Director	State of Hawaii University of Hawaii, WRRC & Environmental Center
Mr. Charles Calvet, Manager Engineering	The Gas Company
Ms. Mary Steiner	The Outdoor Circle and Community Advisory Committee
The Honorable Neil Abercrombie	United States House of Representatives
The Honorable Daniel Akaka	United States Senate
The Honorable Daniel Inouye	United States Senate
Mr. Karl Kim	University of Hawaii Office of Vice Chancellor, Natural Resources Management and Sustainable Development
Mr. Wayne Cabral, Manager	Verizon Hawaii
Mr. Rick Egged	Waikiki Improvement Association and Community Advisory Committee
Mr. Gregory Sue	City and County of Honolulu Department of Design & Construction, Civil Division

6.2.1 Comments Received Within the 30-day Comment Period

Following the procedures established in HAR 11-200, comments received or postmarked within the 30-day comment period between September 8, 2004, and October 8, 2004, are timely. Commenters providing their input within this period are listed below. Comment and response letters follow.

Name	Organization
Mr. William D. Balfour, Jr., Director	City and County of Honolulu, Department of Parks and Recreation
Mr. Keith S. Shida, Principal Executive	City and County of Honolulu, Board of Water Supply
Mr. Charles E. Calvet, P.E., Manager Engineering	The Gas Company
Chief Attilio K. Leonardi	City and County of Honolulu Fire Department
Mr. Rodney K. Haraga, Director of Transportation	City and County of Honolulu, Department of Transportation
Ms. Daisy Murai	Individual
Senator Daniel K. Akaka	United States Senate
Assistant Chief Karl Godsey	City and County of Honolulu Police Department
Chairperson Darlene H. Nakayama	Palolo Neighborhood Board No. 6
Mr. Traver Carroll, President	Ho'olaulima O Palolo
Mr. Henry Q. Curtis, Vice President for Consumer Issues	Life of the Land
Senator Carol Fukunaga	Hawaii State Senate
Representative Scott K. Saiki	Hawaii State House of Representatives
Councilwoman Ann Kobayashi	City Council of the City and County of Honolulu
Mr. John T. Harrison, Environmental Coordinator	University of Hawaii at Manoa, Environmental Center
Ms. Genevieve Salmonson, Director	State of Hawaii, Office of Environmental Quality Control

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 309 • KAPOLEI, HAWAII 96707
TELEPHONE: (808) 692-5561 • FAX (808) 692-5131 • INTERNET www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

EDWARD T. "SKIPPA" DIAZ
DEPUTY DIRECTOR

September 7, 2004

FILED
SEP 8 1 31 PM '04
PUBLIC UTILITIES
COMMISSION

Mr. Carlito Caliboso, Chairman
State of Hawaii Public Utilities Commissions
(Accepting Authority)
465 South King Street
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

Subject: Draft Environmental Assessment
Hawaiian Electric Company's East Oahu
Transmission 46 KV Phased Project

Thank you for the opportunity to review and comment on the Draft Environmental Assessment relating to Hawaiian Electric Company's East Oahu Transmission Project.

The Department of Parks and Recreation has no comment on this proposed project.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454.

Sincerely,

W. D. Balfour

WILLIAM. D. BALFOUR, JR.
Director

WDB:mk
(75025)

cc: Ms. Lesley A. Matsumoto, Belt Collins, Hawaii, Ltd.

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-226

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

Dear Mr. Balfour:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for participating in the review of the EOTP 46kV Phased Project Draft Environmental Assessment (EA). We understand that your department has no comments to offer at this time.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

BOARD OF WATER SUPPLY

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

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
HERBERT S. K. KAOPUA, SR
DAROLYN H. LENDIO

RODNEY K. HARAGA, Ex-Officio
LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

September 10, 2004

FILED
SEP 13 1 05 PM '04
PUBLIC UTILITIES COMMISSION

State of Hawaii Public Utilities Commission
465 South King Street, First Floor
Honolulu, Hawaii 96813

Attention: Carlito Caliboso

Gentlemen:

Subject: Your Letter of August 30, 2004 on the Draft Environmental Assessment for East Oahu Transmission Project 46KV Phased Project

Thank you for the opportunity to comment on the proposed project.

The construction drawings should be submitted for our approval.

The construction schedule should be coordinated to minimize impacts to the community and the water system.

If you have any questions, please contact Joseph Kaakua at 748-5442.

Very truly yours,

K. Shida

KEITH S. SHIDA
Principal Executive
Customer Care Unit

cc: Lesley A. Matsumoto, Belt Collins Hawaii, Ltd.

Pure Water ... our greatest need – now it wasts

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-227

Mr. Keith Shida
Principal Executive
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Shida:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

1 *The construction drawings should be submitted for our approval.*

HECO will submit construction drawings to the Board of Water Supply (BWS) for approval prior to commencement of construction to ensure that the proposed construction does not conflict with BWS facilities.

2 *The construction schedule should be coordinated to minimize impacts to the community and the water system.*

HECO will coordinate the construction schedule of this project with the BWS to minimize impacts to the community and the water system.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

THE GAS COMPANY

RECEIVED

2004 SEP 15 PM 2:02

DELT COLLINS HAWAII

P.O. Box 3000
Honolulu, Hawaii 96802-3000

September 14, 2004

State of Hawaii Public Utilities Commission
(Accepting Authority)
465 South King Street, First Floor
Honolulu, Hawaii 96813

Attention: Mr. Carlito Caliboso
Chairman

Gentlemen:

Subject: Draft Environmental Assessment for
East O'ahu Transmission Project 46KV
Phased Project

Please be advised that The Gas Company, LLC, maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area.

Thank you for the opportunity to comment on the Draft Environmental Assessment. Should there be any questions, or if additional information is desired, please call me at 594-5570.

Sincerely,

The Gas Company, LLC

Charles E. Calvet, P.E.
Manager, Engineering

CEC:krs
04-243

cc: ✓Ms. Lesley A. Matsumoto, Belt Collins Hawaii Ltd.

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-228

Mr. Charles Calvet
Manager, Engineering
The Gas Company
PO Box 3000
Honolulu, HI 96802-3000

Dear Mr. Calvet:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our response to your comment follows.

1 *Please be advised that The Gas Company, LLC, maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area.*

HECO notes that existing underground utility gas mains that serve commercial and residential customers are in the vicinity of the Proposed Action. HECO will take into consideration the location of these existing gas facilities during the detailed planning and design process for HECO's Proposed Action to minimize any potential conflicts. To further minimize any potential conflicts, HECO will submit construction drawings to The Gas Company for review and will coordinate all construction work with your company.

Your comment is appreciated. Thank you for your interest in this project.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819
TELEPHONE (808) 831-7761 • FAX (808) 831-7750 • INTERNET www.honolulufire.org

RECEIVED
2004 SEP 24 PM 2:02
BELT COLLINS HAWAII

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

September 21, 2004

Mr. Carlito Caliboso, Chairman
State of Hawaii
Public Utilities Commission
465 South King Street, Room 103
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

Subject: Draft Environmental Assessment (DEA)
Project: East Oahu Transmission Project
46kV Phased Project
Location: Honolulu, Oahu, Hawaii
Tax Map Key: Zone 2, Various Plots and Parcels

We received a letter from Lesley A. Matsumoto of Belt Collins Hawaii Ltd., dated August 30, 2004, requesting that our comments on the above-mentioned DEA be submitted to you.

The Honolulu Fire Department requires that the following be complied with for the duration of the project:

1. Maintain fire apparatus access throughout the construction site.
2. Notify the Fire Communication Center at 523-4411 regarding any interruption of the existing fire hydrant system.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 831-7778.

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:bh

cc: Lesley A. Matsumoto, Belt Collins Hawaii Ltd.

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-229

Chief Attilio Leonardi
City and County of Honolulu Fire Department
3375 Koapaka Street, Suite H425
Honolulu, HI 96819-1869

Dear Chief Leonardi:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

The Honolulu Fire Department requires that the following be complied with for the duration of the project:

1. Maintain fire apparatus access throughout the construction site.

Access throughout the construction site for fire apparatus will be maintained continuously. Such access will be accomplished by utilizing the same thoroughfare used by the construction machinery. If access across the open trench is required, steel plates can be placed immediately. All traffic control, such as lane closures, will be released at the end of each shift.

2. Notify the Fire Communication Center at 523-4411 regarding any interruption of the existing fire hydrant system.

The Fire Communication Center will be contacted prior to the commencement of work and in the event of any incident such as an interruption to the existing fire hydrant system.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Chief Attilio Leonardi
January 7, 2005
2004.33.0800 / 04EP-229
Page 2

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

LINDA LINGLE
GOVERNOR

RECEIVED
SEP 2 7
BUDGET AND FINANCE
STATE OF HAWAII

RODNEY K. HARAGA
DIRECTOR
Deputy Director
BRUCE Y. MATSUI
LINDEN H. JOESTING
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
STP 8.1376

September 21, 2004

TO: THE HONORABLE CARLITO CALIBOSO, CHAIR
PUBLIC UTILITIES COMMISSION
DEPARTMENT OF BUDGET AND FINANCE

FROM: for RODNEY K. HARAGA
DIRECTOR OF TRANSPORTATION

SUBJECT: HAWAIIAN ELECTRIC COMPANY (HECO)
DRAFT ENVIRONMENTAL ASSESSMENT
EAST OAHU TRANSMISSION 46 KV PHASED PROJECT

We have reviewed the subject environmental report that was submitted to us for the proposed electrical transmission line project. This is to advise you that we anticipate the project will have no significant impact on our transportation facilities.

We appreciate the opportunity to provide our comments.

c: Lesley Matsumoto, Belt Collins Hawaii, Ltd.

FILED
SEP 27 10 10 AM '04
PUBLIC UTILITIES
COMMISSION

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-230

Mr. Rodney Haraga
Director of Transportation
State of Hawai'i
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Dear Mr. Haraga:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for participating in the review of the EOTP 46kV Phased Project Draft Environmental Assessment (EA). We understand that your department anticipates no significant impact on State transportation facilities from the Proposed Action.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

October 2, 2004

FILED
Oct 4 12 07 PM '04
PUBLIC UTILITIES COMMISSION

Commissioner Carlito Caliboso, Chair
Hawaii Public Utilities Commission
465 S. King Street, First Floor
Honolulu, Hawaii 96813

RE: East Oahu Transmission Project (EOTP)
Environmental Assessment (EA)

Dear Commissioner Caliboso:

This letter contains a list of questions, which have not been addressed by the EOTP of the EA. The district of Kapahulu in the Eastern section of Oahu, Hawaii was very much surprised to learn that the Hawaiian Electric Company's (HECO) latest proposal to place new underground power lines on Winam Avenue and adjoining parts of Mooheau Avenue. The project is to boost power from the Makaloa, One Archer and Kamoku/Pukele Stations to East Oahu all the way to Kahuku. There are still questions and concerns by the residents that have not been answered.

Questions:

1) **Why is the project done in segments, as the ultimate goal is to link power all the way to Kahuku?**

2) **Why was Kapahulu - especially Winam & parts of Mooheau Avenues the chosen route?**

3) **Which communities would benefit by the boosting of power service? Kapahulu?, Kaimuki?, St. Louis?, Waikiki?, Hawaii Kai? Windward Oahu?**

4) **Will the Winam segment benefit Waikiki, as they are moving towards higher & increasing density with several high rise condominium projects that are being constructed recently with more construction projects to come?**

5) **Where will the Winam segment be connected to?**

6) **Is the underground trenching procedure on Winam & Mooheau necessary to handle the overload and insure that no more outages occur?**

7) **Kapahulu is comprised of many single family dwellings, smaller apartments, condominiums and small businesses, smaller shopping complexes in the area, similar to adjoining Moiliili & Kaimuki towns and not slated for higher density type of projects. Why is more electric power necessary in this community? Is there such a demand in this small community – especially on Winam & Mooheau Avenue, which is comprised of a few single family dwellings, unlike the high rises of Waikiki?**

8) **Why couldn't the power lines be diverted to other more major streets like Kapiolani as the lines head Eastward?**

9) **Is the Kapahulu segment included in the Integrated Resource Planning process? If so, my I have a copy of the documents?**

Daisy Murai
3039 Kaunaoa Street
Honolulu, Hawaii 96815

Page 2
EOTP/EA Testimony
October 2, 2004

10) Wouldn't it be more feasible to build a power plant in the high density community of Hawaii Kai, as several residential and business projects are being completed with several more homes ready for building? This is where the additional electrical power source should begin and continue Eastward towards Kahuku or Westward towards Kahala. *Smaller substations would not hamper the entire* line, as smaller pockets of communities, which have power outages, would not affect surrounding and larger communities causing for an island-wide power outages of the past.

11) Would it not be more economical for both the Hawaiian Electric Company and the consumers if the Power stations and sub-stations be maintained on a regular basis? This would lower the cost to the consumers as well as increase jobs.

12) Has HECO looked into other more economical and reliable sources of power, as more advance energy efficient technology has improved tremendously in recent years?

13) What will the ultimate cost to consumers be with this EOTP when it is fully completed?

14) Is there really a demand for electrical power and the use of oil for Oahu?

There are more questions and concerns for Kapahulu to come, but these are just some of them as the project proceeds. I believe the general public, the consumers, is entitled for answers from Hawaiian Electric Company project coordinators.

Thanking you for the opportunity to speak.

Daisy M. Murai

Daisy Murai
3039 Kaunaoa Street
Honolulu, Hawaii 96815

cc: Ms. Lesley Matsumoto, Belt Collins Hawaii, 2153 N. King Street, Honolulu, Hawaii 96819
Mr. Kerstan Wong, Hawaiian Electric Company, P. O. Box 2750, Honolulu, Hawaii 96840-0001
Jeyan Thirvgnanam, Office of Environmental Quality Control, 235 S. Beretania Street, Suite 702, Honolulu, Hawaii 96813

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-231

Ms. Daisy Murai
3039 Kauna'oa Street
Honolulu, HI 96815

Dear Ms. Murai:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

1 *Why is the project done in segments, as the ultimate goal is to link power all the way to Kahuku?*

The project is being proposed in phases in order to address in a more timely manner near-term transmission problems, such as the Ko'olau/Pūkele Overload Situation (discussed in Chapter 2) and part of the Pūkele Substation Reliability Concern (discussed in Chapter 2), which includes Waikīkī. The timely implementation of Phase 1 is particularly important, as it addresses in substantial part the on-going Pūkele Substation Reliability Concern, and fully addresses the Ko'olau/ Pūkele Overload Situation (which is expected to start in 2005, if not sooner). A recent event emphasizes the importance of the implementation of Phase 1. The outage of Pūkele Substation, which occurred on March 3, 2004, could have been significantly mitigated if Phase 1 were in place.

The purpose for the EOTP includes addressing the four transmission concerns outlined in Section 2 of the Draft EA, which include (1) the Ko'olau/Pūkele Overload Situation, (2) the Pūkele Substation Reliability Concern, (3) the Downtown Overload Situation, and (4) the Downtown Substation Reliability Concern. HECO currently does not have plans to install 138kV transmission lines to Kahuku. Based on the information in Section 2.2 of the EOTP Draft EA, the Ko'olau Substation serves customers all the way towards the Kahuku area. However to do this, existing infrastructure on the lower voltage sub-transmission (46kV) system and distribution (12kV and below) system is used. The power is transformed from 138kV to 46kV and

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 2

12kV using transformers at various distribution substations and fed to the existing 46kV and 12kV system to transport the power to the Kahuku area.

2 *Why was Kapahulu - especially Winam & parts of Mooheau Avenues the chosen route?*

The Winam and Mo'oheau Avenues route was chosen because of the close proximity of the two existing 46kV lines in that area that are required to be connected electrically as part of the overall reliability project.

3 *Which communities would benefit by the boosting of power service? Kapahulu?, Kaimuki?, St. Louis?, Waikiki?, Hawai'i Kai? Windward Oahu?*

For purposes of responding to the comment, HECO interprets the phrase "boosting of power service" as referring to the EOTP. The purpose of the EOTP is to address the following transmission problems concerning O'ahu's 138kV transmission system in the East O'ahu Service Area: (1) The Pūkele Substation Reliability Concern; (2) the Ko'olau/Pūkele Overload Situation; (3) the Downtown Substation Reliability Concern, and (4) the Downtown Overload Situation. Two 138kV transmission lines currently feed the Pūkele Substation from the Ko'olau Substation in Kāne'ohe, on the windward side of O'ahu (Figure 2-2 of the Draft EA). The two 138kV lines cross the Ko'olau Mountain Range to connect the Pūkele Substation to the rest of the HECO system. The power transported from these two lines is stepped down to the sub-transmission voltage (46kV) and transported over eight 46kV feeders that branch out from Pālolo Valley to distribution substations in Kāhala, Kaimukī, Mānoa, Makiki and Waikīkī. These distribution substations feed communities such as Mānoa, Pālolo, Wai'alae, Kāhala, Kaimukī, Kapahulu, McCully, Mō'ili'ili and Waikīkī as shown in Figure 2-3 of the Draft EA.

4 *Will the Winam segment benefit Waikiki, as they are moving towards higher & increasing density with several high rise condominium projects that are being constructed recently with more construction projects to come?*

Yes, the proposed Winam segment connection would benefit the Waikīkī area. The Winam segment is part of Phase 1 of the EOTP. As explained in Section 3 of the Draft EA, Phase 1 will allow approximately 80 MW of load to shift from the Pūkele Substation, which is served from HECO's Northern 138kV Transmission Corridor, to Archer and Kamoku Substations, which are served from HECO's Southern 138kV Transmission Corridor. By shifting the load, the load demand at the Pūkele Substation is reduced and an overload on the 138kV lines to Ko'olau Substation and Pūkele Substations (Ko'olau/Pūkele Overload Situation) will not occur for the 20-year planning period studied. The Pūkele Substation provides power to 46kV substations

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 3

feeding the Waikīkī area. Addressing the Ko'olau/Pūkele Overload Situation by installing the Winam segment and the other segments associated with Phase 1 of the EOTP increases the reliability of the transmission system to serve the Waikīkī area.

The 80 MW that will be shifted from the Pūkele Substation to Archer and Kamoku Substations include the Waikīkī load areas served from the 'Ena Substation, Waikīkī Substation, Kapahulu Substation, Kapi'olani Substation and the Kūhiō Substation. By shifting the loads to the Archer and Kamoku Substations, if two of the 138kV transmission lines serving the Pūkele Substation were suddenly unavailable (Pūkele Substation Reliability Concern), a portion of Waikīkī should not experience an interruption in electricity service. The rest of the Waikīkī load, which will not be permanently shifted to the Archer and Kamoku Substations would automatically be transferred to the Archer and Kamoku Substation and should experience up to a 6-second outage. Therefore the Winam segment and the other Phase 1 segments will increase the reliability of electricity service to Waikīkī.

5 *Where will the Winam segment be connected to?*

The Winam segment would connect two existing 46kV lines. Presently, one of the 46kV lines runs along Mo'oheau Avenue and the other line is near the corner of Winam Avenue and Ho'olulu Street. The two lines would be connected by extending the line along Winam Avenue to Mo'oheau Avenue. As described in the Draft EA section 3.1.1.1, activities 1D-1, 1D-2, and 1E-3, one circuit is required to connect the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit near the intersection of Mo'oheau Avenue and Winam Avenue in Kapahulu. An underground ductline would be constructed running from a new wood pole (which replaces an existing wood pole in the same location) on Mo'oheau Avenue that carries the existing Pūkele 4 overhead 46kV circuit to a new wood pole (which replaces an existing wood pole in the same location) on Winam Avenue carrying the existing Pūkele 8 overhead 46kV circuit.

6 *Is the underground trenching procedure on Winam & Mooheau necessary to handle the overload and insure that no more outages occur?*

Yes, the segment at Winam and Mo'oheau is required as part of the overall project to increase reliability. HECO proposes to install the Winam Avenue to Mo'oheau Avenue segment underground. Given that the other 46kV lines installed as part of the project are being placed underground, the relatively small incremental engineering and construction cost of placing this segment underground (about $408,000) is small in comparison to the total cost of the project, and when considering the adverse impact if the schedule for Phase 1 is delayed. The cost savings from constructing the line segment overhead could easily disappear if the approvals and permits for the

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 4

project were delayed due to public opposition to the overhead alignment. The combined Ko'olau and Pūkele service areas comprise 30 percent of O'ahu's electrical demand, and an all-underground proposal should enhance community acceptance and provide a better opportunity to improve system reliability in a timely manner.

The segment of Winam and Mo'oheau is part of Phase 1 of the EOTP. As explained earlier, Phase 1 will shift approximately 80 MW of load from the Pūkele Substation served from HECO's Northern 138kV Transmission Corridor to Archer and Kamoku Substations served from HECO's Southern 138kV Transmission Corridor. By shifting the load, the load demand at the Pūkele Substation will be reduced. In addition, an overload on the 138kV lines to Ko'olau Substation and Pūkele Substations (Ko'olau/Pūkele Overload Situation) will not occur for the 20-year planning period studied. The area near Winam and Mo'oheau is served from the Pūkele Substation and therefore, addressing the Ko'olau/Pūkele Overload Situation increases the reliability of electricity service to this area. In addition, including the segment of Winam and Mo'oheau as part of Phase 1 will partially addresses the Pūkele Substation Reliability Concern. Without Phase 1 of the EOTP, customers near Winam and Mo'oheau would experience an interruption in electricity service if both 138kV transmission lines serving the Pūkele Substation were unavailable. The duration of the outage would depend on the cause of the outage. With Phase 1 of the EOTP, the interruption of electricity service to customers near Winam and Mo'oheau would be reduced to at most 6 seconds, therefore the reliability of electricity service to the customers in this area will be increased.

Please note that although this project is being implemented for improving reliability, we cannot guarantee that no outages would occur as a result because there are other reasons for outages such as accidents that the EOTP is not designed to address.

7 *Kapahulu is comprised of many single family dwellings, smaller apartments, condominiums and small businesses, smaller shopping complexes in the area, similar to adjoining Moiliili & Kaimuki towns and not slated for higher density type of projects. Why is more electric power necessary in this community? Is there such a demand in this small community - especially on Winam & Mooheau Avenue, which is comprised of a few single family dwellings, unlike the high rises of Waikiki?*

The amount of power required to serve the small community located on Winam and Mo'oheau Avenues may not be higher than the amount needed to serve Kapahulu; however, the 46kV and 12kV lines that pass through these streets are needed in order to serve the load demand at the end of these lines. As described in Chapter 2 of the Draft EA, power is generated at generating power plants, which are located in the Leeward O'ahu area at Kahe, Barbers Point and Waiau Power Plants. In addition, power is also generated in downtown Honolulu at the Honolulu Power Plant. In order

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 5

to provide power to the Kapahulu area, the power needs to flow from the Leeward O'ahu area through the 138kV transmission lines towards Kapahulu. The power will continue to flow eastward on the 138kV transmission system until it reaches the end of the line. For HECO's Northern 138kV Transmission Corridor, the end of the line is the Pūkele Substation. For HECO's Southern 138kV Transmission Corridor, the end of the line is the Kamoku Substation. Along the way, and at the Pūkele and Kamoku Substations, the power is reduced in voltage using transformers for customer use. The power then flows from the point where it is being reduced in voltage to the end points of the distribution system.

Collectively, each home, apartment, condominium, shopping center or business contributes to the power demand along the distribution line. The 46kV subtransmission lines and distribution lines (12kV and below) may physically pass through communities in order to reach the communities at the end of the distribution line. Some of the power flowing through these lines will be consumed by the Mō'ili'ili and Kaimukī areas, and the rest will pass through these communities until it reaches the end where it is consumed by the Kapahulu and Waikīkī communities. Therefore, while the demand may not necessarily be on Winam and Mo'oheau Avenues, the 46kV and 12kV lines must pass through these streets to serve the load demand at the end of these lines.

An analogy can be drawn using roadways. In general, freeways such as H-1 are similar to 138kV transmission lines. Larger streets, such as Nimitz Highway which connects to H-1, are similar to 46kV subtransmission lines. In turn, smaller streets that connect to Nimitz Highway and lead to ultimate destinations (similar to load demand) are similar to 12kV distribution lines. For example, the H-1 freeway is used to transport a large number of cars that travel from Leeward O'ahu to Honolulu. The H-1 freeway passes through towns such as Pearl City and 'Aiea, and while some cars use the off-ramps from the H-1 to these towns, most cars pass through these towns on the freeway. Similarly, cars utilize roads such as Nimitz Highway to move toward their final destinations. Most of the cars will pass through the communities along Nimitz Highway to reach the end of the line, which is downtown, while some may get off the Nimitz Highway to destinations such as Young Brothers or the Iwilei Home Depot. Thus, cars traveling on road systems are similar to power flowing through the 138kV transmission system and the 46kV subtransmission and distribution systems towards the system end points with some of the power being consumed by communities along the way.

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 6

8 *Why couldn't the power lines be diverted to other more major streets like Kapiolani as the lines head Eastward?*

The subtransmission system (46kV) feeds local distribution substations (12kV and below) that are located throughout the island. These distribution substations are spread out and not necessarily concentrated in one transmission corridor or area. Similarly, the distribution lines that are needed to serve the customers are routed from the distribution substation to the customers' properties. It is possible to route most of the power lines along one single street such as Kapi'olani; however, they must also be routed to where the power is needed.

9 *Is the Kapahulu segment included in the Integrated Resource Planning process? If so, my I have a copy of the documents?*

HECO interprets the term "Kapahulu segment" as referring to the EOTP. No. HECO's current Integrated Resource Plan (IRP), which was filed with the Public Utilities Commission (PUC) on January 30, 1998, does not analyze the EOTP. The IRP process is an approach to electric utility planning for future energy requirements that focuses on the mix of resources for meeting near and long term consumer energy needs. The resources can be new central power plants, new technologies such as Combined Heat and Power (CHP), renewable energy projects such as wind power projects, or electricity load management processes such as Demand Side Management (DSM) programs (e.g., HECO's solar water heating program and program to foster the use of compact fluorescent lighting, both of which reduce the demand for electricity). Transmission and distribution (T&D) projects generally are not explicitly considered in the IRP process. The general assumption is that existing transmission lines will continue to be in service during the planning period, and that new or reconductored lines will be added as necessary or appropriate for reliability purposes and to provide for adequate transmission capacity, taking into account the location of supply-side resources and load growth. However, that does not mean that T&D considerations are irrelevant in the IRP process, or that an IRP Plan is irrelevant to transmission planning. Avoided T&D costs may be relevant to evaluating the cost-effectiveness of DSM programs. Transmission interconnection requirements for new generation resources should be considered in evaluating the costs of those resources. In addition, planning for the transmission system is done in a manner that is consistent with, and takes into account, the resource additions in the latest IRP.

While HECO's current IRP did not analyze the EOTP, a copy of the IRP can be provided upon request or obtained from the PUC.

10 *Wouldn't it be more feasible to build a power plant in the high density community of Hawai'i Kai, as several residential and business projects are being completed with*

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 7

several more homes ready for building? This is where the additional electrical power source should begin and continue Eastward towards Kahuku or Westward towards Kahala. Smaller substations would not hamper the entire line, as smaller pockets of communities, which have power outages, would not affect surrounding and larger communities causing for an island-wide power outages of the past.

Although there is an interrelationship between the location of power plants and power transmission, for numerous reasons it would not be more feasible to install a power plant in the Hawai'i Kai area to address the transmission problems identified in the East O'ahu area. Building a power plant to resolve the East O'ahu transmission problems would incur a substantially greater cost than the EOTP. For example, HECO's IRP-2 filed with the PUC on January 30, 1998, estimated that a 180 MW coal plant (the 180 MW would almost equal the amount required to address the Pūkele Substation Reliability Concern because the Pūkele Substation serves approximately 200 MW of load) would cost $289.61 million to install. The cost of the EOTP will be significantly less, at $55.64 million. A new power plant would also incur higher annual operating and maintenance expenses compared to the EOTP. In addition, there are significant technical issues that must be considered before determining if building a power plant would be feasible in Hawai'i Kai. Some of the technical issues include (1) if permits can be obtained, (2) if adequate land space is available in Hawai'i Kai, (3) if the land is properly zoned for constructing a power plant, (4) will there be a reliable fuel system, either through an underground pipeline or trucks delivering fuel to the plant, (5) is the Hawai'i Kai area outside of a tsunami inundation zone, and others. The EOTP installed in phases can also address the Ko'olau/Pūkele Line Overload Situation, which is forecasted to occur in 2005, and the Pūkele Substation Reliability Concern, which is a current system concern, sooner than installing a power plant.

11 *Would it not be more economical for both the Hawaiian Electric Company and the consumers if the Power stations and sub-stations be maintained on a regular basis? This would lower the cost to the consumers as well as increase jobs.*

HECO regularly maintains its generation plants, substations and associated facilities in accordance with the PUC's General Order No. 7 and accepted good engineering practice in the utility industry. In 2003, HECO spent over $24,000,000 on maintenance of its generation facilities and nearly $3,800,000 on maintenance of substation facilities as filed in the Federal Emergency Regulatory Commission (FERC) Form No. 1 Annual Report of Major Electric Utilities, Licensees and Others.

Regular maintenance is a necessity as we are an island system without the benefit of interconnections to neighboring utilities. HECO utilizes standard industry maintenance best practices such as preventive maintenance (PM) and predictive

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 8

maintenance (PDM), and applies various state-of-the-art instruments, tools and analysis to maintain equipment. The result is a generation reliability trend that continues to outperform similar units on the mainland. A discussion on the application of these maintenance practices is provided below.

PM is a time-driven maintenance practice. Daily examples of PM include lubrication checks on rotating pumps and motors, periodic greasing of traveling screen chains and sootblower drives, etc. Steam generating unit overhauls are also time driven and planned years in advance. The timing of overhauls is usually driven by the need to periodically perform a boiler internal inspection, and may last four to twelve or more weeks depending on the scope of the overhaul. Combustion turbine overhauls are also time driven and primarily based on projected service hours. Combustion turbine overhaul duration may last two to eight or more weeks depending on the scope of work. The scope of work during an overhaul normally includes work that has been back-logged pending the shut down, capital projects, Original Equipment Manufacture (OEM)/Industry recommendations, superheater and high-energy piping life assessment studies, and long lead-time items identified for correction at earlier outages.

PDM is a condition-based maintenance technique where routine monitoring and analysis of specific operating parameters are used to determine when maintenance should be performed. Examples of operating parameters that are routinely monitored include rotating equipment vibration analysis, lubrication oil chemical analysis, ultrasonic analysis, on-line infrared thermography surveys, pump performance tests, etc. State-of-the-art instruments and software are used to monitor and track the condition of critical pieces of equipment that may result in unit forced outages and/or deratings.

Maintenance practices on substation equipment are similar. Intelligent devices monitor the status of substation equipment on a continuous basis. In addition, trained HECO personnel inspect equipment to identify problems on a daily basis. Each quarter, transmission lines are inspected by ground patrols and/or by helicopter. HECO also employs infrared and corona imaging as part of our transmission inspection process. HECO uses independent contractors to test and treat all wood, steel, concrete and fiberglass transmission structures on a 3- to 5-year inspection cycle. Substation equipment is taken out of service for routine maintenance every 2 to 4 years.

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 9

12 *Has HECO looked into other more economical and reliable sources of power, as more advance energy efficient technology has improved tremendously in recent years?*

HECO has evaluated other technologies for mitigating the described transmission problems. (Refer to Section 2 of the Draft EA). Some of the technologies studied are referenced in Section 3.2.3.5, which included newer generation technology such as renewable resources, distributed generation (DG) at HECO substations, and CHP. Various factors were considered when reviewing these options, which include cost, land requirements, permitting requirements and the operation and maintenance costs for generating units compared to transmission facilities. These options were not feasible for different reasons including higher cost compared to EOTP, inadequate land space, and inability for the option to address the transmission overloads and reliability concerns that the EOTP is designed to resolve. In addition, transmission technologies such as static and dynamic line re-rating, re-tensioning and re-conductoring were considered. These transmission technologies were not feasible because of higher costs compared to EOTP, the process would be time consuming, difficult, and expensive, particularly given the logistics of stringing new conductors in the mountainous areas traversed by the lines, and the work would necessitate prolonged outages of the lines, which would increase the possibility of an overload occurring if a second line serving the Ko'olau Substation becomes unavailable for any reason. HECO also hired an independent third-party consultant to review the feasibility of performing live line maintenance on the transmission lines. The consultant concluded that live line maintenance was not practical for much of the HECO system.

13 *What will the ultimate cost to consumers be with this EOTP when it is fully completed?*

The incremental rate impact per month for a typical residential customer is estimated at $0.73 to $0.74 in 2008, the year after Phase 1 is installed. After Phase 2 is installed, the rate impact is estimated at $0.93 to $1.02 in 2010.

14 *Is there really a demand for electrical power and the use of oil for Oahu?*

Yes, there is a demand for electrical power based on HECO's Sales and Peak Forecast. The load forecast that was used for the EOTP studies is the August 2002 Long-Term Sales and Peak Forecast, which estimates that the load for O'ahu will grow from a Day Peak load of 1,222.7 MW in 2003 to 1,469.9 MW in the year 2022. Evidence of load growth was publicized recently when HECO reached a record high evening peak demand of 1,327 MW on October 12, 2004. In addition, an article in the October 17, 2004, *Honolulu Star Bulletin* noted that "O'ahu's electricity consumption

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 10

increased by 1.6 percent in 2002, 1.8 percent in 2003 and 3.3 percent this year, through September. Within the overall growth, residential consumption has increased even faster, up 4.8 percent so far this year over 2003."

Many types of generation can be utilized to serve the load demand. The majority of the generating units on the HECO system utilize oil; however, load demand is also served by the AES plant in Barbers Point, which uses coal as its fuel source, and the H-Power facility in Barbers Point, which uses municipal waste as its fuel source. On other islands such as the Big Island, where other resources are available and have been developed, other technologies are used such as wind, run of the river hydro, and geothermal.

15 *The district of Kapahulu in the Eastern section of Oahu, Hawaii was very much surprised to learn that the Hawaiian Electric Company's (HECO) latest proposal to place new underground power lines on Winam Avenue and adjoining parts of Mooheau Avenue.*

In 2003, HECO implemented an extensive public input process on three alternatives for the EOTP. The three alternatives were: (1) Kamoku-Pūkele 138kV Underground Alternative, (2) Kamoku 46kV Underground Alternative, and (3) Kamoku 46kV Underground Alternative - Expanded. The two 46kV alternatives involve the construction of a new underground 46kV line, approximately 420 feet in length, in Kapahulu on Winam Avenue and Mo'oheau Avenue.

In May 2003, HECO sent invitations to 17 organizations to participate on a Community Advisory Committee as part of the public input process to evaluate the three alternatives. The organizations included nine neighborhood boards, Life of the Land, The Outdoor Circle, Mālama o Mānoa, University of Hawai'i at Mānoa, and five business organizations. Additionally, all other neighborhood boards and State and City elected officials were sent letters to inform them of the public meetings and to encourage their participation. Also, in May 2003, HECO issued a press release to describe the project and to announce that five meetings were to be held to solicit public input on the project.

On June 18, 2003, letters and flyers were sent to some 300 residents residing on streets that would be directly affected by the construction of the Kamoku 46kV Underground alternative (i.e. Fern, Hau'oli, Lime, Nanea, Punahou, Ho'olulu, and Williams streets and Winam Avenue) to inform them of the project and of the public meetings.

HECO also purchased advertising space to announce the meetings in various island publications including *The Honolulu Advertiser*, *Honolulu Star Bulletin*, and

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 11

Midweek. Two additional meetings were scheduled and held on July 7 and 8, 2003, at Kaimukī High School. The first meeting was targeted for residents that reside in the project area. The second meeting was a continuation of the June 24, 2003, meeting. On October 8, 2003, HECO issued a press release indicating that it had chosen to pursue the Kamoku 46kV Alternative – Expanded, but in a phased approach.

On November 6, 2003, HECO did a presentation at the McCully/Mō'ili'ili Neighborhood Board meeting to obtain comments on the, at that time, proposed alternatives. In October, HECO provided the Chair of the neighborhood board with about 300 flyers and a banner to publicize the meeting presentation.

On December 18, 2003, HECO filed an application with PUC to obtain approval on the project. On March 23, 2004, the Kapahulu Neighbors was granted participant status in HECO's case before the PUC. Participant status entitles the Kapahulu Neighbors to receive copies of all correspondence, filings, and briefs related to HECO's case and also the opportunity to submit a written statement of position.

On June 10, 2004, HECO did a presentation at the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board meeting to obtain comments on the project, in particular, the Winam Avenue segment of the project.

Since August 2004, HECO has been going door-to-door to inform residents and businesses about the project in the project area, which includes Winam Avenue and Mo'oheau Avenue. HECO will continue to keep residents and businesses in the project area informed as the project progresses.

16 *The project is to boost power from the Makaloa, One Archer and Kamoku/Pukele Stations to East Oahu all the way to Kahuku.*

We do not understand your characterization that the purpose of the EOTP is to "boost" power from various substations located in Honolulu to East O'ahu and Kahuku. More accurately, as described in the Draft EA, the Proposed Action would allow electrical loads in the East O'ahu Service Area (from downtown to Hawai'i Kai and from Makapu'u Point to Kahuku), currently being served exclusively via Ko'olau Substation and Pūkele Substation at the end of the Northern 138kV Transmission Corridor, to be augmented from Kamoku and Archer Substations in the Southern 138kV Transmission Corridor. For the western part of O'ahu, the two corridors are linked by transmission lines between power plants and substations, but no similar connection exists to provide reliable power to the eastern part of the island, which represents 56 percent of HECO's total load. The purpose of the Proposed Action is to address four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload

Ms. Daisy Murai
January 7, 2005
2004.33.0800 / 04EP-231
Page 12

Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation.

The line overload situations increase the risk of catastrophic power outages. A catastrophic outage has the potential to take down the entire island system for many hours. Restarting generation facilities is a very complex and time-consuming process; therefore, a significant number of customers could be without power for many hours until the system can be restored. The substation reliability concerns could be characterized as increasing the potential for localized outage problems. Although the latter are limited to a certain area, certain localized power outages are of significant concern because of the number and critical nature of the customers affected and the potential duration of the outages.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa

DANIEL K. AKAKA
HAWAII

WASHINGTON OFFICE
141 HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510
TELEPHONE: (202) 224-6361

HONOLULU OFFICE
3106 PRINCE JONAH KUHIO
KALANIANAOLE FEDERAL BUILDING
P.O. BOX 50144
HONOLULU, HI 96850
TELEPHONE: (808) 522-8970

United States Senate
WASHINGTON, DC 20510

RECEIVED
2004 OCT -6 PM 3:06
BELT COLLINS HAWAII

COMMITTEES
ARMED SERVICES
ENERGY AND NATURAL RESOURCES
GOVERNMENTAL AFFAIRS
INDIAN AFFAIRS
VETERANS' AFFAIRS
SELECT COMMITTEE ON ETHICS

September 27, 2004

Ms. Lesley A. Matsumoto
Vice President
Belt Collins Hawaii LTD.
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

Dear Ms. Matsumoto:

Thank you for providing me with a copy of the Draft Environmental Assessment for the East Oahu Transmission Project prepared for the Hawaiian Electric Company, Inc.

I appreciate your sharing with me materials related to the environmental assessment process for this project. Mahalo again for contacting me.

Aloha pumehana,

Daniel K. Akaka

DANIEL K. AKAKA
U.S. Senator

PRINTED ON RECYCLED PAPER

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-235

The Honorable Daniel Akaka
Prince Kuhio Federal Building
300 Ala Moana Boulevard, Room 3-106
Honolulu, HI 96850

Dear Senator Akaka:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for acknowledging your receipt of the EOTP 46kV Phased Project Draft Environmental Assessment (EA).

Sincerely,

BELT COLLINS HAWAII LTD.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

POLICE DEPARTMENT

RECEIVED

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.honolulu.gov

2004 OCT -6 PM 1:38

BELT COLLINS HAWAII

JEREMY HARRIS
MAYOR

BOISSE P. CORREA
CHIEF

GLEN R. KAJIYAMA
PAUL B. PUTZULU
DEPUTY CHIEFS

OUR REFERENCE CS-KP

September 30, 2004

Mr. Carlito Caliboso, Chair
Public Utilities Commission
State of Hawaii
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the East O'ahu Transmission Project.

This project will have a significant impact on the services to be provided by Districts 1 and 7 of the Honolulu Police Department. We anticipate an increase in calls for service due to the construction-related dust, noise, parking, and traffic complaints in and around the different construction sites.

In order to minimize the complaints, we would like to have the contractor call Major Kevin Lima of District 1 (529-3386) and Captain Marie McCauley of District 7 (529-3362) and provide them with the names and contact numbers of his or her representatives as well as to discuss specific concerns as the project progresses. Additionally, we are requesting that the construction schedules be forwarded to Major Lima and Captain McCauley when they are finalized.

If there are any questions, please call Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

Sincerely,

BOISSE P. CORREA
Chief of Police

By
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

cc: ✓Ms. Leslie A. Matsumoto
Belt Collins Hawaii Ltd.

Serving and Protecting with Aloha

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-233

Assistant Chief Karl Godsey
City and County of Honolulu Police Department
801 South Beretania Street
Honolulu, HI 96813

Dear Chief Godsey:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

This project will have a significant impact on the services to be provided by Districts 1 and 7 of the Honolulu Police Department. We anticipate an increase in calls for service due to the construction-related dust, noise, parking, and traffic complaints in and around the different construction sites.

In order to minimize the complaints, we would like to have the contractor call Major Kevin Lima of District 1 (529-3386) and Captain Marie McCauley of District 7 (529-3362) and provide them with the names and contact numbers of his or her representatives as well as to discuss specific concerns as the project progresses. Additionally, we are requesting that the construction schedules be forwarded to Major Lima and Captain McCauley when they are finalized.

Districts 1 and 7 will be contacted prior to commencement of work. The Honolulu Police Department will be provided with HECO's 24/7 project hotline telephone number to handle all complaints and concerns. The number will be published and distributed widely. HECO does not anticipate increased complaints during the construction work. This assessment is based on experience from past projects, most notably, the Kapi'olani Boulevard ductline completed in 2001. During this 24-month project, there were no complaints regarding dust, traffic, or parking, and there was only one complaint regarding noise.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Chief Godsey
January 7, 2005
2004.33.0800 / 04EP-233
Page 2

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

PALOLO NEIGHBORHOOD BOARD NO. 6

c/o NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET, ROOM 400 • HONOLULU, HAWAII 96813
PHONE: (808) 527-5749 • FAX: (808) 527-5760 • INTERNET: www.co.honolulu.hi.us

FILED
OCT 7 2 20 PM '04
PUBLIC UTILITIES COMMISSION

October 4, 2004

Public Utilities Commission
465 South King Street
Kekuanaoa Building, Room 103
Honolulu, Hawaii 96813

Re: **Hawaiian Electric Company's Proposed East Oahu Transmission Project (EOTP) - 46kV Line**

Dear Sir or Madam,

I am writing on behalf of Palolo Neighborhood Board No. 6 to urge the Public Utilities Commission to ensure that the Hawaiian Electric Company's proposed Kamoku-Pukele 138,000 volt transmission line is not considered as an option. As reflected in the three resolutions adopted on July 28, 1993, February 22, 1995 and September 23, 1998, for years, the Palolo Neighborhood Board has consistently opposed the Kamoku-Pukele line constructed in Palolo Valley -- on the ground that HECO has never established the need for the project. In light of new energy generation and transmission technologies, the Palolo Neighborhood Board is more convinced now than ever that there is simply no need for the Kamoku-Pukele line.

The Consumer Advocate appears to be analyzing whether the Palolo underground route is the best option. The Palolo route is part of the Kamoku-Pukele EIS, which is an exhibit in the EOTP docket. The Palolo Neighborhood Board does not want the line in Palolo Valley.

Please answer the following questions:

1. Can the Pukele Substation be expanded, and if so, by how much? Will HECO have to do another EIS if the Palolo Underground route is chosen?
2. Is the Underground route through Palolo Valley still a route under consideration?
3. Has HECO evaluated any other technology or routes for Palolo?
4. Is the Palolo alignment as denoted in the EOTP Exhibit 4, a reasonable alternative?
5. Should all Palolo alignments have the degree of analysis devoted to the EOTP alternatives?
6. Has there been any cultural impact analysis in the vicinity of the Pukele Substation?
7. Are there historical agricultural terraces along the Palolo alignments?
8. Are there any historic heiau along the Palolo alignments?

Oahu's Neighborhood Board System - Established 1973

Palolo Neighborhood Board No. 6
PUC
Page 2

9. Doesn't a more detailed analysis need to be included if you go with the Palolo alignment?

10. Has the Carlos Long Neighborhood been analyzed for historical and/or burial sites?

11. Has HECO done additional EMF readings at Pukele? What were the results?

12. Why have there been so many helicopters used by HECO in repairing transmission lines near Palolo?

13. What questions did the Consumer Advocate ask regarding the Palolo route? AND what answers did you give to the Consumer Advocate?

14. Who did you consult with about cultural impacts in Palolo Valley?

In considering HECO's Draft Environmental Assessment, the Public Utilities Commission must balance the costs and benefits of the project to determine whether approving or denying the Environmental Assessment will best serve the public interest. Please consider the interest of the people of Palolo Valley and not allow any additional electric lines through the valley.

Thank you very much for your consideration of the Palolo Neighborhood Board's views. Please feel free to contact me at 392-1136, if you would like to discuss this matter further.

Sincerely,

Darlene H. Nakayama

Darlene H. Nakayama
Chairperson

FILED
OCT 7 2 20 PM '04
PUBLIC UTILITIES COMMISSION

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-234

Ms. Darlene Nakayama
Chairperson Neighborhood Board 6
c/o Neighborhood Commission
530 South King Street, Room 400
Honolulu, HI 96813

Dear Ms. Nakayama:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *I am writing on behalf of Palolo Neighborhood Board No. 6 to urge the Public Utilities Commission to ensure that the Hawaiian Electric Company's proposed Kamoku-Pukele 138,000 volt transmission line is not considered as an option.*

HECO interprets the reference to the "Kamoku-Pūkele 138,000 volt transmission line" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described on page 3-49 of the Draft EA. The Kamoku-Pūkele 138kV Underground Alternative via Pālolo involves the installation of an underground 138kV transmission line between Kamoku Substation and Pūkele Substation, approximately 3.6 miles in length. After considering the issues, HECO eliminated this alternative in favor of 46,000-volt (46kV) alternatives. Accordingly, the Kamoku-Pūkele 138kV Underground Alternative is not being considered for the EOTP.

HECO's current proposal before the Public Utilities Commission (PUC) is the 46kV Phased Project. As described on page 3-1 of the Draft EA, HECO is proposing to reconfigure and connect existing 46 kV circuits from Pūkele Substation at the end of HECO's Northern 138kV Transmission Corridor with existing and new 46kV circuits at Archer Substation and Kamoku Substation in HECO's Southern 138kV Transmission Corridor. This action is planned in two independent phases. The estimated completion dates are mid-2007 for Phase 1 and early 2009 for Phase 2.

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 2

Phase 1 involves the installation of underground ductline for 46kV subtransmission lines and related work at eight existing substations. Underground 46kV lines would be installed in the Ala Moana, McCully, Mō'ili'ili, and Kapahulu areas. Existing 46kV and 12kV lines would be removed from the existing ductline. Phase 2 involves the installation of 1.9 miles of new underground ductline for 46kV subtransmission lines and related work at one substation. Three underground 46kV lines would be installed in the new ductline in the Kaka'ako, Makiki, and McCully areas, predominantly along King Street.

2 *The Consumer Advocate appears to be analyzing whether the Palolo underground route is the best option. The Palolo route is part of the Kamoku-Pukele EIS, which is an exhibit in the EOTP docket. The Palolo Neighborhood Board does not want the line in Palolo Valley.*

HECO interprets the commenter's references such as the "Pālolo underground route" or "Pālolo route" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described on page 3-49 of the Draft EA. HECO notes that the Pālolo Neighborhood Board does not want the Kamoku-Pūkele 138kV Underground Alternative in Pālolo Valley. As noted earlier in this response letter, HECO eliminated this alternative in favor of 46kV alternatives. HECO's current proposal before the PUC is the 46kV Phased Project as described earlier in this response letter and on page 3-1 of the Draft EA.

3 *1. Can the Pukele Substation be expanded, and if so, by how much? Will HECO have to do another EIS if the Palolo Underground route is chosen?*

The Proposed Action does not involve construction activities at Pūkele Substation. Currently, HECO has no plans to expand the Pūkele Substation. Nevertheless, in response to the commenter's inquiry, the existing Pūkele Substation occupies approximately 67,000 square feet on a parcel of land owned by HECO that totals approximately 290,000 square feet. When taking into consideration the required setbacks for the Pūkele Substation, there is no room to increase the footprint of this facility. Other reasons for not expanding to the maximum footprint is that Pūkele Substation is also bounded by (1) the valley wall on one side, (2) residential housing on another, and (3) a streambed on the other two sides.

HECO interprets the phrase "Pālolo underground route" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described earlier in this response letter and on page 3-49 of the Draft EA. As noted earlier in this response letter, HECO eliminated this alternative in favor of the earlier described 46kV project. Since the Kamoku-Pūkele 138kV Underground Alternative has been eliminated, no environmental impact statement (EIS) will be performed for this alternative.

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 3

4 *2. Is the Underground route through Palolo Valley still a route under consideration?*

HECO interprets the phrase "Underground route through Pālolo Valley" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described on page 3-49 of the Draft EA. No, the Kamoku-Pūkele 138kV Underground Alternative is not being considered for the EOTP. As noted earlier in this response letter, HECO eliminated this alternative in favor of 46kV alternatives. HECO's current proposal before the PUC is the 46kV Phased Project as described earlier in this response letter and on page 3-1 of the Draft EA.

5 *3. Has HECO evaluated any other technology or routes for Palolo?*

HECO interprets the phrase "routes for Pālolo" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" via Pālolo which is described on page 3-49 of the Draft EA. As explained earlier, HECO eliminated this alternative in lieu of other 46kV alternatives. Routes for the proposed EOTP were described earlier and additional 46kV routes were evaluated in Section 2.3.3.1 and Section 3.2.3.2 of the Draft EA.

HECO has evaluated other technologies for mitigating the described transmission problems. (Refer to Section 2 of the Draft EA.) Some of the technologies studied are included in Section 3.2.3.5. For example, performing live line maintenance was studied by an independent consultant for the 138kV transmission lines serving the Ko'olau and Pūkele Substations. As discussed in the Draft EA, in the case of HECO's 138kV system as it is currently configured, live line maintenance has, at best, very limited applicability due to constraints imposed by climate, terrain, and facility conditions. These constraints render live line maintenance impracticable for all but a very small percentage of the needed maintenance activities. Other technologies such as renewable energy, demand side management (DSM), a thorough investigation of distributed generation (DG) at HECO substations, combined heat and power (CHP), and increasing the ratings of the conductors were reviewed and the conclusion was that these options were not feasible to address the transmission problems described.

6 *4. Is the Palolo alignment as denoted in the EOTP Exhibit 4, a reasonable alternative?*

HECO interprets the phrase "Pālolo alignment as denoted in the EOTP Exhibit 4" as referring to the "Kapi'olani Boulevard-Pālolo XLPE Underground Alternative" and "Kapi'olani Boulevard-Pālolo HPFF Underground Alternative" that are described in the *Kamoku-Pūkele 138-kV Transmission Line Project, Revised Final Environmental Impact Statement*, September 2000 (HECO September 2000). These alternatives are

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 4

the same as the "Kamoku-Pūkele 138kV Underground Alternative" described earlier in this response letter and on page 3-49 of the Draft EA.

Yes, the "Kamoku-Pūkele 138kV Underground Alternative" could be a considered a reasonable alternative because it would fully address the four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation, which are described more fully in Chapter 2 of the Draft EA. However, HECO eliminated this alternative in favor of 46kV alternatives after considering the issues.

7 *5. Should all Palolo alignments have the degree of analysis devoted to the EOTP alternatives?*

As noted in response to Comment 4 above and as set forth in the Draft EA, HECO is not considering any Pālolo alignment as an alternative to the Proposed Action. Accordingly, HECO is not required to evaluate a Pālolo alignment in the Final EA. Hawai'i Administrative Rules (HAR) Section 11-200-10, Contents of an environmental assessment, requires the "identification and summary of impacts and alternatives considered." It does not require an analysis of alternatives that were not considered such as a Pālolo alignment.

Note that a review of the comments received on the Draft EA reveals that no one suggested that a Pālolo alignment should be considered as an alternative alignment. To the contrary, comments were received to the effect that a Pālolo alignment should not be considered.

8 *6. Has there been any cultural impact analysis in the vicinity of the Pukele Substation?*

The Proposed Action does not involve activities in the vicinity of the Pūkele Substation. The vicinity of the Pūkele Substation is therefore not within the affected environment that has been evaluated in the Draft EA. Accordingly, a cultural impact analysis has not been performed for the Pūkele Substation area.

9 *7. Are there historical agricultural terraces along the Palolo alignments?*

The Proposed Action does not involve actions along the Pālolo alignments. The vicinity of the Pālolo alignments is therefore not within the affected environment that has been evaluated in the Draft EA, and historical agricultural terraces along the Pālolo alignments have not been identified.

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 5

10 *8. Are there any historic heiau along the Palolo alignments?*

The Proposed Action does not involve actions along a Pālolo alignment. The vicinity of the Pālolo alignments is therefore not within the affected environment that has been evaluated in the Draft EA, and historic heiau along a Pālolo alignment have not been identified.

11 *9. Doesn't a more detailed analysis need to be included if you go with the Palolo alignment?*

As noted in response to Comment 5 above, HECO is not considering any Pālolo alignment as an alternative to the Proposed Action. Accordingly, HECO is not required to evaluate a Pālolo alignment in the Final EA. A more detailed analysis would need to be included in the Final EA only if a Pālolo alignment were under consideration.

12 *10. Has the Carlos Long Neighborhood been analyzed for historical and/or burial sites?*

The Proposed Action does not involve actions in or around Carlos Long Street in Pālolo, and Carlos Long Street is outside of the affected environment assessed in this EA. Therefore, no historical and/or burial sites around Carlos Long Street have been analyzed.

13 *11. Has HECO done additional EMF readings at Pukele? What were the results?*

HECO interprets the reference to "Pukele" to mean the Pūkele Substation. The Proposed Action does not involve activities in the vicinity of the Pūkele Substation. The vicinity of the Pūkele Substation is therefore not within the affected environment that has been evaluated in the Draft EA, and electrical and magnetic field (EMF) readings have not been performed for the Pūkele Substation area.

14 *12. Why have there been so many helicopters used by HECO in repairing transmission lines near Palolo?*

The helicopter activities observed recently in Pālolo were part of several projects. They include replacement of distribution poles in Pālolo, the repair/upgrade of a transmission pole (138kV) directly above the Pūkele Substation, and routine line maintenance on the 138kV lines, which terminate at Pūkele Substation. Helicopters were used on the distribution poles because all poles were located on back-lot easements, which were not accessible to line trucks.

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 6

15 *13. What questions did the Consumer Advocate ask regarding the Palolo route? AND what answers did you give to the Consumer Advocate.*

HECO interprets the term "Pālolo route" to refer to the "Kamoku-Pūkele 138kV Underground Alternative," which, as noted earlier in this response, is no longer being considered. In Docket No. 03-0417 (EOTP), the Division of Consumer Advocacy (Consumer Advocate) information requests (IRs) CA-IR-1, CA-IR-4, CA-IR-22, CA-IR-23, CA-IR-29 and CA-IR-33 asked questions regarding a 138 kV underground line alternative between the Kamoku and Pūkele Substations. A copy of these Consumer Advocate IRs as well as HECO's responses is available upon request.

16 *Who did you consult with about cultural impacts in Palolo Valley?*

The Proposed Action does not involve actions in the Pālolo Valley. It is located on the Kewalo and Pāwa'a flat lands and in the land areas of Kalua'Ōlohe and Kapahulu, within the ahupua'a of Honolulu and Waikīkī. The boundaries of the cultural impact assessment for the Proposed Action extended from Beretania Street to Ala Moana/Ala Wai Boulevards in a mauka-makai direction, and from Cooke Street to Kapahulu Avenue in an 'Ewa–Koko Head Direction. The research area also included the area near the intersection of Winam Avenue and Mo'oheau Avenue, east of Kapahulu Avenue. Pālolo Valley is not within the affected environment that has been evaluated in this EA, and no consultation about cultural impacts in Pālolo Valley has therefore been conducted.

17 *In considering HECO's Draft Environmental Assessment, the Public Utilities Commission must balance the costs and benefits of the project to determine whether approving or denying the Environmental Assessment will best serve the public interest. Please consider the interest of the people of Palolo Valley and not allow any additional electric lines through the valley.*

The Draft EA for the EOTP will neither be "approved" nor "denied" by the PUC. The Draft EA was prepared by HECO following Hawai'i Revised Statutes (HRS) Chapter 343 and Title 11, Chapter 200 of the HAR, and was submitted to the PUC. A Final EA will be prepared that includes responses to all public comments. The PUC will then either issue a negative declaration (also known as a Finding of No Significant Impact) or an EIS preparation notice, after considering the significance of potential environmental effects as described in HAR 11-200-12.

HECO's request to expend funds for the EOTP will be determined by the PUC in its review of HECO's EOTP application in Docket No. 03-0417. The Draft and Final EA will be part of the documentation submitted by HECO in support of the project.

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 7

As agreed to by the parties in Docket No. 03-0417, the following are the issues in the EOTP proceeding that the PUC will consider:

1. Whether HECO's proposed expenditures for Phases 1 and 2 of the EOTP will provide facilities which are reasonably required to meet HECO's present or future requirements for utility purposes.

2. Whether HECO's selected routing, location, configuration and method of construction for Phases 1 and 2 of the EOTP are reasonable.

3. Whether the EOTP is preferable to HECO's other 138kV and 46kV transmission system alternatives, comparing factors such as, but not limited to the following:

   a) Cost;
   b) Timeliness and Schedule;
   c) Effectiveness;
   d) Construction impacts;
   e) Electromagnetic fields;
   f) Other impacts, if any;
   g) Public sentiment; and
   h) The public welfare in general.

4. Whether the EOTP is preferable to other feasible non-transmission options.

5. Pursuant to the requirements of HRS 269-27.6(a), whether all (as proposed by HECO) or part of the 46kV lines that are part of HECO's EOTP should be placed, constructed, erected or built below the surface of the ground.

In proposing the EOTP, HECO is considering the interests of its customers in East O'ahu, including the people of Pālolo Valley. The project will address several transmission problems concerning O'ahu's 138kV transmission system in the eastern half of the island. First, an overload situation with one of the three 138kV transmission lines that transport power to the Ko'olau/Pūkele Service Area (i.e., the area served by the Ko'olau and Pūkele Substations) in the Northern 138kV Transmission Corridor could occur beginning in 2005, whenever the other two lines are out of service. Second, an overload situation with one of the three 138kV transmission lines that transport power to the Downtown Area (i.e., the area served by the School Street, Iwilei, Archer, Kewalo and Kamoku Substations) in the Southern 138kV Transmission Corridor could occur after 2024, whenever the other two lines

Ms. Darlene Nakamaya
January 7, 2005
2004.33.0800 / 04EP-234
Page 8

are out of service. Third, Pūkele Substation, located at the end of the Northern 138kV Transmission Corridor, would be without power if the two 138kV transmission lines serving it were lost. (Pūkele Substation serves critical loads such as Waikīkī, State Civil Defense, Hawai'i Air and Army National Guard Headquarters, and the University of Hawai'i at Mānoa.) And fourth, Archer Substation, Kewalo Substation and Kamoku Substation, all located in the Southern 138kV Transmission Corridor, would be without power if the two 138kV transmission lines serving Archer Substation were lost.

HECO is not proposing any action to pursue the 138kV underground alternative to address the four East O'ahu transmission issues described above and in Section 2 of the Draft EA, now or in the future. In addition, the proposed project does not call for 46kV lines to be installed in Pālolo Valley.

Please note that your comment could also be interpreted to mean that HECO should not install additional distribution lines to serve new or additional loads within Pālolo Valley. HECO trusts that the commenter does not intend this interpretation because it would not be in the best interests of the Pālolo Valley customers who would require the new distribution lines in order to receive electric service.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

FILED
OCT 8 10 40 AM '04
PUBLIC UTILITIES COMMISSION

Ho'olaulima O Palolo

Public Utilities Commission
465 South King Street
Kekuanaoa Building, Room 103
Honolulu, Hawaii 96813

Re: **Hawaiian Electric Company's Proposed East Oahu Transmission Project (EOTP) - 46kV Line**

Dear Public Utilities Commission:

I am writing on behalf of Ho'olaulima O Palolo to urge the Public Utilities Commission to reject Hawaiian Electric Company's proposed Kamoku-Pukele 138,000 volt transmission line. Ho'olaulima O Palolo opposes the Kamoku-Pukele line on the grounds that HECO has never established the need for the project. In light of new energy generation and transmission technologies, Ho'olaulima O Palolo is convinced that there is no need for the Kamoku-Pukele line.

The Consumer Advocate appears to be analyzing whether the Palolo underground route is the best option. The Palolo route is part of the Kamoku-Pukele EIS which is an exhibit in the EOTP docket. Ho'olaulima O Palolo does not want the line in Palolo Valley. We ask that you please answer the following questions:

- Is the underground route through Palolo Valley still under consideration?
- Has HECO evaluated any other technology or routes for Palolo?
- Can the Pukele Substation be expanded, and if so, by how much? Will HECO have to do another EIS if the Palolo Underground route is chosen?
- Is the Palolo alignment as denoted in the EOTP Exhibit 4, a reasonable alternative?
- Has HECO done additional EMF readings at Pukele? What were the results?
- Has there been any cultural impact analysis in the vicinity of the Pukele Substation?
- Are there historical agricultural terraces along the Palolo alignments?
- Are there any historic heiau along the Palolo alignments?
- Has the Carlos Long Neighborhood been analyzed for historical and/or burial sites?
- What questions did the Consumer Advocate ask regarding the Palolo route? What answers did you give to the Consumer Advocate?
- Who did you consult with about cultural impacts in Palolo Valley?

In considering HECO's Draft Environmental Assessment, the Public Utilities Commission must balance the costs and benefits of the project to determine whether approving or denying the Environmental Assessment will best serve the public interest. Please consider the interest of the people of Palolo Valley and not allow any additional electric lines through the valley.

Thank you very much for your consideration of Ho'olaulima O Palolo's views. Please feel free to contact me at 737-5657 if you would like to discuss this matter further.

Sincerely,

Traver Carroll, President
Ho'olaulima O Palolo

FILED
Oct 0 10 42 AM '04
PUBLIC UTILITIES
COMMISSION

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-225

Mr. Traver Carroll
President
Ho'olaulima O Palolo
2525 Makaulii Place
Honolulu, HI 96816

Dear Mr. Carroll:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

1 *I am writing on behalf of Ho'olaulima O Palolo to urge the Public Utilities Commission to reject Hawaiian Electric Company's proposed Kamoku-Pukele 138,000 volt transmission line.*

HECO interprets the reference to the "Kamoku-Pūkele 138,000 volt transmission line" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described on page 3-49 of the EOTP Draft EA. The Kamoku-Pūkele 138kV Underground Alternative via Pālolo involves the installation of an underground 138kV transmission line between Kamoku Substation and Pūkele Substation, approximately 3.6 miles in length. After considering the issues, HECO eliminated this alternative in favor of the 46,000-volt (46kV) alternatives. Accordingly, the Kamoku-Pūkele 138kV Underground Alternative is not being considered for the EOTP.

HECO's current proposal before the Public Utilities Commission (PUC) is the 46kV Phased Project. As described on page 3-1 of the Draft EA, HECO is proposing to reconfigure and connect existing 46kV circuits from Pūkele Substation at the end of HECO's Northern 138kV Transmission Corridor with existing and new 46kV circuits at Archer Substation and Kamoku Substation in HECO's Southern 138kV Transmission Corridor. This action is planned in two independent phases. The estimated completion dates are mid-2007 for Phase 1 and early 2009 for Phase 2.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 2

Phase 1 involves the installation of underground ductline for 46kV subtransmission lines and related work at eight existing substations. Underground 46kV lines would be installed in the Ala Moana, McCully, Mō'ili'ili, and Kapahulu areas. Existing 46kV and 12kV lines would be removed from the existing ductline. Phase 2 involves the installation of 1.9 miles of new underground ductline for 46kV subtransmission lines and related work at one substation. Three underground 46kV lines would be installed in the new ductline in the Kaka'ako, Makiki, and McCully areas, predominantly along King Street.

2 *Ho'olaulima O Palolo opposes the Kamoku-Pukele line on the grounds that HECO has never established the need for the project. In light of new energy generation and transmission technologies, Ho'olaulima O Palolo is convinced that there is no need for the Kamoku-Pukele line.*

HECO interprets the phrase "Kamoku-Pūkele line" to refer to the Kamoku-Pūkele 138kV Underground Alternative, which as noted above, is not being considered for the EOTP. In addition, the proposed project does not call for 46kV lines to be installed in Pālolo Valley.

HECO, however, believes that it has clearly established a need for the EOTP. HECO identified four needs for the EOTP in Section 2 of the Draft EA, which are the (1) Pūkele Substation Reliability Concern, (2) the Ko'olau/Pūkele Overload Situation, (3) the Downtown Substation Reliability Concern, and (4) the Downtown Overload Situation. The line overload situations increase the risk of catastrophic power outages. The reliability concerns create the potential for significant localized outages, which are of concern because of the number and critical nature of the customers affected and the duration of the outages.

Rather than installing a 138kV transmission line from Kamoku Substation to Pūkele Substation, HECO is proposing to reconfigure and connect existing 46kV circuits from Pūkele Substation at the end of HECO's Northern 138kV Transmission Corridor with existing and new 46kV circuits at Archer Substation and Kamoku Substation in HECO's Southern 138kV Transmission Corridor. This action is planned in two independent phases. Phase 1 will allow HECO to shift a portion of the load from the Pūkele Substation to Archer and Kamoku Substations. By doing this, HECO can address the Ko'olau/Pūkele Line Overload Situation and partially address the Pūkele Substation Reliability Concern. In addition, Phase 2 of the project will install additional 46kV lines to interconnect the remaining customers served by the Pūkele Substation to three other 46kV lines served from the Archer Substation, which will resolve the Pūkele Substation Reliability Concern. The EOTP will provide some deferral of the Downtown Line Overload Situation and partially address the Downtown Substation Reliability Concern.

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 3

Other options were considered as described in Section 3.2.3.5 of the Draft EA, which included newer generation technology such as renewable resources, distributed generation (DG) at HECO substations, and combined heat and power (CHP). Various factors were considered when reviewing these options, which include cost, land requirements, permitting requirements and the operation and maintenance costs for generating units compared to transmission facilities. These options were not feasible for different reasons, including higher cost compared to EOTP, inadequate land space, and inability for the option to address the transmission overloads and reliability concerns. In addition, transmission technologies such as static and dynamic line re-rating, re-tensioning and re-conducutoring were considered. These transmission technologies were not feasible because of higher costs compared to EOTP, the process would be time consuming, difficult, and expensive, particularly given the logistics of stringing new conductors in the mountainous areas traversed by the lines, and the work would necessitate prolonged outages of the lines, which would increase the possibility of an overload occurring if a second line serving the Ko'olau Substation becomes unavailable for any reason. HECO also hired an outside third-party consultant to review the feasibility of performing live line maintenance on the transmission lines. The consultant concluded that live line maintenance was not practical for much of the HECO system.

3 *The Consumer Advocate appears to be analyzing whether the Palolo underground route is the best option. The Palolo route is part of the Kamoku-Pukele EIS which is an exhibit in the EOTP docket. Ho'olaulima O Palolo does not want the line in Palolo Valley.*

HECO interprets the commenter's references such as the "Pālolo underground route" or "Pālolo route" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described on page 3-49 of the EOTP Draft EA. HECO notes that Ho'olaulima O Pālolo does not want the Kamoku-Pūkele 138kV Underground Alternative in Pālolo Valley. As noted earlier in this response letter, HECO eliminated this alternative in favor of 46kV alternatives. HECO's current proposal before the PUC is the 46kV Phased Project as described earlier in this response letter and on page 3-1 of the Draft EA.

4 *Is the underground route through Palolo Valley still under consideration?*

HECO interprets the phrase "underground route through Pālolo Valley" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described on page 3-49 of the EOTP Draft EA. No, the Kamoku-Pūkele 138kV Underground Alternative is not being considered for the EOTP. As noted earlier in this response letter, HECO eliminated this alternative in favor of 46kV alternatives. HECO's current proposal

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 4

before the PUC is the 46kV Phased Project as described earlier in this response letter and on page 3-1 of the Draft EA.

5 *Has HECO evaluated any other technology or routes for Palolo?*

HECO interprets the phrase "routes for Pālolo" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" via Pālolo which is described on page 3-49 of the Draft EA. As explained earlier, after balancing all the issues such as effectiveness, timeliness, cost, and public acceptance, HECO eliminated this alternative in lieu of other 46kV alternatives. Routes for the proposed EOTP were described earlier and additional 46kV routes were evaluated in Section 2.3.3.1 and Section 3.2.3.2 of the Draft EA.

HECO has evaluated other technologies for mitigating the described transmission problems. (Refer to Section 2 of the Draft EA.) Some of the technologies studied are included in Section 3.2.3.5. For example, performing live line maintenance was studied by an independent consultant for the 138kV transmission lines serving the Ko'olau and Pūkele Substations. As discussed in the Draft EA, in the case of HECO's 138kV system as it is currently configured, live line maintenance has, at best, very limited applicability due to constraints imposed by climate, terrain, and facility conditions. These constraints render live line maintenance impracticable for all but a very small percentage of the needed maintenance activities. Other technologies such as renewable energy, demand side management, a thorough investigation of DG at HECO substations, CHP, and increasing the ratings of the conductors were reviewed and the conclusion was that these options were not feasible to address the transmission problems described.

6 *Can the Pukele Substation be expanded, and if so, by how much? Will HECO have to do another EIS if the Palolo Underground route is chosen?*

The Proposed Action does not involve construction activities at Pūkele Substation. Currently, HECO has no plans to expand the Pūkele Substation. Nevertheless, in response to the commenter's inquiry, the existing Pūkele Substation occupies approximately 67,000 square feet on a parcel of land owned by HECO that totals approximately 290,000 square feet. When taking into consideration the required setbacks for the Pūkele Substation, there is no room to increase the footprint of this facility. Other reasons for not expanding to the maximum footprint is that Pūkele Substation is also bounded by (1) the valley wall on one side, (2) residential housing on another, and (3) a streambed on the other two sides.

HECO interprets the phrase "Pālolo underground route" as referring to the "Kamoku-Pūkele 138kV Underground Alternative" described earlier in this response letter and

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 5

on page 3-49 of the Draft EA. As noted earlier in this response letter, HECO eliminated this alternative in favor of the earlier described 46kV project. Since the Kamoku-Pūkele 138kV Underground Alternative has been eliminated, no environmental impact statement (EIS) will be performed for this alternative.

7 *Is the Palolo alignment as denoted in the EOTP Exhibit 4, a reasonable alternative?*

HECO interprets the phrase "Pālolo alignment as denoted in the EOTP Exhibit 4" as referring to the "Kapi'olani Boulevard-Pālolo XLPE Underground Alternative" and "Kapi'olani Boulevard-Pālolo HPFF Underground Alternative" that are described in the *Kamoku-Pūkele 138-kV Transmission Line Project, Revised Final Environmental Impact Statement*, September 2000 (HECO Inc., September 2000). These alternatives are the same as the "Kamoku-Pūkele 138kV Underground Alternative" described earlier in this response letter and on page 3-49 of the EOTP Draft EA.

Yes, the Kamoku-Pūkele 138kV Underground Alternative could be a considered a reasonable alternative because it would fully address the four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation, which are described more fully in Chapter 2 of the EOTP Draft EA. However, as noted earlier in this response, HECO eliminated this alternative in favor of 46kV alternatives after considering the issues.

8 *Has HECO done additional EMF readings at Pukele? What were the results?*

HECO interprets the reference to "Pūkele" to mean the Pūkele Substation. The Proposed Action does not involve activities in the vicinity of the Pūkele Substation. The vicinity of the Pūkele Substation is therefore not within the affected environment that has been evaluated in this EA, and electric and magnetic fields (EMF) readings have not been performed for the Pūkele Substation area.

9 *Has there been any cultural impact analysis in the vicinity of the Pukele Substation?*

The Proposed Action does not involve activities in the vicinity of the Pūkele Substation. The vicinity of the Pūkele Substation is therefore not within the affected environment which has been evaluated in this EA. Accordingly, a cultural impact analysis has not been performed for the Pūkele Substation area.

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 6

10 *Are there historical agricultural terraces along the Palolo alignments?*

The Proposed Action does not involve actions along the Pālolo alignments. The vicinity of the Pālolo alignments is therefore not within the affected environment that has been evaluated in this EA, and historical agricultural terraces along the Pālolo alignments have not been identified.

11 *Are there any historic heiau along the Palolo alignments?*

The Proposed Action does not involve actions along a Pālolo alignment. The vicinity of the Pālolo alignments is therefore not within the affected environment that has been evaluated in this EA, and historic heiau along a Pālolo alignment have not been identified.

12 *Has the Carlos Long Neighborhood been analyzed for historical and/or burial sites?*

The Proposed Action does not involve actions in or around Carlos Long Street in Pālolo, and Carlos Long Street is outside of the affected environment assessed in this EA. Therefore, no historical and/or burial sites around Carlos Long Street have been analyzed.

13 *What questions did the Consumer Advocate ask regarding the Palolo route? What answers did you give to the Consumer Advocate?*

HECO interprets the term "Pālolo route" to refer to the "Kamoku-Pūkele 138kV Underground Alternative," which, as noted earlier in this response, is no longer being considered. In Docket No. 03-0417 (EOTP), the Division of Consumer Advocacy (Consumer Advocate) information requests (IRs) CA-IR-1, CA-IR-4, CA-IR-22, CA-IR-23, CA-IR-29 and CA-IR-33 asked questions regarding a 138 kV underground line alternative between the Kamoku and Pūkele Substations. A copy of these Consumer Advocate IRs as well as HECO's responses is available upon request.

14 *Who did you consult with about cultural impacts in Palolo Valley?*

The Proposed Action does not involve actions in Pālolo Valley. It is located on the Kewalo and Pāwa'a flat lands and in the land areas of Kalua'Ōlohe and Kapahulu, within the ahupua'a of Honolulu and Waikīkī. The boundaries of the cultural impact assessment for the Proposed Action extended from Beretania Street to Ala Moana/Ala Wai Boulevards in a mauka-makai direction, and from Cooke Street to Kapahulu Avenue in an 'Ewa–Koko Head Direction. The research area also included the area near the intersection of Winam Avenue and Mo'oheau Avenue, east of Kapahulu Avenue. Pālolo Valley is not within the affected environment that has been evaluated

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 7

in this EA, and no consultation about cultural impacts in Pālolo Valley has therefore been conducted.

15 *In considering HECO's Draft Environmental Assessment, the Public Utilities Commission must balance the costs and benefits of the project to determine whether approving or denying the Environmental assessment will best serve the public interest. Please consider the interest of the people of Palolo Valley and not allow any additional electric lines through the valley.*

The Draft EA for the EOTP will neither be "approved" nor "denied" by the PUC. The Draft EA was prepared by HECO following Hawai'i Revised Statutes (HRS) Chapter 343 and Title 11, Chapter 200 of the Hawai'i Administrative Rules (HAR), and was submitted to the PUC. A Final EA will be prepared that includes responses to all public comments. The PUC will then either issue a negative declaration determination (also known as a Finding of No Significant Impact) or an EIS preparation notice, after considering the significance of potential environmental effects as described in HAR 11-200-12.

HECO's request to expend funds for the EOTP will be determined by the PUC in its review of HECO's EOTP application in Docket No. 03-0417. The Draft and Final EA will be part of the documentation submitted by HECO in support of the project.

As agreed to by the parties in Docket No. 03-0417, the following are the issues in the EOTP proceeding that the PUC will consider:

1. Whether HECO's proposed expenditures for Phases 1 and 2 of the EOTP will provide facilities which are reasonably required to meet HECO's present or future requirements for utility purposes.

2. Whether HECO's selected routing, location, configuration and method of construction for Phases 1 and 2 of the EOTP are reasonable.

3. Whether HECO's EOTP is preferable to HECO's other 138kV and 46kV transmission system alternatives, comparing factors such as, but not limited to the following:

   a) Cost;

   b) Timeliness and schedule;

   c) Effectiveness;

   d) Construction impacts;

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 8

e) Electromagnetic fields;

f) Other impacts, if any;

g) Public sentiment; and

h) The public welfare in general.

4. Whether HECO's EOTP is preferable to other feasible non-transmission options.

5. Pursuant to the requirements of HRS 269-27.6(a), whether all (as proposed by HECO) or part of the 46kV lines that are part of HECO's EOTP should be placed, constructed, erected or built below the surface of the ground.

In proposing the EOTP, HECO is considering the interests of its customers in East O'ahu, including the people of Pālolo Valley. The project will address several transmission problems concerning O'ahu's 138kV transmission system in the eastern half of the island. First, an overload situation with one of the three 138kV transmission lines that transport power to the Ko'olau/Pūkele Service Area (i.e., the area served by the Ko'olau and Pūkele Substations) in the Northern 138kV Transmission Corridor could occur beginning in 2005, whenever the other two lines are out of service. Second, an overload situation with one of the three 138kV transmission lines that transport power to the Downtown Area (i.e., the area served by the School Street, Iwilei, Archer, Kewalo and Kamoku Substations) in the Southern 138kV Transmission Corridor could occur after 2024, whenever the other two lines are out of service. Third, Pūkele Substation, located at the end of the Northern 138kV Transmission Corridor, would be without power if the two 138kV transmission lines serving it were lost (Pūkele Substation serves critical loads such as Waikīkī, State Civil Defense, Hawai'i Air and Army National Guard Headquarters, and the University of Hawai'i). And fourth, Archer Substation, Kewalo Substation and Kamoku Substation, all located in the Southern 138kV Transmission Corridor, would be without power if the two 138kV transmission lines serving Archer Substation were lost.

HECO is not proposing any action to pursue the 138kV underground alternative to address the four East O'ahu transmission issues described above and in Section 2 of the Draft EA. In addition, the proposed project does not call for 46kV lines to be installed in Pālolo Valley.

Please note that your comment could also be interpreted to mean that HECO should not install additional distribution lines to serve new or additional loads within Pālolo

Mr. Traver Carroll
January 7, 2005
2004.33.0800 / 04EP-225
Page 9

Valley. HECO trusts that the commenter does not intend this interpretation because it would not be in the best interests of the Pālolo Valley customers who would require the new distribution lines in order to receive electric service.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

LIFE OF THE LAND

Hawai'i's own local environmental and community action group
Protecting our fragile natural and cultural resources through
Research, Education, Advocacy & Litigation

October 8, 2004

Lesley Matsumoto
Belt Collins Hawai'i
2153 N King Street, Suite 200
Honolulu, Hawai'i 96819

Aloha,

Mahalo for this opportunity to review and comment on HECO's East O'ahu Transmission Project - 46 kV Phased Project Draft Environmental Assessment.

The mission of Life of the Land is to preserve and protect the life of the land through sustainable land use and energy policies and to promote open government through research, education, advocacy, and litigation. Life of the Land has been advocating for the people and the 'aina since 1970. In that time we have reviewed hundreds of environmental documents and, sadly, this is one of the worst we have ever seen. The purpose of environmental review documents are to disclose the impacts of any proposed project.

Life of the Land wants to state for the record, that several community groups were contacted by Belt Collins asking for individual meetings. Being acutely aware of HECO's 100+ year 'Divide and Conquer' strategy, all groups refused individual meetings, but asked for a public scoping meeting instead. Life of the Land was one of those groups contacted. We asked that before this document was written, a public scoping meeting - to take place in the affected community - be held so that the community could define the issues that they wanted this document to adequately analyze. Belt Collins, we assume on behalf of HECO, refused to consider this option. This, unfortunately, only adds to the community's suspicion about this proposal. Wouldn't any good developer want to know the community concerns up front so that they could focus on those issue areas of concern to the community? Gathering community up front generally makes for a better project and a more cooperative effort.

The following thumbnail sketch of HECO's interaction with the community on this project will reveal that HECO's <u>only</u> concern is their bottom line.

76 North King Street, Suite 203, Honolulu, Hawai'i 96817 * 533-3454

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Two...

1971: HECO proposes Halawa-Kamoku 138,000 volt transmission line
1973: HECO announced plans for a 138,000 volt power line to Pukele
1975: Under pressure by Rep. Ted Morioka (D-Palolo) HECO withdraws project
1977: HECO proposes project again
1979: Palolo community sues to stop the project
1980:
* Palolo wins out of court settlement;
* HECO agrees that the line is not needed
* Palolo is declared an "Overhead Exclusion Zone"

1992: HECO resurrects project as Phase III of Archer-Pukele 138,000 volt line
1994: HECO withdraws project
1995: Environmental Impact Statement Preparation Notice (EISPN) is published for Kamoku-Pukele 138,000 volt transmission line
1997:
* Act 95, widely supported by the community, is signed into law requiring HECO to consider "breadth and depth" of community sentiment in planning 138,000 volt lines
* Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board passes resolution against the project
* HECO goes to Waimanalo Neighborhood Board seeking support telling community that if they don't support the line, it may go through their neighborhood!
* HECO goes to Kaimuki Neighborhood Board seeking support for the need for the project
* Palolo Neighborhood Board passes resolution opposing the project on "no need" basis
* Kalihi Valley Neighborhood Board passes resolution opposing project
* HECO sends threatening letter to Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board warning that their resolution "violated HECO's contracts.
* HECO sends letter to Neighborhood Commission challenging the legality of Diamond Head/Kapahulu/St. Louis Heights and Kalihi Valley Neighborhood Boards' resolutions against the project
* HECO sends another letter to Neighborhood Commission protesting Palolo and Manoa Neighborhood Board's resolutions against the project
* Neighborhood Commission responds that no law had been violated by the Boards
* Life of the Land sends letter to T. Michael May asking that the 45-day EIS public comment period be extended to 6 months to review such a complex document
* HECO sends letter to Neighborhood Commission stating that the Manoa Neighborhood Board's Resolution violated the Sunshine Law because it was written though group effort

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Three...

1997 cont'd.:
- HECO (Kerstan Wong) replies to Life of the Land letter to Michael may saying that only DLNR could extend *the comment period*
- Neighborhood Commission Board meets to discuss HECO letter and sends formal letter to Corporation Counsel requesting clarification of the Board's role in responding to HECO
- The Environmental Council of OEQC passes Cultural Impact Guidelines to clarify how Environmental Impact Statements should assess cultural impacts
- Life of the Land sends letter to OEQC requesting clarification on extending comment periods for a Draft EIS
- HECO (Kerstan Wong) sends letter to Life of the Land apologizing for the error and saying they cannot extend time limit
- HECO writes letter to Rep. Scott Saiki stating that if HECO extended the comment period, then "a separate entity may subsequently challenge the 138 kV project by arguing that HECO violated the statutory process."
- OEQC responds that HECO and DLNR could jointly extend the comment period
- Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board passes a resolution asking for a six month extension on the public comment period for the DEIS
- Sens. Fukunaga, Ihara, Matsunaga and Taniguchi, along with Reps. Case and Saiki send letter to the Attorney General requesting clarification of HRS §343-5(c) in regard to voluntary expansion of the EIS comment period
- OEQC publishes a request by HECO to extend the comment period for the Malae Communications Tower (hours after agreeing to this extension, HECO challenges Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board's resolution for six-month extension on the public comment period for the DEIS

1998:
- HECO issues copyrighted Draft Environmental Impact Statement
- Office of Environmental Quality Control (OEQC) rejects DEIS since Attorney General rules that public documents cannot be copyrighted
- HECO re-publishes DEIS without copyright
- Over 3,000 comments are submitted on DEIS
- HECO publishes Final Environmental Impact Statement (FEIS)

1999:
- DLNR rejects FEIS on substantive (rare species) and procedural (improper responses to reviewers' postcard comments) issues
- HECO publishes *Revised* DEIS
- 3,900 people respond to the RDEIS

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Four...

2000
- HECO publishes RFEIS
- DLNR accepts RFEIS with 27 page letter outlining their many concerns with this project

2001:
- 'Ilio'ulaokalani Coalition, Life of the Land, The Outdoor Circle, and Karla Kral, a resident of Palolo file suit in Circuit Court challenging the adequacy of the EIS
- BLNR holds public hearing on HECO's CDUA in State Capitol Auditorium; community turns out hundreds - testimony runs from 6 PM - 2 AM; four groups ask for Contested Case Hearing - 'Ilio'ulaokalani Coalition, Life of the Land, Malama o Manoa, and The Outdoor Circle
- 3 parties file papers for Contested Case Hearing - Life of the Land, Malama o Manoa, and The Outdoor Circle
- Contested Case Hearing takes place over 7 days in November

2002:
- February - Judge McConnell recommends that BLNR deny HECO's permit
- June - BLNR denies HECO's Conservation District Use Permit (CDUP)

2003:
- HECO proposes 17th name for this project - East O'ahu Transmission Project (EOTP) and writes to parties in Contested Case Hearing and the press to say they heard the community
- HECO stages 5 community meetings in Waipahu, Kane'ohe, Honolulu, Kaimuki
- HECO hand picks Community Advisory Committee (CAC) and holds 2 meetings
- Seven groups and individuals file motions to intervene in the EOTP PUC docket

2004:
- The PUC accepts Life of the Land and Elected Officials as intervenors, allows Malama o Manoa, Palolo Community Council, Ho'olaulima o Palolo, and Kapahulu Neighbors to 'participate' in the docket, and denies entrance to two individuals
- HECO hires Belt Collins to write their 'voluntary' Environmental Assessment
- Belt Collins then tries to set up private and individual meetings with each party that filed motions to intervene in Docket # 03-0417. All parties refuse individual meetings and propose a public scoping meeting, common when controversial projects are proposed. HECO refuses.

This sad history illustrates how HECO uses their power over the community. They use their political connections, as evidenced by their re-definition of renewable energy in the newly enacted Act 95, to push their fossil fuel agenda. They use these connections and their deep pockets (ours) to cajole, threaten, intimidate, and bully communities who oppose their plans.

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Five...

So after in four decades, numerous Environmental Impact Statements, court cases, resolutions against the project passed by a plethora of Neighborhood Boards, comes EOTP - the 17th name for this proposal!

Section 1.3 - PURPOSE OF THIS DOCUMENT arrogantly states: *"HECO's decision to voluntarily prepare this EA was in response to requests made at the McCully/Mo'ili'ili neighborhood board meeting, continued public interest in HECO's Proposed Action, and the history of events leading up to this proposal, as discussed in Section 1.2."*

Life of the Land has never heard of a 'voluntary' EA. What section of law does this refer to? Below we have included the sections of law dealing with EAs and EISs.

§343-1 Findings and purpose. *The legislature finds that the quality of humanity's environment is critical to humanity's well being, that humanity's activities have broad and profound effects upon the interrelations of all components of the environment, and that an environmental review process will integrate the review of environmental concerns with existing planning processes of the State and counties and alert decision makers to significant environmental effects which may result from the implementation of certain actions. The legislature further finds that the process of reviewing environmental effects is desirable because environmental consciousness is enhanced, cooperation and coordination are encouraged, and public participation during the review process benefits all parties involved and society as a whole.*

It is the purpose of this chapter to establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.

Two relevant definitions are included for your edification:

§343-2 Definitions. As used in this chapter unless the context otherwise requires:
"Council" means the environmental council.
"Environmental assessment" means a written evaluation to determine whether an action may have a significant effect.

Life of the Land find no definition of a 'voluntary' EA anywhere in the Hawai'i Revised Statutes, and would appreciate your providing the guidance that lead to this determination.

If, however, there is no legal standing, why would an environmental consultant with the experience of Belt Collins issue a document that has no legal standing? Since when did complying with the law become 'voluntary'?

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Six...

Chapter 343 HRS clearly states:

§343-5 Applicability and requirements. *(a) Except as otherwise provided, an environmental assessment* ***shall be required for actions*** *which:*
(1) ***Propose the use of state or county lands*** *or the use of state or county funds...*
(5) ***Propose any use within the Waikiki area of Oahu,*** *the boundaries of which are delineated in the land use ordinance as amended, establishing the "Waikiki Special District"*

Both §343-5 (1) and (5) are triggered by this proposal!

Another issue for Life of the Land is that an EA is presented when the applicant has a reasonable expectation of receiving a FONSI (finding of no significant impact). Does HECO actually believe that this cobbled together approach will have no impact? Ask the Board of Water Supply! They found plenty of iwi kupuna along their Kalakaua Avenue project. So did Wal-Mart, and the state even admitted that the burials were not confined solely to the inland Wal-Mart site and that some might even be found in roadways. The October 7, 2004 Honolulu Advertiser had a story in the Hawai'i Section, page B1 entitled, "Remains found at Waikiki Site," another inland site. Why does HECO believe that their project will have no cultural impacts in light of these recent discoveries? The cultural analysis in this flawed document is completely inadequate and Life of the Land believes that an Environmental Impact Statement must be prepared that adequately analyzes the cultural impacts of this proposal.

After speaking with many residents along the proposed route, Life of the Land assets that the health impacts of this project have been understated and inadequately assessed. The affected community has many retired and elderly residents who were told that the proposed line would go down the middle of the street, away from their homes. They were then subsequently told that the line would be on the sidewalk, a mere 17 feet from some residences. This is a cause of great worry and concern to the area residents and Life of the Land does not believe that their concerns have been sincerely analyzed. The residents have told us that they are worried about the ingress and egress of emergency vehicles should the project move forward since several of their neighbors had medical emergencies in the last several months. How will HECO deal with emergency vehicles and personal vehicles needed to address medical emergencies? What liability will HECO bear if an ambulance or other medical personnel cannot get through during construction and a person dies? We understanding that the loss of life can never be mitigated, but how will HECO compensate the family directly affected?

Some of these residents care for their grandchildren and are very concerned about the potential health impacts of a line close to their home where their young grandchildren sleep. What epidemiological studies will HECO conduct before, during and after construction? The residents have been told that the EMF exposure will be similar

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Seven...

to that of a household appliance, but they know that the line will be constantly energized, so that is not the same as the intermittent use of a household appliance. Does HECO have a doctor on staff to handle these concerns? *If so, who is it? Please* provide the name and contact information for this doctor. If HECO does not have a doctor on staff to handle these concerns, why not? This inadequate analysis of the community's health concerns lead Life of the Land to assert that an Environmental Impact Statement must be prepared to adequately address these serious concerns.

The intent of Chapter 343's 'Alternatives' means exactly that...what *alternatives* to building a power line are available, i.e. technology (renewable energy), conservation, energy efficiency, etc. Routing is NOT an alternative. Under the 'Alternatives" section of the law is the 'No Build' alternative, which must be fully explored. Life of the Land is insulted by the inadequate "Alternatives" section of this flawed document. The law required an honest review of all feasible alternatives, including the 'No Build' alternative. In HECO's PUC filing asking for the right to provide CHP, they admit that CHP is more reliable. Why then do they waste ratepayer money with more dinosaur projects? Life of the Land believes that a full Environmental Impact Statement must be done because of this inadequate analysis.

When they staged their dog and pony shows last summer, they led off with a meeting in Waipahu! A location in the communities directly affected by this proposal was not even considered by HECO. The area legislators had to push HECO to hold a meeting in Kaimuki. Is this their 'good neighbor' policy?

At these community meetings, there was overwhelming opposition to this proposal. Their only real ally was at the Kane'ohe meeting, by one of their retirees who has been their most loyal cheerleader. Even their hand-picked Community Advisory Committee did not support the option they are putting forth now. The business members of the CAC, including the Chamber of Commerce, the Hawai'i Hotel Association, the Waikiki Improvement Association, and the National Association of Industrial Owners of Property, all said that if the project was determined to be needed, they supported the cheapest option. That is not the option HECO chose. This confirms that HECO had already decided what they were going to do and the public meetings were just window dressing.

HECO's justification for this project has been a shell game....'it's about reliability', 'no, this line wouldn't make our system more reliable', 'yes it is about reliability.' Their reasons for doing this have constantly changed. Why?

At the Kaimuki public meeting, their justification was finally revealed. This project is needed so they can recover the $17 million lost from their Wa'ahila Ridge debacle. They admitted that these costs were embedded in the planning and permitting costs for this proposal. Why should ratepayers bear the costs for their bad business decisions? This is immoral. This cost should be borne by HECO's shareholders.

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Eight...

With the price of oil hovering at approximately $50 a barrel and HECO's infrastructure aging, Hawai'i is perfectly poised to transition to *real* renewable energy, thus diversifying our portfolio of alternatives. Life of the Land implores the PUC to look at this project in the context of Hawai'i today. Of course, to HECO, oil still costs on $20-$25 a barrel since they pass all costs over that onto the backs of their ratepayers in the Energy Cost Adjustment Clause. This is also why they have no incentive to get off oil -- they don't feel our pain...they just reap the benefits.

This ill-conceived project has been 'alive' in the HECO boardroom since the 60's, when it was first discussed. As a regulated monopoly (established to eliminate any competition from entering 'their' marketplace), HECO can recover their expenditures for projects they build if the PUC agrees now that it is 'reasonable' and 'in the public interest,' and then in the next rate case if its 'used and useful'. In this economy, that is an enviably good deal - the more they spend, the more they make. What this policy promotes is more building projects, which has resulted in HECO not being pro-active in their maintenance program. Why should they, maintenance costs them money they can't make a profit on! This is dangerous public policy and continues to work against the public interest.

The already over-burdened ratepayers of O'ahu have consistently asked HECO to maintain their infrastructure, while exploring innovative ways to provide electricity that will have fewer impacts.

They have spent over $17 million just in the last 10 years to ram this project through communities that have united and resisted. WE ARE STILL UNITED. WE ARE STILL RESISTING. AND WE WILL CONTINUE TO DO SO.

After their embarrassing defeat in the Wa'ahila Ridge Contested Case Hearing they said they 'heard the community' and then went on to ask which route would you like? They heard us? Then which part of 'NO" didn't they understand. NO NEED. That was the mantra of the communities working to stop this incredible waste of Hawai'i's resources - economic, cultural, environmental, social, etc. They come back with a routing alternative?

At the PUC hearing for this project an engineer testified that HECO could replace their current wiring with copper wiring that would be more efficient and forestall the need to build anything more. The community has asked time and time again for HECO to maintain their lines, rather than to continue expanding with old technology. Why has HECO not considered these upgrades? What upgrade in technology was considered to meet this perceived need? Is this project a test to see if HECO can continue connecting all these manini segments to ensure a continuous revenue stream? Who recommended this project now and who rejected this option in the Kamoku-Pukele EIS?

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Nine...

"Kamoku-Pukele 46-kV Network Alternative. This alternative requires the configuration of the existing 46-kV subtransmission system to provide a transmission path between the Kamoku and Pukele Substations. ... a technical analysis of this alternative suggests that its implementation would greatly destabilize the power quality within the area and increase the number of transformer short circuits, voltage drops, and transmission line losses." **Hawaiian Electric Company: Final Revised EIS. See: East Oahu Transmission Project Exhibit 4 (2004)**

1. Does HECO believe that a 46-kV Network would destabilize (a) the power quality; (b) increase the number of transformer short circuits; (c) increase the number of voltage drops; and/or (d) increase the amount of transmission line losses within East O'ahu? If the above answers are generally in the affirmative, why is HECO pursuing this option? If the above answers are generally not in the affirmative then is HECO continuing to rely on the documents that said they are? If HECO changed their opinion, what new documents led HECO to change its mind? Please elaborate and give a full answer to these questions.

2. "This cultural impact analysis has relied on archival sources made up primarily of native and foreign testimonies that were recorded in the **mid-1800s.**" (Appendix C-2: Cultural Impact Statement. Section 5, page 33, line 1) Why did HECO rely on testimonies primarily from the pre-electrical era?

3. Did HECO consult with any Native Hawaiian Civic Clubs regarding cultural impacts? If so, which group and when?

CONCURRENT ACTION: Federal Register: June 14, 2004: The U.S. Army Corps of Engineers and the State of Hawaii Department of Land and Natural Resources will prepare an Environmental Impact Statement (EIS) for the alternatives and potential impacts associated with the Ala Wai Canal Project Feasibility Study. This effort could result in a multi-purpose project being proposed under Section 209 of the Flood Control Act of 1962 (Pub. L. 87-874) and will incorporate both flood hazard reduction and ecosystem restoration components into a single, comprehensive strategy.

The federal Ala Wai Canal EIS will be completed in 2005 (EOTP EA pages 5-6 through 5-7) HECO will complete Phase 1 of the EOTP in 2007 (including constructing Subtransmission Lines between the Kamoku Substation and the Pukele Subtransmission Line #4), (EOTP Draft EA ES-1; Figure 2-2, page 2-3) remove and relocate part or all of Pukele Subtransmission Line #4 between the Kamoku Connection and the Waikiki Substation in 2007 (EOTP EA pages 5-6 through 5-7), and complete Phase 2 in 2009 (EOTP Draft EA ES-1). The Draft EA notes that the Pukele Subtransmission Line will be relocated fronting Kai'olu Street. The map, located in another section of the Draft EA, has mislabeled the relevant streets.

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Ten...

4. The electrical route from the Kamoku Substation to the Waikiki Substation consists of two segments, both of which HECO plans to install in 2007. How come one is analyzed in this EA, while the other is not even included in the EOTP DEA secondary or cumulative impacts section?

5. What different voltages did HECO consider in relocating the Pukele Subtransmission Line #4?

6. What different technologies did HECO consider in relocating the Pukele Subtransmission Line #4?

7. What would be the benefits and costs associated with simultaneously replacing the Pukele Subtransmission Line #4 with two or more subtransmission lines?

8. What would be the benefits and costs associated with simultaneously replacing the Pukele Subtransmission Line #4 with one transmission line?

9. What would be the benefits and costs associated with simultaneously replacing the Pukele Subtransmission Line #4 with one subtransmission line and one transmission line?

10. Does HECO or its contractors ever trim trees on the ground above underground lines? Does HECO or its contractors ever use herbicides on the ground above underground lines? What aboveground maintenance is performed for underground lines which lie below unpaved surfaces?

The document lists a number of separate projects which are somehow linked together into one EOTP project. But there is no information on why (from a reliability, load, critical load, etc. perspective) that each one is included as a piece of something bigger.

11. For each of the following: (1) Downtown Transmission Service Area Load; (2) Koolau/Pukele Transmission Service Area Load; (3) Central O'ahu Transmission Service Area Load; (4) West O'ahu Transmission Service Area Load; (5) Pukele Transmission Service Area Load; and (6) The Total Island Load, please answer the following questions
(a) What is the minimum night-time load?
(b) What is the average night-time load?
(c) What is the maximum night-time load?
(d) What is the minimum day-time load?
(e) What is the average day-time load?
(f) What is the maximum day-time load?
(g) What is the minimum evening load?
(h) What is the average evening load?
(i) What is the maximum evening-time load?

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Eleven...

12. Costs: engineering costs, accounting costs, regulatory costs, etc. (a) Do the costs associated with different option include just engineering costs or all costs? (b) If all costs are included, what percentage is used by the Company for (1) the interest rate; (2) the discount rate? (3) carrying charge? (c) Do the costs differentiate between utility installation and third party installation? If so, please elaborate. (d) Are the costs calculated for (1) construction? (2) operation? (3) maintenance? (4) removal? (e) Are the costs calculate from a given number of years, or the average costs over the lifetime of the option? (f) Is the cost of fuel for different options considered?

13. Does HECO consider that most solar-thermal, solar-electric, combined heat and power systems, and wind energy systems use land as part of a multi-use, that is, they do not require vacant land?

14. (a) What percentage of the load could be reduced through cost-effective energy efficiency measures? (b) What percentage of the load could be reduced through load shifting measures?

15. Are most outages in Waikiki caused by problems with transmission, subtransmission or distribution circuits?

16. What time of day do blackouts usually happen at?

17. Are blackouts more common at night, during the morning, during the day or during the evening peak?

18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:
(a) Will upgrades at one of these substations have a greater impact on load, reliability, critical load, etc. than improvements at another substation?
(b) What are the relative cost benefits for each substations improvements?
(c) How does the Substation improvements fit into the project?
(d) What is the total cost and benefit for each Substation segment?
(e) What technologies were considered for this project?
(f) When did HECO first consider implementing this improvement? Please provide a list of all HECO documents that make reference to this substation.
(g) Would there be any kind of benefit to installing a 138-kV Line to this substation? If so, please elaborate?
(h) Would strengthening (increasing the number of, increasing the capacity of, increasing the voltage of) the subtransmission and/or distribution lines from this station improving reliability concerns?
(i) Would strengthening (increasing the number of, increasing the capacity of, increasing the voltage of) the subtransmission and/or distribution lines from this

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Twelve...

station improving overloading concerns?
(j) What are the reliability metrics for this substation?
(k) What would be the cost & benefit of the EOTP if all components of the EOTP were built except for this Substation improvement?
(l) Would the Pukele Substation Reliability Concern be impacted? If so, how? Would the Downtown Substation Reliability Concern be impacted? If so, how?
(m) Would the Koolau/Pukele Overload Situation be impacted? If so, how? Would the Downtown Overload Concern be impacted? If so, how?
(n) What segment of the population would remain vulnerable to overload and/or reliability issues if this one segment were not built but everything else was built? Why?
(o) Using Generally Acceptable Accounting Procedures, what is the total cost of this segment (including the interest payments)?
(p) What is the interest rate and discount rate used by the utility in pricing out alternatives? Does HECO consider only the cost of the infrastructure (lines, on-site generation)?
(q) How does the utility account for differences in the price of fuels (oil, sunlight)?
(r) When did this proposed segment first appear in any engineering study? Please provide a copy of that document.
(s) When did this proposed segment first appear in HECO's Capital Expenditure Budgets filed yearly with the PUC? Please provide a copy of that document.
(t) When did this segment first get discussed in the Integrated Resource Planning process? Please provide a copy of that document.
(u) How many customers receiving power from this substation have been talking to the utility about ways of decreasing their need for grid-based electricity through on-site generation, efficiency devices and conservation measures? (measured in number of customers, or percent of customers, or load, or percentage of load)
(v) What is the size (in acres) of the substation? What are the restrictions as to the acreage that buildings/ infrastructure could be built at the substation? What are the restrictions as to the height that buildings/ infrastructure could be built at the substation?
(w) How much could the substation be expanded (acres, height, number of distribution lines, number of transmission lines, number of subtransmission lines, transformers? Could photovoltaic be installed at the site?
(x) The Gas Company has an urban underground gas pipeline in the area -- how close is the nearest gas line? Could on-site generation be built at the site? Please elaborate and include discussion on size (MW), acreage, reliability, load impacts of on-site generation?
(y) Has HECO considered expanding capacity between this substation and other substations in Waikiki? If not, why not?
(z) Has HECO considered expanding capacity between this substation and other substations in Waikiki? If not, why not?

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Thirteen...

19. For the Winam Subtransmission Line ((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:
(a) How does the segment fit into the project?
(b) What is the total cost and benefit for just the segment?
(c) What other routes were considered for this project?
(d) What other technologies were considered for this project?
(e) When did HECO first consider implementing this segment?
(f) Please provide a list of all HECO documents that make reference to this segment.
(g) What would be the cost & benefit of the EOTP if all components of the EOTP were built except for this segment? (1) Would reliability increase for anyone? If so, for whom? (2) Would the Pukele Substation Reliability Concern be impacted? If so, how? (3) Would the Koolau/Pukele Overload Situation be impacted? If so, how? (4) Would the Downtown Substation Reliability Concern be impacted? If so, how? (5) Would the Downtown Overload Concern be impacted? If so, how? What segment of the population would remain vulnerable? Why?
(h) Using Generally Acceptable Accounting Procedures, what is the total cost of this segment (including the interest payments)?
(i) What is the interest rate and discount rate used by the utility in pricing out alternatives?
(j) Does HECO consider only the cost of the infrastructure (lines, on-site generation)? How does the utility account for differences in the price of fuels (oil, sunlight)?
(k) When did this proposed segment first appear in any engineering study? Please provide a copy of that document.
(l) When did this proposed segment first appear in HECO's Capital Expenditure Budgets filed yearly with the PUC? Please provide a copy of that document.
(m) When did this segment first get discussed in the Integrated Resource Planning process? Please provide a copy of that document.

20. Power Factor (Average Usage): What is the power factor (or average use or average percent of capacity used) on the Downtown transmission and subtransmission grids? What is the power factor in the Kamoku transmission service area?

21. In the downtown area, can future overload issues be deferred through locating power conditioning systems (such as ElectroFlow, www.electroflow.com/) at Transmission Substations, Distribution Substations and/or for major loads?

22. In the downtown area, can HECO increase reliability and/or defer new load requirements through the addition of harmonic filtering, surge suppression, transient suppression, etc at Transmission Substations, Distribution Substations and/or for major loads?

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Fourteen...

23. In the Kamoku transmission service area, can future overload issues be deferred through locating power conditioning systems (such as ElectroFlow, www.electroflow.com/) at Transmission Substations, Distribution Substations and/or for major loads?

24. In the Kamoku transmission service area, can HECO increase reliability and/or defer new load requirements through the addition of harmonic filtering, surge suppression, transient suppression, etc at Transmission Substations, Distribution Substations and/or for major loads?

25. In the downtown service area, are some transmission components less effective due to excessive heat?, and in turn, is this affecting power quality in the area?

26. What are the benefits of increasing the power factor in a transmission service area?

27. Can power needs be reduced through the installation of capacitors at strategic points on the distribution system?

28. Would the additional of capacitors at transmission/distribution substations improve power quality and reliability?

29. Can T&D efficiencies be improved so as to decrease the need for new load (capacity)?

30. Has HECO analyzed power factors on its transmission system?

31. Has HECO investigated the potential for increasing the use of capacitors and/or capacitor banks on its transmission system?

32. What is the relationship between power factor and capacity?

33. Regarding the March 3, 2004 outage: (a) What steps have been taken, but have not been finished, that need to be completed to prevent the recurrence of such an outage? (b) What steps have not been taken, but need to be completed to prevent the recurrence of such an outage?

34. HECO (2004): "Pukele Substation serves about one-sixth of Oahu's power demand" (a) Does this statement mean that the Pukele service area accounts for one-sixth of HECO's total electricity produced in a typical year? (b) Does this statement mean that the Pukele service area accounts for one-sixth of HECO's total electricity produced in the one hour period when the island system is peaking? (c) Does this statement mean that the Pukele service area accounts for one-sixth of HECO's total electricity produced in the one hour period when the Pukele service area is peaking?

Life of the Land's Comments on HECO EOTP DEA
October 8, 2004
Page Fifteen...

35. HECO (2004): "For noise, contractors will be required to abide by Department of Health noise permits and variances" What are the typical variances that HECO requests for this type of construction?

36. HECO (2004): "HECO has also met and continues to work closely with the descendents of the Hawaiian families who are associated with the ahupuaa in which this project lies to gain their insights and hear their concerns." (a) Which ahupuaa are you referencing? (b) Which Hawaiian families are you consulting with?

HECO (2004): "With respect to the facilities of other utilities, HECO would coordinate scheduling with those agencies to minimize construction in the same area at the same time." (a) Doesn't it make more sense the coordinate construction with other agencies to maximize construction in the same area at the same time? (b) If more than one agency performs simultaneous construction, wouldn't (1) the total construction time go down?; and (2) the total cost of construction go down?

Mahalo for this opportunity to submit our comments. We look forward to your complete responses to our concerns.

Sincerely,

Dated October 8, 2004

Henry Q Curtis
VICE PRESIDENT FOR CONSUMER ISSUES
LIFE OF THE LAND

Certificate of Service

I hereby certify that I have this date delivered a copy of the foregoing Life of the Land's Questions re HECO's Draft Environmental Assessment, Docket Number 03-0417, upon the following parties. I hand delivered the original and 8 copies to the PUC, two copies to the Consumer Advocate, one copy to each of the following: the Office of Environmental Quality Control, Belt Collins Hawaii, Hawaiian Electric Company and Goodsill Anderson Quinn & Stifel.

I have also emailed a copy to all parties and participants.

Carlito Caliboso, Chair
Public Utilities Commission
465 S King St. Suite 103
Honolulu, HI 96813

John Cole, Consumer Advocate
Office of the Consumer Advocate
P. O. Box 541
Honolulu, HI 96813

Lesley Matsumoto
Belt Collins Hawaii
2153 N King Street, Suite 200
Honolulu, Hawaii 96819

Thomas Williams, Esq.
Peter Y. Kikuta, Esq.
Goodsill Anderson Quinn & Stifel
Alii Place, Suite 1800
1099 Alakea Street
Honolulu, HI 96813

Kerstan Wong
Hawaiian Electric Co (HECO)
P. O. Box 2750
Honolulu, HI 96840--0001

Genevieve Salmonson
Office of Environmental Quality Control
235 S. Beretania, Suite 702
Honolulu, HI 96813

Dated October 8, 2004

Henry Q Curtis
VICE PRESIDENT FOR CONSUMER ISSUES
LIFE OF THE LAND

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-236

Mr. Henry Q Curtis
Vice President for Consumer Issues
Life of the Land
76 North King Street, Suite 203
Honolulu, HI 96817

Dear Mr. Curtis:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

1 *Life of the Land has been advocating for the people and the 'aina since 1970. In that time we have reviewed hundreds of environmental documents and, sadly, this is one of the worst we have ever seen. The purpose of environmental review documents are to disclose the impacts of any proposed project.*

HECO disagrees with the commenter's assessment of the Draft EA. As the responses to other comments in this letter indicate, the Draft EA presents a thorough evaluation of the impacts associated with the EOTP.

2 *Life of the Land wants to state for the record, that several community groups were contacted by Belt Collins asking for individual meetings. Being acutely aware of HECO's 100+ year 'Divide and Conquer' strategy, all groups refused individual meetings, but asked for a public scoping meeting instead. Life of the Land was one of those groups contacted. We asked that before this document was written, a public scoping meeting - to take place in the affected community - be held so that the community could define the issues that they wanted this document to adequately analyze. Belt Collins, we assume on behalf of HECO, refused to consider this option. This, unfortunately, only adds to the community's suspicion about this proposal. Wouldn't any good developer want to know the community concerns up front so that they could focus on those issue areas of concern to the community? Gathering community up front generally makes for a better project and a more cooperative effort.*

As stated in the Draft EA for the EOTP 46kV Phased Project, the EA is being prepared following Hawai'i Revised Statutes (HRS) Chapter 343 and its implementing rules, Hawai'i Administrative Rules (HAR) 11-200. Belt Collins contacted agencies and interested parties as specified in HAR 11-200-9, which requires HECO "to seek the advice and input of the lead

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 ▪ Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 2

county agency responsible for implementing the county's general plan for each county in which the proposed action is to occur, and consult with other agencies having jurisdiction or expertise as well as those citizen groups and individuals which the approving agency reasonably believes to be affected." HECO followed this rule.

We concur that understanding community concerns as soon as possible helps with project development and cooperation between interested parties. For these reasons, HECO reached out to the affected communities early in the planning stage for this 46kV Phased Project by undertaking the following activities.

- In 2003, HECO held an extensive public input process on three alternatives for the EOTP. The three alternatives were: (1) Kamoku-Pūkele 138kV Underground Alternative, (2) Kamoku 46kV Underground Alternative, and (3) Kamoku 46kV Underground Alternative - Expanded. The two 46kV alternatives involve the construction of a new underground 46kV line, approximately 420 feet in length, in Kapahulu on Winam Avenue and Mo'oheau Avenue.

- In May 2003, HECO sent invitations to seventeen organizations to participate on a Community Advisory Committee (CAC) as part of the public input process to evaluate the three alternatives. The organizations included nine neighborhood boards, Life of the Land, The Outdoor Circle, Mālama o Mānoa, University of Hawai'i at Mānoa, and five business organizations. Additionally, all other neighborhood boards and State and City elected officials were sent letters to inform them of the public meetings and to encourage their participation. Also, in May 2003, HECO issued a press release to describe the project and to announce that five meetings were to be held to solicit public input on the project.

- On June 18, 2003, letters and flyers were sent to some 300 residents residing on streets that would be directly affected by the construction of the Kamoku 46kV Underground alternative (i.e. Fern, Hau'oli, Lime, Nanea, Punahou, Ho'olulu, and Williams Streets and Winam Avenue) to inform them of the project and of the public meetings.

- HECO also purchased advertising space to announce the meetings in various island publications including *The Honolulu Advertiser*, *Honolulu Star Bulletin*, and *Midweek*. Two additional meetings were scheduled and held on July 7 and 8, 2003, at Kaimuki High School. The first meeting was targeted for residents that reside in the project area. The second meeting was a continuation of the June 24, 2003, meeting. On October 8, 2003, HECO issued a press release indicating that it had chosen the Kamoku 46kV Alternative - Expanded to pursue but in a phased approach.

- On November 6, 2003, HECO made a presentation about the project at the McCully/Mō'ili'ili Neighborhood Board meeting to obtain comments on the alternatives proposed at that time. In October, HECO provided the Chair of the Neighborhood Board with about 300 flyers and a banner to publicize the meeting.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 3

- On December 18, 2003, HECO filed an application with the Public Utilities Commission (PUC) to obtain approval for the project. On March 23, 2004, the Kapahulu Neighbors, a non-profit corporation that represents property owners on record, residents, and registered voters of the district of Kapahulu, was granted participant status in HECO's case before the PUC. Participant status entitles the Kapahulu Neighbors to receive copies of all correspondence, filings, and briefs related to HECO's case and also the opportunity to submit a written statement of position.

- On June 10, 2004, HECO made a presentation at the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board meeting to obtain comments on the project, in particular, the Winam Avenue segment of the project.

- Since August 2004, HECO has been going door-to-door to inform residents and businesses in the project area, which includes Winam Avenue and Mo'oheau Avenue. HECO will continue to keep residents and businesses in the project area informed as the project progresses.

As a result of public input, the HECO's initial preferred alternative was modified several times before it became the "Phased Project."

3 *The following thumbnail sketch of HECO's interaction with the community on this project will reveal that HECO's only concern is their bottom line.*

1971: HECO proposes Halawa-Kamoku 138,000 volt transmission line

1973: HECO announced plans for a 138,000 volt power line to Pukele

1975: Under pressure by Rep. Ted Morioka (D-Palolo) HECO withdraws project

1977: HECO proposes project again

1979: Palolo community sues to stop the project

*1980: * Palolo wins out of court settlement;*

** HECO agrees that the line is not needed*

** Palolo is declared an "Overhead Exclusion Zone"*

1992: HECO resurrects project as Phase III of Archer-Pukele 138,000 volt line

1994: HECO withdraws project

1995: Environmental Impact Statement Preparation Notice (EISPN) is published for Kamoku-Pukele 138,000 volt transmission line

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 4

1997: ** Act 95, widely supported by the community, is signed into law requiring HECO to consider "breadth and depth" of community sentiment in planning 138,000 volt lines*

** Diamond Head/ Kapahulu/ St. Louis Heights Neighborhood Board passes resolution against the project*

** HECO goes to Waimanalo Neighborhood Board seeking support telling community that if they don't support the line, it may go through their neighborhood!*

** HECO goes to Kaimuki Neighborhood Board seeking support for the need for the project*

** Palolo Neighborhood Board passes resolution opposing the project on "no need" basis.*

** Kalihi Valley Neighborhood Board passes resolution opposing project*

** HECO sends threatening letter to Diamond Head/ Kapahulu/ St. Louis Heights Neighborhood Board warning that their resolution "violated HECO's contracts.*

** HECO sends letter to Neighborhood Commission challenging the legality of Diamond Head/Kapahulu/St. Louis Heights and Kalihi Valley Neighborhood Boards' resolutions against the project*

** HECO sends another letter to Neighborhood Commission protesting Palolo and Manoa Neighborhood Board's resolutions against the project*

** Neighborhood Commission responds that no law had been violated by the Boards*

** Life of the Land sends letter to T. Michael May asking that the 45-day EIS public comment period be extended to 6 months to review such a complex document*

** HECO sends letter to Neighborhood Commission stating that the Manoa Neighborhood Board's Resolution violated the Sunshine Law because it was written though group effort*

HECO disagrees with the commenter's assertion that HECO's only concern is the bottom line. The purpose of the Proposed Action is to address four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation.

The line overload situations increase the risk of catastrophic power outages. A catastrophic outage has the potential to take down the entire island system for many hours. Restarting generation facilities is a very complex and time-consuming process; therefore, a significant number of customers could be without power for many hours until the system can be

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 5

restored. The substation reliability concerns relate to localized outage problems. Although the latter are limited to a certain area, certain localized power outages are of significant concern because of the number and critical nature of the customers affected and the potential duration of the outages.

These transmission problems were first identified in 1991 and since that time, HECO has been trying to proactively address these problems. The Pūkele Substation Reliability Concern was heightened earlier this year. On March 3, 2004, one of the two transmission lines serving the Pūkele Substation was out for scheduled maintenance when the second transmission line went out of service and resulted in a power outage. Approximately 40,000 customers in the Honolulu/East O'ahu area, including Waikīkī, lost power. Approximately 39,000 customers were without power for 45 minutes to 2 hours; approximately 1,000 customers were without power for almost 4 hours. (Prior to March 3, 2004, HECO had been fortunate that the second of the two 138kV lines to Pūkele Substation had not tripped out of service while the other line was out for maintenance or out of service due to a forced outage.) The sustained outage would have been prevented if the Proposed Action had been completed. Many of the customers affected on March 3, 2004, would not have seen any interruption in service, while the other affected customers would have experienced a momentary interruption of service lasting only seconds. The following are responses to the commenter's chronology of events:

1971 to 1980 Events

HECO disagrees with commenter's characterization of some of the events listed from 1971 to 1980 and the inference that they are part of the EOTP. The events are related to a different project called the Proposed Hālawa to Kamoku 138-kV Transmission Lines project ("Hālawa-Kamoku project"). The purpose of the Hālawa-Kamoku project was to provide power to Kamoku Substation. This objective was accomplished with the installation of the Iwilei to Archer (1989), Archer to Kewalo (2003), and Kewalo to Kamoku transmission line projects (2002). The concerns that the EOTP is designed to address were identified in 1991. The Hālawa-Kamoku project was never intended to address the (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, or (4) Downtown Overload Situation. Accordingly, the events the commenter noted from 1971 to 1980 are irrelevant to the Proposed Action.

1992

- The commenter's characterization of Phase III of the Archer-Pūkele 138,000 volt line as a resurrection of the Hālawa-Kamoku project is inaccurate as noted above.

1994

- It is unclear what "project" the commenter is referring to that HECO withdrew. It also unclear from what process or entity the "project" was withdrawn. Therefore, a meaningful response to the comment cannot be provided.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 6

1995

- *An Environmental Impact Statement (EIS) preparation notice was issued for the* Kamoku-Pūkele 138kV Transmission Line project.

1997

- The commenter's characterization of Act 95 is incomplete. Act 95 amended HRS 269-27.6, which requires the PUC to consider and make specific findings on a number of factors, which includes the breadth and depth of public sentiment, when a utility is seeking a determination from the PUC on a transmission line project.

- The Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board passed a resolution against the Kamoku-Pūkele 138kV Transmission Line project.

- HECO disagrees with the commenter's assertion that HECO told the Waimānalo Neighborhood Board that "if they don't support the line, it may go through their neighborhood!" The minutes from the July 14, 1997, meeting that the commenter is referring to do not reflect the assertion made. However, HECO did analyze an alternative of bringing a third 138kV overhead transmission line from Ko'olau Substation to Pūkele Substation, which would have been visible from the Waimānalo area, and this alternative was presented to the Neighborhood Board.

- HECO went to the Kaimuki Neighborhood Board seeking support for the need for the project.

- The Pālolo Neighborhood Board passed a resolution opposing the Kamoku-Pūkele 138kV Transmission Line project on a "no need" basis.

- The Kalihi Valley Neighborhood Board passed a resolution opposing the Kamoku-Pūkele 138kV Transmission Line project.

- HECO disagrees with the commenter's assertion that a "threatening" letter was sent to the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board. In a September 11, 1997 letter to the Neighborhood Board members, HECO's counsel noted the fact that HECO has regulatory and contractual obligations to serve its customers. In addition, HECO asked the Neighborhood Board to rescind its January 1997 resolution and allow HECO to present the facts of the project. HECO had not been afforded the opportunity to present the facts before the resolution was passed.

- HECO disagrees with the commenter's assertion that HECO sent a letter to the Neighborhood Board Commission "challenging the legality" of the Diamond Head/Kapahulu/St. Louis Heights and the Kalihi Valley Neighborhood Boards' resolutions opposing the Kamoku-Pūkele 138kV Transmission Line project. In a September 17, 1997, letter to the Neighborhood Board Commission, HECO summarized

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 7

how the resolutions were passed and asked for clarification whether those resolutions were passed fairly and consistently with the Neighborhood Boards' rules of procedure.

- HECO disagrees with the commenter's assertion that HECO sent a letter to the Neighborhood Board Commission "*protesting*" *resolutions* passed by the Pālolo and Mānoa Neighborhood Boards against the Kamoku-Pūkele 138kV Transmission Line project. In a September 30, 1997 letter to the Neighborhood Board Commission, HECO summarized how the resolutions were passed and asked for clarification whether those resolutions were passed fairly and consistently with the Neighborhood Boards' rules of procedure.

- The Neighborhood Board Commission clarified the Neighborhood Board rules in an October 8, 1997, letter to HECO. The Neighborhood Board Commission further noted that the Neighborhood Boards that passed resolutions against the Kamoku-Pūkele 138kV Transmission Line project appeared to have complied with statutory requirements.

- Life of the Land sent an October 27, 1997, letter to T. Michael May asking for an extension of the EIS public comment period.

- HECO sent an October 23, 1997, letter to Neighborhood Board Commission stating that it appeared the Mānoa Neighborhood Board may have violated the Sunshine Law.

4 *1997 cont'd.:*

• HECO (Kerstan Wong) replies to Life of the Land letter to Michael may saying that only DLNR could extend the comment period

• Neighborhood Commission Board meets to discuss HECO letter and sends formal letter to Corporation Counsel requesting clarification of the Board's role in responding to HECO

• The Environmental Council of OEQC passes Cultural Impact Guidelines to clarify how Environmental Impact Statements should assess cultural impacts

• Life of the Land sends letter to OEQC requesting clarification on extending comment periods for a Draft EIS

• HECO (Kerstan Wong) sends letter to Life of the Land apologizing for the error and saying they cannot extend time limit

• HECO writes letter to Rep. Scott Saiki stating that if HECO extended the comment period, then 'a separate entity may subsequently challenge the 138 kV project by arguing that HECO violated the statutory process."

• OEQC responds that HECO and DLNR could jointly extend the comment period

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 8

** Diamond Head / Kapahulu / St. Louis Heights Neighborhood Board passes a resolution asking for a six month extension on the public comment period for the DEIS*

** Sens. Fukunaga, Ihara, Matsunaga and Taniguchi, along with Reps. Case and Saiki send letter to the Attorney General requesting clarification of HRS §343-5(c) in regard to voluntary expansion of the EIS comment period*

** OEQC publishes a request by HECO to extend the comment period for the Malae Communications Tower (hours after agreeing to this extension. HECO challenges Diamond Head / Kapahulu / St. Louis Heights Neighborhood Board's resolution for six-month extension on the public comment period for the DEIS*

*1998: * HECO issues copyrighted Draft Environmental Impact Statement*

** Office of Environmental Quality Control (OEQC) rejects DEIS since Attorney General rules that public documents cannot be copyrighted*

** HECO re-publishes DEIS without copyright*

** Over 3,000 comments are submitted on DEIS*

** HECO publishes Final Environmental Impact Statement (FEIS)*

1999: DLNR rejects FEIS on substantive (rare species) and procedural (improper responses to reviewers' postcard comments) issues

** HECO publishes Revised DEIS*

** 3,900 people respond to the RDEIS*

- HECO (Kerstan Wong) sent a November 10, 1997, letter to the Life of the Land that said among other things that only the Department of Land and Natural Resources (DLNR) could extend the comment period on the Kamoku-Pūkele 138kV Transmission Line project EIS.
- Although HECO does not have the information necessary to substantiate the interactions between the Neighborhood Board Commission and the Corporation Counsel, HECO is aware that the Neighborhood Board Commission and the Corporation Counsel held a briefing on September 22, 1997 with Neighborhood Board members regarding liability issues.
- The Environmental Council of the Office of Environmental Quality Control (OEQC) adopted Cultural Impact Guidelines to assess cultural impacts.
- Life of the Land sent a November 21, 1997, letter to the OEQC requesting clarification on extending a Draft EIS public comment period.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 9

- HECO (Kerstan Wong) sent a November 24, 1997, letter to Life of the Land apologizing for an error regarding the extension of the public comment period for a Draft EIS. As noted in the letter, HECO received clarification that the law does not provide for any process by which the public comment period could be extended. HECO initially thought that DLNR could extend the public comment period.

- HECO sent a November 25, 1997, letter to Representative Scott Saiki stating that HECO had concern with extending the Draft EIS public comment period because it may provide an opportunity for a legal challenge on the Draft EIS.

- OEQC sent a December 3, 1997, letter to Life of the Land stating that HECO and DLNR could jointly extend the Draft EIS public comment period.

- The Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board passed a resolution on December 11, 1997, that a request be made to appropriate agencies to extend the public comment on the Draft EIS from forty-five days to six months.

- Senators Fukunaga, Ihara, Matsunaga, and Taniguchi, and Representatives Case and Saiki sent a December 18, 1997, letter to the Attorney General requesting clarification of HRS Chapter 343 (c). In a January 30, 1998, letter to the legislators, the Attorney General concluded that extension of the public comment period for a Draft EIS is not authorized under the law and legal challenges are possible if the public comment period is extended.

- The OEQC published a request by HECO to extend the public comment period for the Malae Communications Station Tower Draft EA in the December 23, 1997, OEQC bulletin. However, as noted in a January 26, 1998, letter to Life of the Land, HECO withdrew its request to extend the public comment period on the Malae project but missed the deadline for the December 23, 1997, OEQC bulletin. HECO disagrees with the commenter's assertion that HECO challenged the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board's resolution requesting an extension of the public comment period. HECO simply stated at the Board's December 11, 1997 meeting that it did not intend to extend the public comment period because it may jeopardize the EIS process.

1998

- HECO issued a copyrighted Draft EIS for the Kamoku-Pūkele 138kV Transmission Line project.

- The OEQC requested that the copyright notation from the Kamoku-Pūkele 138kV Transmission Line project Draft EIS be removed from the document. Rather then debate the issue with the Attorney General and delay issuing the much anticipated Draft EIS to the public, HECO removed the copyright notation from the document.

- The Kamoku-Pūkele 138kV Transmission Line project Draft EIS was issued for public comment without the copyright notation.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 10

- Over 3,000 comments were submitted on the Kamoku-Pūkele 138kV Transmission Line project Draft EIS.
- HECO published the Kamoku-Pūkele 138kV Transmission Line project Final EIS.

1999

- DLNR did not accept the Kamoku-Pūkele 138kV Transmission Line project Final EIS.
- HECO published a Revised Draft EIS for public comment.
- Over 3,000 people responded to the Revised Draft EIS.

5 *2000 * HECO publishes RFEIS*

** DLNR accepts RFEIS with 27 page letter outlining their many concerns with this project*

*2001: * 'Ilio'ulaokalani Coalition, Life of the Land, The Outdoor Circle, and Karla Kral, a resident of Palolo file suit in Circuit Court challenging the adequacy of the EIS*

** BLNR holds public hearing on HECO's CDUA in State Capitol Auditorium; community turns out hundreds - testimony runs from 6 PM - 2 AM; four groups ask for Contested Case Hearing - 'Ilio'ulaokalani Coalition, Life of the Land, Malama o Manoa, and The Outdoor Circle*

** 3 parties file papers for Contested Case Hearing - Life of the Land, Malama o Manoa, and The Outdoor Circle*

** Contested Case Hearing takes place over 7 days in November*

*2002: * February - Judge McConnell recommends that BLNR deny HECO's permit*

** June - BLNR denies HECO's Conservation District Use Permit (CDUP)*

*2003: * HECO proposes 17th name for this project - East O'ahu Transmission Project (EOTP) and writes to parties in Contested Case Hearing and the press to say they heard the community*

** HECO stages 5 community meetings in Waipahu, Kane'ohe, Honolulu, Kaimuki*

** HECO hand picks Community Advisory Committee (CAC) and holds 2 meetings*

** Seven groups and individuals file motions to intervene in the EOTP PUC docket*

*2004: * The PUC accepts Life of the Land and Elected Officials as intervenors, allows Malama o Manoa, Palolo Community Council, Ho'olaulima o Palolo, and Kapahulu Neighbors to 'participate' in the docket, and denies entrance to two individuals*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 11

• HECO hires Belt Collins to write their 'voluntary' Environmental Assessment

• Belt Collins then tries to set up private and individual meetings with each party that filed motions to intervene in Docket # 03-0417. All parties refuse individual meetings and propose a public scoping meeting, common when controversial projects are proposed. HECO refuses.

2000

- HECO published a Revised Final EIS for the Kamoku-Pūkele 138kV Transmission Line project.
- DLNR accepted the Revised Final EIS.

2001

- A lawsuit was filed challenging the adequacy of the Revised Final EIS
- The Board of Land and Natural Resources held a public hearing on March 22, 2001, regarding the Conservation District Use Application (CDUA) No. OA-2801, at which many individuals and groups testified and four groups asked for a contested case.
- Three out of the four groups that initially requested a contested case hearing confirmed their requests in writing.
- The contested case hearing occurred in November 2004.

2002

- In February, the hearing officer for the contested case recommended that the Board of Land and Natural Resources deny HECO's CDUA No. OA-2801.
- In June, the Board of Land and Natural Resources denied HECO's CDUA No. OA-2801.

2003

- HECO disagrees with the commenter's assertion that the EOTP is the 17th name for the project. The EOTP was initiated after a 1991 study, entitled "East O'ahu 138kV Requirements," identified potential transmission problems and needs in the East O'ahu transmission system. From that study until 2004, numerous alternatives were identified and evaluated. The initial preferred alternative was the Kamoku-Pūkele 138kV Transmission Line project, which was at times known as the Honolulu City Line. Currently, the preferred alternative, which is the subject of this Draft EA, is the 46kV Phased Project, which is a phased version of the Kamoku 46kV Underground Alternative - Expanded. These names were selected to distinguish between the numerous alternatives that have been identified and evaluated for the EOTP.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 12

- HECO wrote to the parties in the contested case and issued a press release acknowledging that HECO has heard the community.
- HECO held five community meetings in various parts of the island.
- HECO disagrees with the commenter's assertion that the CAC was "hand picked" by HECO. In 1993, the CAC was formed with representatives from five neighborhood boards in the Kamoku-Pūkele 138kV Transmission Line project area. Members of the CAC were solicited through their respective neighborhood boards and appointed by the chairs of each board. In 2003, HECO reconvened the original CAC to solicit input on three alternatives that HECO was evaluating for the EOTP after the CDUA for the Kamoku-Pūkele 138kV Transmission Line project was denied. The membership of the CAC was expanded to include more stakeholders that potentially had an interest in the specific alternatives being evaluated or who had a particular interest in the overall project.
- Two CAC meetings were held in 2003 with the expanded membership.
- As a matter of correction, eight groups and individuals filed motions to intervene on HECO's application before the PUC.

2004

- The PUC allowed Life of the Land and public officials (Senator Fukunaga, Representative Saiki, and Councilwoman Kobayashi) to be intervenors in the EOTP docket, allowed four other groups participant status, and denied participant status to two individuals.
- Belt Collins was hired to draft the EA for the EOTP.
- Belt Collins tried to solicit comments as part of the pre-consultation phase for the EA process from the groups and individuals who requested intervention in HECO's application before the PUC. Only one individual provided input to Belt Collins as shown on Table 6-1 of the Draft EA.

6 *This sad history illustrates how HECO uses their power over the community. They use their political connections, as evidenced by their re-definition of renewable energy in the newly enacted Act 95, to push their fossil fuel agenda. They use these connections and their deep pockets (ours) to cajole, threaten, intimidate, and bully communities who oppose their plans.*

HECO disagrees and finds the commenter's unsubstantiated innuendo objectionable and irrelevant to the EA process. The record shows that HECO's intention with this project is to provide reliable electric service to its customers at a reasonable cost. To that end, HECO continuously consulted with appropriate agencies for guidance and clarification to ensure that laws and rules were followed. In addition, HECO kept communities informed by making

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 13

numerous public presentations, provided information as requested, and met with individuals and groups who wanted to discuss the project. Finally, HECO tried different approaches to solicit input on the project and maintain open dialogue with the community regarding the project.

7 *So after in four decades, numerous Environmental Impact Statements, court cases, resolutions against the project passed by a plethora of Neighborhood Boards, comes EOTP - the 17th name for this proposal!*

As noted earlier in this response letter, the EOTP began in 1991 and has not had 17 names. The use of various names has been to distinguish between the numerous alternatives that have been evaluated for this project.

8 *Section 1.3. – PURPOSE OF THIS DOCUMENT arrogantly states: "HECO's decision to voluntarily prepare this EA was in response to requests made at the McCully/Mo'ili'ili neighborhood board meeting, continued public interest in HECO's Proposed Action, and the history of events leading up to this proposal, as discussed in Section 1.2."*

Life of the Land has never heard of a 'voluntary' EA. What section of law does this refer to? Below we have included the sections of law dealing with EAs and EISs.

§343-1 Findings and purpose. *The legislature finds that the quality of humanity's environment is critical to humanity's well being, that humanity's activities have broad and profound effects upon the interrelations of all components of the environment, and that an environmental review process will integrate the review of environmental concerns with existing planning processes of the State and counties and alert decision makers to significant environmental effects which may result from the implementation of certain actions. The legislature further finds that the process of reviewing environmental effects is desirable because environmental consciousness is enhanced, cooperation and coordination are encouraged, and public participation during the review process benefits all parties involved and society as a whole.*

It is the purpose of this chapter to establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.

Two relevant definitions are included for your edification:

§343-2 Definitions. *As used in this chapter unless the context otherwise requires: "Council" means the environmental council.*

"Environmental assessment" means a written evaluation to determine whether an action may have a significant effect.

Life of the Land find no definition of a 'voluntary' EA anywhere in the Hawai'i Revised Statutes, and would appreciate your providing the guidance that lead to this determination.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 14

If, however, there is no legal standing, why would an environmental consultant with the experience of Belt Collins issue a document that has no legal standing? Since when did complying with the law become 'voluntary'?

Chapter 343 HRS clearly states:

§343-5 Applicability and requirements. *(a) Except as otherwise provided, an environmental assessment* ***shall be required for actions*** *which:*

(1) ***Propose the use of state or county lands*** *or the use of state or county funds...*

(5) ***Propose any use within the Waikiki area of Oahu,*** *the boundaries of which are delineated in the land use ordinance as amended, establishing the "Waikiki Special District"*

Both §343-5 (1) and (5) are triggered by this proposal!

HECO disagrees with your interpretation of the application of Chapter 343 to this project. For the reasons explained below, HECO does not require any discretionary consent from a governmental agency to construct the EOTP. Several additional provisions of Chapter 343 that the commenter omitted provide the basis for HECO's conclusion:

§343-5 Applicability and requirements. (c) Whenever an applicant proposes an action specified by subsection (a) which requires approval of an agency, the agency receiving the request for approval shall prepare an environmental assessment of such proposed action at the earliest practicable time to determine whether an environmental impact statement shall be required. . . . (Emphasis added.)

§343-2 Definitions. "Approval" means a discretionary consent required from an agency prior to actual implementation of an action.

"Discretionary consent" means a consent, sanction, or recommendation from an agency for which judgment and free will may be exercised by the issuing agency, as distinguished from ministerial consent.

HECO is the franchised public utility responsible for the production, purchase, transmission, distribution, and sale of electricity on the island of O'ahu, Hawai'i. HECO's Franchise dates back to 1903; the current HECO Franchise, dated 1925, with amendments dated 1961 and 1974, is pertinent here. The Franchise is a law, first of the Kingdom, then of the Territory, and finally of the State of Hawai'i.

The Franchise expressly provides that "the company shall have the right to place, construct, erect, or otherwise build poles, wires, pipes, and other appurtenances in, on, above, along, or under public rights of way, provided that the proposed installation meet standards prescribed by the PUC governing such installation."

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 15

In view of this Franchise, HECO does not require any discretionary consent from Hawai'i Community Development Authority (HCDA), the PUC or Department of Planning and Permitting (DPP) to construct the project. As noted above, HRS Section 343-2 distinguishes discretionary consent from ministerial consent. The approvals that HECO will obtain for this project are ministerial as HECO has the legal right to use the right of way. For this reason, while HECO may use county land in the sense that it will construct in the public right of way, it has a right do so as a matter of law and does not require discretionary approval to do so.

With respect to the Waikīkī Special District, the Draft EA describes the work that would be performed in the Waikīkī and 'Ena substations. At the Waikīkī Substation, six existing hydraulic operators would be replaced with new motor operators and two 46kV switch interrupters would be installed. All of this work is within the existing substation structure. Similarly with regard to the 'Ena Substation, seven existing hydraulic operators would be replaced with new motor operators and three 46kV switch interrupters would be installed. All of this work is within the existing structure.

The work at these substations does not require any agency approval, discretionary or ministerial. Because it does not require a discretionary approval, the work does not trigger Chapter 343. Even if it did, this limited activity falls within two of the exempt classes of action identified in HAR Section 11-200-8:

1. Operations, repairs, or maintenance of existing structures, facilities, equipment, or topographical features, involving negligible or no expansion or change of use beyond that previously existing; [and]

2. Replacement or construction of existing structures and facilities where the new structure will be located generally on the same site and have substantially the same purpose, capacity, density, height, and dimensions as the structure replaced.

Based on the foregoing, we conclude that Chapter 343 is not triggered by this project. While the power lines will be placed in a county roadway, HECO has a franchise to construct in the public right of way and does not need a discretionary consent to do so. While there is work within two substations in Waikīkī, that work does not require a discretionary approval and is so minor that it comes within the exemptions set forth in the Council's rules.

Even though HECO does not believe that an EA is required, it nonetheless concluded that the EA process would afford the public an opportunity to review and comment on this project.[1] For this reason, the EA is voluntary. The document refers to the voluntary nature of this EA only twice: At page 1-6 of the report, "HECO's decision to voluntarily prepare this EA was in response to requests made at the McCully/Mō'ili'ili neighborhood board..." and at page 1 of Appendix A, "This request was made to HECO by the City agency during the course of a consultation meeting for the voluntary EA being prepared for the project." At OEQC's

[1] Rather than developing a new process to provide the public an opportunity to review and comment on the EOTP, HECO chose to track the Chapter 343 process, which provides a detailed structure that is generally familiar to the public, regulatory agencies and regulated entities.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 16

request, without waiving the analysis provided in this response, we will delete the reference to voluntary in both places.

9 *Another issue for Life of the Land is that an EA is presented when the applicant has a reasonable expectation of receiving a FONSI (finding of no significant impact). Does HECO actually believe that this cobbled together approach will have no impact? Ask the Board of Water Supply! They found plenty of iwi kupuna along their Kalakaua Avenue project. So did Wal-Mart, and the state even admitted that the burials were not confined solely to the inland Wal-Mart site and that some might even be found in roadways. The October 7, 2004 Honolulu Advertiser had a story in the Hawai'i Section, page B1 entitled, "Remains found at Waikiki Site," another inland site.*

HECO believes that the information in its EA for the EOTP supports issuance of a Finding of No Significant Impact (FONSI). Pursuant to HAR 11-200-9, the PUC, which is the approving agency for this project, will issue a negative declaration determination or an EIS preparation notice.

10 *Why does HECO believe that their project will have no cultural impacts in light of these recent discoveries? The cultural analysis in this flawed document is completely inadequate and Life of the Land believes that an Environmental Impact Statement must be prepared that adequately analyzes the cultural impacts of this proposal.*

HECO disagrees with the commenter's characterization of the cultural analysis in the Draft EA.

Whenever excavations occur in Hawai'i, there is the possibility of encountering human remains. However, some areas are more likely to contain human remains than others. For example, coastal sand dune areas have a much higher likelihood of containing human remains than upland plateau areas. The archaeological and cultural impact assessments that were conducted as part of the EA process evaluated the different areas of the project and rated their likelihood of containing cultural resources including human remains. The Cultural Impact Analysis was prepared following the Guidelines for Assessing Cultural Impacts (State Office of Environmental Quality Control, June 2004) and the procedures in Act 50, approved by the Governor on April 26, 2000. The Archaeological Assessment was prepared to determine the potential for archeological resources to be located within the proposed project areas. As a result of the findings in the Archaeological Assessment, HECO is developing plans so that if human remains are encountered during construction, they are protected and treated appropriately as specified by State laws and rules.

11 *After speaking with many residents along the proposed route, Life of the Land assets that the health impacts of this project have been understated and inadequately assessed. The affected community has many retired and elderly residents who were told that the proposed line would go down the middle of the street, away from their homes. They were then subsequently told that the line would be on the sidewalk, a mere 17 feet from some residences. This is a*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 17

cause of great worry and concern to the area residents and Life of the Land does not believe that their concerns have been sincerely analyzed.

From the context of the commenter's use of the phrase "health impacts" we interpret the comment to mean health effects of electric and magnetic fields (EMF). Section 4.13.2.5 of the Draft EA responds to public concern regarding possible health risks from residential and occupational exposure to low-strength, low-frequency EMF and acknowledges that "Public concern regarding possible health risks ... has generated considerable debate among scientists and public officials." (Draft EA at p. 4-87.) The Draft EA also acknowledges that although epidemiological studies have reported positive associations between magnetic fields and human health effects, the number of well-designed studies supporting this association are not sufficient in themselves to conclude that the association is causal. Other explanations, such as systematic bias, have not been ruled out. Mechanistic and animal toxicology studies have failed to demonstrate any consistent pattern of biological effect, including increased cancers in animals. This lack of connection between human data (epidemiology) and the experimental data (mechanistic and animal) weakens the belief that this association is actually due to EMF.

The EA does not rely on HECO's own conclusions regarding health effects of EMF but instead summarizes evaluations of EMF research by national and international scientific organizations including the National Institute of Environmental Health Sciences (NIEHS), the National Academy of Sciences National Research Center (NAS/NRC), the International Agency for Research on Cancer (IARC), the International Commission on Nonionizing Radiation Protection (ICNIRP), the Health Council of the Netherlands (HCN), and the National Radiological Protection Board of Great Britain (NRPB), which all agree that there is little evidence that EMF is associated with adverse health effects, including most forms of adult and childhood cancer, heart disease, Alzheimer's disease, depression, and reproductive effects. However, all of the assessments concluded that epidemiology studies in total suggest a possible association between magnetic fields at higher exposure levels (annual average greater than 4mG) and childhood leukemia. All agree that the experimental laboratory data do not support a causal link between EMF and any adverse health effect, including leukemia, and have not concluded that EMF is, in fact, the cause of any disease. These organizations have not recommended exposure limits or required measures to reduce exposures since they have not concluded that a causal relationship between EMF and adverse health effects exists.

In Hawai'i, general transmission line safety standards are established by the State of Hawai'i PUC in General Order Nos. 6 (Rules for Overhead Electric Line Construction) and 10 (Rules for Construction of Underground Electric and Communications Systems). On issues not covered by General Orders 6 and 10, the National Electrical Safety Code may be used as guidance. These rules primarily address the electrical safety of the public but do not specifically address EMF. Although a few States within the United States have set non health-related standards for levels of EMF, neither the federal government nor any of the State governments have established health-related standards specifically for 60-hertz EMF.

Although there are no Hawai'i health-related standards for 60-hertz EMF, HECO follows a policy of "Prudent Avoidance" in its transmission facility planning. The concept of Prudent

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 18

Avoidance was adopted by the State of Hawai'i Department of Health in their policy position paper. Prudent Avoidance was subsequently explained by the Hawai'i PUC in its Decision and Order No. 13201 in Docket No. 7256 as follows:

> Prudent avoidance is an approach to making decisions about risks. This decision-making process is based on judgment and values, can be applied to groups and individuals, and can be considered for all aspects of our lives, not just EMFs. Prudent avoidance applied to EMFs suggests adopting measures to avoid EMF exposures when it is reasonable, practical, relatively inexpensive and simple to do so. This position or course of action can be taken even if the risks are uncertain and even if safety issues are unresolved.

HECO has implemented prudent avoidance in planning the EOTP as described in Section 4.13.4 of the Draft EA. Reduction of EMF levels can be achieved for multiple circuit power lines with similar loads by optimizing the cable placement and phasing arrangement within the cable ducts. Enertech studied a variety of cable placements and phasing arrangements for the 46kV circuit cable sections to determine the optimum phase configuration for EMF reduction. Enertech's calculated results for multiple circuit 46kV cables show that use of optimum phase placement in the cable ducts can reduce EMF levels by a maximum amount of 87 percent when all circuits have identical loads. HECO has applied prudent avoidance in its engineering design for ductlines with multiple circuits by optimizing the cable placement and phasing arrangement within the cable ducts.

12 *The residents have told us that they are worried about the ingress and egress of emergency vehicles should the project move forward since several of their neighbors had medical emergencies in the last several months. How will HECO deal with emergency vehicles and personal vehicles needed to address medical emergencies?*

As with all HECO trenching projects, travel lanes are continuously maintained for the duration of the project. For wider, arterial roads, this is accomplished with various traffic control devices, such as lane closures, or contraflow lanes. For narrower, residential streets, where lane closures or contraflow may not be available to permit through traffic, an access lane along the entire work zone will be maintained for the duration of the work. This access lane will accommodate all emergency response vehicles. Access across any open trench will be facilitated with steel plates. Such steel plates can be placed immediately, thereby facilitating a timely response by emergency personnel. Also, HECO's Construction Manager will contact all residents along the project route. The initial contact will be made in person prior to commencement of the work. The scope of work and schedule will be explained. During the initial contact, all residents are provided with a 24 hour per day/7 day per week telephone number for all complaints and questions. Typically, the Construction Manager maintains a dialogue with the residents for the duration of the work. Additionally, this initial contact and dialogue seek to identify any special needs or situations, such as residents with medical conditions, those who require Handi-Van access, doctor's appointments, etc. The work and/or schedule will incorporate these considerations.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 19

13 *What liability will HECO bear if an ambulance or other medical personnel cannot get through during construction and a person dies?*

HECO does not anticipate that the commenter's scenario would occur since HECO maintains access to the entire work zone during the project so that construction equipment and, if necessary, emergency responders have entry to and egress from the area. In addition, special-duty Honolulu Police Department (HPD) Officers are employed throughout the project and are posted at each work zone.

If such an event were to occur, HECO's responsibility for any loss it caused would be determined based on the facts and circumstances of the particular incident. HECO maintains liability insurance and requires its contractors to maintain liability insurance.

14 *We understanding that the loss of life can never be mitigated, but how will HECO compensate the family directly affected?*

HECO does not anticipate that the commenter's scenario would occur. If such an event were to occur, HECO's responsibility for any loss it caused would be determined based on the facts and circumstances of the particular incident. HECO maintains liability insurance and requires its contractors to maintain liability insurance.

15 *Some of these residents care for their grandchildren and are very concerned about the potential health impacts of a line close to their home where their young grandchildren sleep. What epidemiological studies will HECO conduct before, during and after construction?*

HECO interprets the question to refer to health effects from EMF from power lines. This issue is discussed at length in Section 4.13 of the Draft EA. Existing epidemiological literature does not support the allegation that exposure to EMF causes injury to adults or children. The epidemiological studies involve a large cohort and significant areas of study. HECO does not plan to conduct additional epidemiological studies before, during, or after construction.

16 *The residents have been told that the EMF exposure will be similar to that of a household appliance, but they know that the line will be constantly energized, so that is not the same as the intermittent use of a household appliance. Does HECO have a doctor on staff to handle these concerns? If so, who is it? Please provide the name and contact information for this doctor. If HECO does not have a doctor on staff to handle these concerns, why not?*

As described in the *Magnetic Field Evaluation* prepared by Enertech Consultants of Santa Clara, Inc. and provided in the Draft EA as Appendix D1, the Illinois Institute of Technology Research measured magnetic field strengths of a large number of common household appliances for the U.S. Navy. Appliance measurements were also conducted by Enertech Consultants for the Electric Power Research Institutes or EPRI. Typical magnetic field values for some appliances are presented in Table 1 on page 4 of the Magnetic Field Evaluation, with acknowledgement that "[t]hese everyday sources have variable temporal and spatial

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 20

characteristics." The EA does not compare EMF exposure levels from the proposed power lines to the levels from household appliances.

The EA does conclude, in Section 4.13.3, that the difference in projected magnetic field levels between the existing and proposed power line configurations under 2009 forecasted loading can decrease slightly, remain unchanged, or increase depending upon the project segment. If the project is implemented, the proposed underground circuits would have little effect on EMF levels at nearby institutions and EMF levels will be in the range of common everyday levels. The proposed substations, manholes, and risers of the EOTP will be similar to existing facilities and have very low EMF levels at a relatively short distance away. There are a wide variety of EMF levels and sources encountered in everyday life that are comparable to EMF due to electric power facilities. For this reason, HECO does not have a doctor on staff to handle these concerns.

As indicated above, HECO follows a policy of "Prudent Avoidance" in its transmission facility planning, a concept adopted by both the State of Hawai'i Department of Health and the Hawai'i PUC.

17 *This inadequate analysis of the community's health concerns lead Life of the Land to assert that an Environmental Impact Statement must be prepared to adequately address these serious concerns.*

The commenter's conclusion erroneously assumes that EMF substantially affects public health, even though national and international scientific organizations including NIEHS, NAS/NRC, IARC, ICNIRP, HCN, and NRPB have all reached different conclusions regarding public health effects of EMF. HECO believes that the concerns regarding public health effects of EMF have been adequately identified and addressed in the EA and that the changes to magnetic field levels resulting from this project will not impact public health.

18 *The intent of Chapter 343's 'Alternatives' means exactly that ...what* alternatives *to building a power line are available, i.e. technology (renewable energy), conservation, energy efficiency, etc. Routing is NOT an alternative.*

HECO disagrees with the commenter's assertion that routing is not an alternative. Indeed, routing is an alternative for discussion in an EA. The implementing regulations for HRS Chapter 343 require that an EA include, among other things, "[i]dentification and summary of impacts and alternatives considered." 11 HAR 200-10(6). In its guidance for the environmental review process, the OEQC specifically identifies "different sites" as an example of a type of alternative to be discussed in a draft EA. See "A Guidebook for the State Environmental Review Process" at p. 17 (June 2004). Given the nature of the proposed action, alternative routes qualify as different sites. Furthermore, contrary to the implications of the comment above, HECO did not only evaluate alternative routes. In addition to routing alternatives, HECO considered other alternatives to the EOTP as described in Section 3.2.3.5. For example generation technologies such as renewable resources, distributed generation (DG) at HECO substations, and combined heat and power (CHP) were considered along with

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 21

newer transmission technologies such as static and dynamic line re-rating, re-tensioning and re-conductoring. HECO also hired an independent third-party consultant to review the feasibility of performing live line maintenance on the transmission lines. Various factors were considered when reviewing the options, which include cost, land requirements, permitting requirements and the operation and maintenance costs for generating units compared to transmission facilities. These options were not feasible for different reasons, which included higher cost compared to EOTP, inadequate land space, and inability for the option to address the transmission overloads and reliability concerns.

19 *Under the "Alternatives" section of the law is the 'No Build' alternative, which must be fully explored. Life of the Land is insulted by the inadequate "Alternatives" section of this flawed document. The law required an honest review of all feasible alternatives, including the 'No Build' alternative.*

It is not clear what section of the law the commenter is referring to. HRS Chapter 343 does not discuss "alternatives" or the "no build" alternative. Under the implementing rules, HAR 11-200, an EA is required to contain "identification and summary of impacts and alternatives considered," which was accomplished in the Draft EA for the EOTP 46kV Phased Project. No other requirements for alternatives or "no build" alternative are included in the rules for an EA. "Rigorous exploration and objective evaluation" of alternative actions, including "no action," is stated as part of HAR 11-200, but applies only to EISs. In any event, the "no action" alternative is described throughout the draft EA, including Chapter 4, Affected Environment and Environmental Consequences.

20 *In HECO's PUC filing asking for the right to provide CHP, they admit that CHP is more reliable. Why then do they waste ratepayer money with more dinosaur projects?*

HECO disagrees with the commenter's characterization of the EOTP. Section 3.2.3.5 of the Draft EA and Exhibit 6 of the EOTP Application explained how CHP was considered for mitigating the Ko'olau/Pūkele Overload Situation. The conclusion of the analysis was that the current CHP forecast is inadequate to mitigate the Ko'olau/Pūkele Overload Situation. HECO recognizes the positive impacts that CHP can have on the transmission and distribution system; however, CHP installations are driven by customer choice and the customer will generally decide to proceed with a CHP project based on the customer's need and assessment of its cost-effectiveness. For instance a developer opening a new business may consider CHP or an existing business may consider CHP when it is time to replace large systems such as the air conditioners, which may be at the end of their useful lives. Therefore the megawatts (MW) that would be provided by CHP and the timing of CHP installations do not coincide with the need to resolve overload conditions here.

21 *Life of the Land believes that a full Environmental Impact Statement must be done because of this inadequate analysis.*

HECO prepared the Draft EA to inform decision makers and the public of environmental effects of the Proposed Action. The process and the analyses were performed following the

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 22

procedures set forth in HRS Chapter 343 and HAR 11-200, and findings, such as potential impacts, were appropriately disclosed. The determination as to whether the Proposed Action warrants an anticipated negative declaration or an EIS preparation notice is the responsibility of the approving agency, in this case, the PUC. However, the commenter's opinion is noted.

22 *When they staged their dog and pony shows last summer, they led off with a meeting in Waipahu! A location in the communities directly affected by this proposal was not even considered by HECO. The area legislators had to push HECO to hold a meeting in Kaimuki. Is this their 'good neighbor' policy?*

At these community meetings, there was overwhelming opposition to this proposal. Their only real ally was at the Kane'ohe meeting, by one of their retirees who has been their most loyal cheerleader. Even their hand-picked Community Advisory Committee did not support the option they are putting forth now. The business members of the CAC, including the Chamber of Commerce, the Hawai'i Hotel Association, the Waikiki Improvement Association, and the National Association of Industrial Owners of Property, all said that if the project was determined to be needed, they supported the cheapest option. That is not the option HECO chose. This confirms that HECO had already decided what they were going to do and the public meetings were just window dressing.

HECO disagrees with the commenter's characterization of the public participation process HECO implemented for public input. HECO acknowledges that as part of the 2003 public input process, a community meeting was held in Waipahu, which is not part of the project area. However, while the project is not located in Leeward or Central O'ahu, people from these communities still have a stake in this project. Therefore, HECO wanted to solicit input from people outside of the project area.

HECO also acknowledges that at the request of project area legislators, HECO held an additional community meeting at Kaimuki High School, which was more central to the project area.

HECO finds particularly objectionable commenter's characterization of a HECO retiree as a "loyal cheerleader" in a manner that is meant to demean his opinion. The retiree's right to express and opinion are no less than those of any other member of the public. To demean any person for expressing an opinion in a public meeting is contrary to the public participation process.

Additionally, HECO acknowledges that numerous individuals expressed opposition or concern with the project at the 2003 community meetings. As noted earlier in this response letter, HECO disagrees with the characterization that the CAC was hand-picked.

HECO also disagrees with the commenter's assertion "that HECO already decided what they were going to do and the public meetings were just window dressing." HECO earnestly wanted public input on the three alternatives presented in 2003 before selecting a preferred alternative. Public sentiment was one of the factors that HECO considered in selecting a

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 23

preferred alternative, along with other factors, including an alternative's effectiveness in addressing the transmission problems, timeliness for implementation, construction and other impacts, and cost. Balancing all the issues, HECO selected the Kamoku 46kV Underground Alternative - Expanded.

23 *HECO's justification for this project has been a shell game.... 'it's about reliability', 'no, this line wouldn't make our system more reliable', 'yes it is about reliability.' Their reasons for doing this have constantly changed. Why?*

HECO disagrees with the commenter's characterization of the project. As previously noted in this response letter, the purpose of the project is to resolve identified overload and reliability concerns in HECO's 138kV transmission system in eastern O'ahu.

24 *At the Kaimuki public meeting, their justification was finally revealed. This project is needed so they can recover the $17 million lost from their Wa'ahila Ridge debacle. They admitted that these costs were embedded in the planning and permitting costs for this proposal. Why should ratepayers bear the costs for their bad business decisions? This is immoral. This cost should be borne by HECO's shareholders.*

HECO disagrees with the commenter's characterization that the justification for the project is to recover incurred project costs. As noted earlier in this response letter, the purpose of the Proposed Action is to address four problems relating to the 138kV transmission system in the East O'ahu area. However, it is noted that the incurred project costs are related to planning and permitting.

HECO disagrees with commenter's inference that the Kamoku-Pūkele 138kV Transmission Line project was a bad business decision. Various studies and expert opinions conclude that this alternative was the best option to address the transmission problems. In addition, there were no permitting or technical constraints precluding the consideration of Wa'ahila Ridge for an overhead transmission line. Therefore, HECO pursued the Conversation District Use Permit for this alternative by complying with the pertinent laws. Through this process, numerous alternatives were identified and evaluated including the consideration for 46kV options. The continuation of the planning process after the 138kV alternative (over Wa'ahila Ridge) was eliminated as a viable option by the Board of Land and Natural Resources (BLNR) action, led to a reevaluation of the previous 46kV options. This reevaluation eventually resulted in the identification of the Proposed Action.

25 *With the price of oil hovering at approximately $50 a barrel and HECO's infrastructure aging, Hawai'i is perfectly poised to transition to* real *renewable energy, thus diversifying our portfolio of alternatives. Life of the Land implores the PUC to look at this project in the context of Hawai'i today.*

In 1995, HECO contracted a consultant, CH2M HILL, to evaluate alternative non-transmission options (the "1995 CH2M HILL Alternatives Study."). With input from HECO and its CAC, the CH2M HILL Study evaluated options such as wind, solar and fuel cells.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 24

CH2M HILL identified various wind sites that were closest to the Ko'olau/Pūkele service area, which included Tantalus, Waimānalo and Koko Head areas. The study noted that approximately 3 acres were needed per 500 kW wind turbine. Based on this evaluation, *approximately 1,200 acres of land and over 400 wind turbines would be required to address* the Pūkele Substation Reliability Concern and resolve the Ko'olau/Pūkele Overload Situation. Additional transmission facilities would also be required to transport the power into the Ko'olau/Pūkele area and tie into HECO's grid.

With respect to solar energy, the CH2M HILL Study noted that Hawai'i captures solar energy through the use of solar water heaters and heat pumps. Hawai'i has the highest per capita solar water heating installations in the United States. Large-scale solar production of energy within East O'ahu would require 450 to 700 acres of land per 100-MW plant, which would severely impact vegetation on the island. Corrosion from the high salt content in the air was another issue cited.

Fuel cells were discussed in the CH2M HILL Study, and were described as a developing technology still in the "demonstration stage." There are other obstacles to overcome such as the prevention of accidental spills of the electrolyte medium used for the chemical reactions that are used to generate electricity.

The electric utilities, which include HECO, Maui Electric Company, Inc. (MECO) and Hawai'i Electric Light Company, Inc. (HELCO), currently support renewable sources in various ways, including their solar water heating and heat pump programs and their purchase power contracts with nonutility generators using renewable sources (e.g., refuse-fired, geothermal, hydroelectric and wind turbine generating systems). The electric utilities continue to initiate and support many renewable energy research and development projects to help develop these technologies (e.g., photovoltaic projects). They are also conducting integrated resource planning (IRP) to evaluate the use of more renewables and, in December 2002, HECO formed a subsidiary, Renewable Hawai'i, Inc., to invest in renewable energy projects. About 6.8% of electricity sales for 2002 were from renewable resources (as defined under the renewable portfolio standard law).

26 *Of course, to HECO, oil still costs on $20-$25 a barrel since they pass all costs over that onto the backs of their ratepayers in the Energy Cost Adjustment Clause. This is also why they have no incentive to get off oil – they don't feel our pain ...they just reap the benefits.*

HECO disagrees with the characterization about HECO's intentions or incentives regarding the use of oil. HECO is concerned about the cost of oil and the recovery of its oil-related expenses from its customers. HECO remains committed to evaluate and look for opportunities to lessen O'ahu's reliance on fossil-fuel generating units through its IRP process and renewable energy initiatives and programs.

27 *This ill-conceived project has been 'alive' in the HECO boardroom since the 60's, when it was first discussed.*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 25

HECO disagrees with the commenter's assertion that the project is "ill-conceived" and has been "alive" since the 1960's. As stated earlier in this response letter, the purpose of the Proposed Action is to address four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation. These problems were first identified in 1991 and since that time, HECO has been trying to proactively address these problems.

28 *As a regulated monopoly (established to eliminate any competition from entering 'their' marketplace), HECO can recover their expenditures for projects they build if the PUC agrees now that it is 'reasonable' and 'in the public interest,' and then in the next rate case if its 'used and useful'. In this economy, that is an enviably good deal - the more they spend, the more they make.*

HECO disagrees with the commenter's characterization. HECO has franchise rights for the island of O'ahu, and under its franchise, HECO has an obligation "to manufacture, sell, furnish and supply electric light, electric current, or electric power on the island of O'ahu." However, it is not accurate to say that HECO is a monopoly "established to eliminate any competition from entering [its] marketplace." HECO has power purchase contracts with three independent power producers, i.e., Kalaeloa Partners, L.P., AES Hawai'i, Inc., and HPOWER, that produce and sell firm power to HECO.

It is also not accurate to say that the more HECO spends, the more it makes. PUC approval of a project pursuant to the PUC's General Order No. 7, paragraph 2.3(g)(2), does not guarantee inclusion of all project costs in HECO's rate base. HECO has the responsibility to prudently manage the project. Capital expenditures that are shown by reliable, probative and substantial evidence to have been imprudently incurred may be disallowed by the PUC in a subsequent rate case.

29 *What this policy promotes is more building projects, which has resulted in HECO not being pro-active in their maintenance program. Why should they, maintenance costs them money they can't make a profit on! This is dangerous public policy and continues to work against the public interest.*

HECO disagrees with the commenter's characterization of its maintenance program. Regular maintenance is a necessity as we are an island system without the benefit of interconnections to neighboring utilities. Therefore, HECO takes its responsibility for maintenance very seriously.

HECO regularly maintains its generation and substation plants and facilities in accordance with the PUC's General Order No. 7 and accepted good engineering practice in the utility industry. In 2003, HECO spent over $24,000,000 on maintenance of its generation facilities, over $10,000,000 on maintenance of transmission and distribution facilities, and nearly $3,800,000 on maintenance of substation facilities, as filed in the Federal Energy Regulatory

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 26

Commission (FERC) Form No. 1 Annual Report of Major Electric Utilities, Licensees and Others.

HECO utilizes standard industry maintenance best practices such as preventive maintenance (PM) and predictive maintenance (PDM), and applies various state-of-the-art instruments, tools and analysis to maintain equipment. The result is a generation reliability trend that continues to outperform similar units on the mainland. A discussion on the application of these maintenance practices is provided below.

PM is a time driven maintenance practice. Daily examples of PM include lubrication checks on rotating pumps and motors, periodic greasing of traveling screen chains and soot blower drives, etc. Steam generating unit overhauls are also time driven and planned years in advance. The timing of overhauls is usually driven by the need to periodically perform a boiler internal inspection, and may last four to twelve or more weeks depending on the scope of the overhaul. Combustion turbine overhauls are also time driven and primarily based on projected service hours. Combustion turbine overhaul duration may last two to eight or more weeks depending on the scope of work. The scope of work during an overhaul normally includes work that has been back-logged pending the shut down, capital projects, Original Equipment Manufacture (OEM)/Industry recommendations, superheater and high-energy piping life assessment studies, and long lead-time items identified for correction at earlier outages.

PDM is a condition-based maintenance technique where routine monitoring and analysis of specific operating parameters are used to determine when maintenance should be performed. Examples of operating parameters that are routinely monitored include rotating equipment vibration analysis, lubrication oil chemical analysis, ultrasonic analysis, on-line infrared thermography surveys, pump performance tests, etc. State-of-the-art instruments and software are used to monitor and track the condition of critical pieces of equipment that may result in unit forced outages and/or deratings.

Maintenance practices on substation equipment are similar. Intelligent devices monitor the status of substation equipment on a continuous basis. In addition, trained HECO personnel inspect equipment to identify problems on a daily basis. Each quarter, transmission lines are inspected by ground patrols and/or by helicopter. HECO also employs infrared and corona imaging as part of our transmission inspection process. HECO uses independent contractors to test and treat all wood, steel, concrete and fiberglass transmission structures on a three to five year inspection cycle. Substation equipment is taken out of service for routine maintenance every two to four years.

30 *The already over-burdened ratepayers of O'ahu have consistently asked HECO to maintain their infrastructure, while exploring innovative ways to provide electricity that will have fewer impacts.*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 27

They have spent over $17 million just in the last 10 years to ram this project through communities that have united and resisted. WE ARE STILL UNITED. WE ARE STILL RESISTING. AND WE WILL CONTINUE TO DO SO.

The comment is noted, but HECO disagrees with the commenter's characterization of HECO's efforts to address the overload situations and reliability concerns identified in the Draft EA and earlier in this response letter.

31 *After their embarrassing defeat in the Wa'ahila Ridge Contested Case Hearing they said they 'heard the community' and then went on to ask which route would you like? They heard us? Then which part of 'NO" didn't they understand. NO NEED. That was the mantra of the communities working to stop this incredible waste of Hawai'i's resources - economic, cultural, environmental, social, etc. They come back with a routing alternative?*

HECO acknowledges that some in the community did not support the 138kV alternative utilizing Wa'ahila Ridge and/or did not support the need for the 138kV line. Others in the community recognized the need for the project. HECO considered public input, and public sentiment was one of several factors considered in selecting an alternative for the project.

32 *At the PUC hearing for this project an engineer testified that HECO could replace their current wiring with copper wiring that would be more efficient and forestall the need to build anything more.*

HECO interprets the reference to "the PUC hearing for this project," to mean the public hearing that was held on September 1, 2004, at the State Capitol Auditorium. The purpose of the EOTP is to address several transmission problems that can affect system reliability. Copper conductors have a higher conductivity and therefore have a higher ampacity, i.e., current carrying limit. All other things being equal, reconductoring, i.e., replacing existing wires (conductors) with higher capacity conductors, will only address the line overload problem, but will not increase the reliability of the Pūkele or Downtown Substations. But as noted below, for several reasons, reconductoring is not a viable alternative to resolve the Ko'olau/Pūkele Overload Situation.

As discussed in Chapter 3 of the Draft EA, the reconductoring option would require installation of new conductors to replace the existing aluminum conductors on the three 138kV transmission lines serving the Ko'olau Substation. The weight and ultimate tension of copper conductor is approximately twice that of aluminum conductor. This means that every structure would need to either be replaced or retrofited to carry the larger conductor loads. The process would be time consuming, difficult, and expensive, particularly given the logistics of stringing new conductors in the mountainous areas traversed by the lines. The work would necessitate prolonged outages of the lines, which would increase the possibility of an overload occurring if a second line serving the Ko'olau Substation becomes unavailable for any reason. Accordingly, this option was not considered viable to address the Ko'olau/Pūkele Overload Situation and is not considered further in this EA.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 28

33 *The community has asked time and time again for HECO to maintain their lines, rather than to continue expanding with old technology. Why has HECO not considered these upgrades? What upgrade in technology was considered to meet this perceived need?*

HECO disagrees with commenter's implication that HECO does not maintain its lines. In 2003, HECO spent over $10,000,000 on maintenance of transmission and distribution facilities as filed in the FERC Form No. 1 Annual Report of Major Electric Utilities, Licensees and Others.

HECO considered reconductoring with experimental high temperature, low sag (HTLS) conductors, which are relatively smaller-sized cables with the ability to handle higher heating conditions and, therefore, a higher current flow. HTLS conductors could increase the current carrying capacity of a transmission line. Using HTLS conductors may not require as many pole or tower replacements or reinforcements compared to reconductoring with a larger sized wire. However, HTLS conductors are still being evaluated by HECO. Indeed, HECO is conducting some test trials to determine their long-term service lives and effects on system reliability. HTLS conductors also cost 12-15 times more than conventional conductors, such as the 556.5 MCM aluminum conductors. Accordingly, HECO determined that at this time, reconductoring with HTLS conductors is not a viable alternative for the EOTP.

34 *Is this project a test to see if HECO can continue connecting all these manini segments to ensure a continuous revenue stream?*

No, as noted earlier in this response letter, the purpose of the Proposed Action is to address two line overload situations and two substation reliability concerns relating to the 138kV transmission system in the East O'ahu area.

35 *Who recommended this project now and who rejected this option in the Kamoku-Pukele EIS?*

As mentioned earlier in this response letter, the Proposed Action was identified after reevaluating 46kV options considered in the Kamoku-Pukele 138kV Transmission Line project EIS.

36 *"Kamoku-Pukele 46-kV Network Alternative. This alternative requires the configuration of the existing 46-kV subtransmission system to provide a transmission path between the Kamoku and Pukele Substations. ... a technical analysis of this alternative suggests that its implementation would greatly destabilize the power quality within the area and increase the number of transformer short circuits, voltage drops, and transmission line losses." **Hawaiian Electric Company: Final Revised EIS. See: East Oahu Transmission Project Exhibit 4 (2004)***

1. Does HECO believe that a 46-kV Network would destabilize (a) the power quality; (b) increase the number of transformer short circuits; (c) increase the number of voltage drops; and/or (d) increase the amount of transmission line losses within East O'ahu? If the above answers are generally in the affirmative, why is HECO pursuing this option? If the above

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 29

answers are generally not in the affirmative then is HECO continuing to rely on the documents that said they are? If HECO changed their opinion, what new documents led HECO to change its mind? Please elaborate and give a full answer to these questions.

The commenter appears to assume that the 46kV Network Alternative is the same as the EOTP 46kV Proposed Action. It is not. The EOTP 46kV Proposed Action, however, grew out of a re-evaluation of the 46kV Network Alternative once the BLNR turned down HECO's application for a CDUP for the Kamoku-Pūkele 138kV Transmission Project. The challenge facing HECO transmission planners and designers was to determine whether there was an approach that utilized the 46kV subtransmission system but avoided the referenced concerns with the 46kV Network Alternative.

The EOTP is a radial connection with interconnections between Kamoku or Archer Substation, not a network. Unlike a network, there is always an open point at the end of each 46kV feeder, which makes it a radial configuration. For example, Pūkele 7 will continue to be served by the Pūkele Substation after Phase 1 and Phase 2 of the EOTP is installed. With Phase 2 of EOTP, the Archer 45 circuit will be connected with the Pūkele 7 circuit; however, during normal operation, a switch at Archer Substation will remain in the open position. With the EOTP, if the Pūkele Substation should lose both 138kV transmission lines feeding the substation, the switch at Archer will close, energizing the Archer 45 circuit and the switch at the Pūkele Substation for the Pūkele 2 circuit will open, creating a radial connection, which would be served from the Archer Substation.

In contrast, the 46kV network evaluated as part of the August 1994 Kamoku-Pūkele 46kV Alternatives Study and reviewed by CH2M Hill in the June 1995 Kamoku-Pūkele 46kV Transmission Line Alternative Study considered operating the Pūkele Substation in parallel with the Kamoku Substation, providing a continuous link between the Northern 138kV Transmission Corridor and the Southern 138kV Transmission Corridor utilizing the 46kV system. By doing this, the lines between the Pūkele Substation and Kamoku Substation would be connected all the time forming a network (i.e. Pūkele 7 would be served from Kamoku or Pūkele Substation depending on the flow from the 138kV system). This 46kV network also would require capacity to be installed at Pūkele and Kamoku Substations because power would need to be transformed from 46kV up to 138kV in order for the 46kV network to perform like a 138kV line between Pūkele and Kamoku Substations. Therefore the concerns listed with short circuits, voltage drops and losses are still valid with a 46kV network.

In the 46kV Network Alternative, besides the additional 46kV capacity that would have been required at Pūkele and Kamoku Substations, another 138kV line from Hālawa-School would have been required in order to address the accelerated Downtown Overload Situation caused by installing the 46kV network. The EOTP, along with shifting some of the loads from Pi'ikoi Substation, will not accelerate the Downtown Overload Situation in the same manner as the 46kV network would.

37 *2. "This cultural impact analysis has relied on archival sources made up primarily of native and foreign testimonies that were recorded in the mid-1800s." (Appendix C-2: Cultural*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 30

Impact Statement. Section 5, page 33, line 1) Why did HECO rely on testimonies primarily from the pre-electrical era?

In order to identify knowledgeable sources for use in the Cultural Impact Assessment, *meetings with the following agencies and organizations were conducted:* State Historic Preservation Division, Archaeological Program; the State Historic Preservation Division, Burial Program; the Office of Hawaiian Affairs; the Waikīkī Descendents Group; and Van Diamond, representing the O'ahu Burial Council. This consultation was done in accordance with the Hawai'i State OEQC "Guidelines for Assessing Cultural Impacts." There was no attempt to focus on information resources from a "pre-electrical era."

Native and foreign testimonies that were recorded between about 1848 and 1860 for the mahele were used as sources of information about traditional practices. These accounts provide insights into the traditional uses of the area that are not present in more recent accounts. These resources are typically relied upon when performing cultural impact assessments.

38 *3. Did HECO consult with any Native Hawaiian Civic Clubs regarding cultural impacts? If so, which group and when?*

As noted above, meetings with the following agencies and organizations were conducted: State Historic Preservation Division, Archaeological Program; the State Historic Preservation Division, Burial Program; the Office of Hawaiian Affairs; the Waikīkī Descendents Group; and Van Diamond, representing the O'ahu Burial Council. Through this process, no Hawaiian Civic Clubs were identified.

39 *CONCURRENT ACTION: Federal Register: June 14, 2004: The U.S. Army Corps of Engineers and the State of Hawaii Department of Land and Natural Resources will prepare an Environmental Impact Statement (EIS) for the alternatives and potential impacts associated with the Ala Wai Canal Project Feasibility Study. This effort could result in a multi-purpose project being proposed under Section 209 of the Flood Control Act of 1962 (Pub. L. 87-874) and will incorporate both flood hazard reduction and ecosystem restoration components into a single, comprehensive strategy.*

The federal Ala Wai Canal EIS will be completed in 2005 (EOTP EA pages 5-6 through 5-7) HECO will complete Phase 1 of the EOTP in 2007 (including constructing Subtransmission Lines between the Kamoku Substation and the Pūkele Subtransmission Line #4). (EOTP Draft EA ES-1; Figure 2-2, page 2-3) remove and relocate part or all of Pūkele Subtransmission Line #4 between the Kamoku Connection and the Waikīkī Substation in 2007 (EOTP EA pages 5-6 through 5-7), and complete Phase 2 in 2009 (EOTP Draft EA ES-1). The Draft EA notes that the Pūkele Subtransmission Line will be relocated fronting Kai'olu Street. The map, located in another section of the Draft EA, has mislabeled the relevant streets.

For purposes of describing a project considered in the cumulative impacts analysis, Kai'olu Street is used to describe the approximate location of an existing subtransmission line near

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 31

the Ala Wai Canal. However, the maps in the Draft EA incorrectly labeled the streets in this area. Corrections have been made and are reflected in the following figures of the Final EA: Figure 1-1, 3-1, and 3-2; Appendix B, Figure 1-1; Appendix C-1, Figure 2 and Figure 6; Appendix C-2, Figure 2; and Appendix D1, Figure A-1. Thank you for bringing the mislabeling to our attention.

40 *4. The electrical route from the Kamoku Substation to the Waikiki Substation consists of two segments, both of which HECO plans to install in 2007. How come one is analyzed in this EA, while the other is not even included in the EOTP DEA secondary or cumulative impacts section?*

The commenter's statement about the electrical route from the Kamoku Substation to the Waikīkī Substation having two segments both of which would be installed in 2007 is incorrect. Currently, there is an existing 46kV circuit, called Pūkele 4, which provides power to Waikīkī Substation from Pūkele Substation. A portion of the Pūkele 4 circuit passes Kamoku Substation on Date Street. For the Proposed Action, the existing Pūkele 4 circuit will be split into two separate circuits at this location (i.e. where the circuit passes Kamoku Substation on Date Street). Each portion of the existing circuit will be connected to a new 46kV circuit out of Kamoku Substation. This proposed work is described on page 3-4 and Table 3-1 of the Draft EA. All other portions of the Pūkele 4 circuit will remain unchanged, including the section that connects to Waikīkī Substation. Therefore, there will not be two segments between the Kamoku Substation and Waikīkī Substation as the commenter asserts.

For a portion of the existing Pūkele 4 46kV circuit between Kamoku Substation and Waikīkī Substation, the existing portion that currently crosses the Ala Wai Canal will be relocated, possibly in the same time frame as the Proposed Action. This is discussed in Section 5.1.2 Cumulative Impacts section of the Draft EA on pages 5-6 and 5-7.

41 *5. What different voltages did HECO consider in relocating the Pukele Subtransmission Line #4?*

HECO is planning to relocate two existing 46kV circuits, one of which is the Pūkele Subtransmission Line #4, that cross the Ala Wai Canal in the area fronting Kai'olu Street by year-end 2007 to accommodate anticipated construction of the DLNR/U.S. Army Corps of Engineers Ala Wai Canal Watershed Improvement Project. The relocation of these two circuits is not part of the Proposed Action and is therefore not evaluated in this EA. HECO did not consider different voltages in relocating the Pūkele Subtransmission Line #4 because there is no infrastructure for other voltages in the area.

42 *6. What different technologies did HECO consider in relocating the Pukele Subtransmission Line #4?*

The relocation of Pūkele Subtransmission Line #4 is not part of the Proposed Action and is therefore not evaluated in this EA. HECO is considering various construction technologies to address the canal crossing. Specifically, horizontal directional drilling, micro tunneling and

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 32

the jack and bore installation methods are being analyzed. Both Ethylene Propylene Rubber and Cross-Linked Polyethylene cables are being evaluated.

43 *7. What would be the benefits and costs associated with simultaneously replacing the Pukele Subtransmission Line #4 with two or more subtransmission lines?*

The relocation of Pūkele Subtransmission Line #4 is not part of the Proposed Action and is therefore not evaluated in this EA. This project represents a one-for-one cable replacement. There would be no benefit to adding two or more subtransmission lines as additional 46kV capacity is not required in the area of the project at this time.

44 *8. What would be the benefits and costs associated with simultaneously replacing the Pukele Subtransmission Line #4 with one transmission line?*

The relocation of Pūkele Subtransmission Line #4 is not part of the Proposed Action and is therefore not evaluated in this EA. This project represents a one-for-one cable replacement. There would be no benefit to adding one 138kV transmission line as there is no 138kV infrastructure in the area of the project.

45 *9. What would be the benefits and costs associated with simultaneously replacing the Pukele Subtransmission Line #4 with one subtransmission line and one transmission line?*

The relocation of Pūkele Subtransmission Line #4 is not part of the Proposed Action and is therefore not evaluated in this EA. This project represents a one-for-one cable replacement. There would be no benefit to adding two or more subtransmission lines as additional 46kV capacity is not required in the area of the project. In addition, there would be no benefit to adding one 138kV transmission line as there is no 138kV infrastructure in the area of the project.

46 *10. Does HECO or its contractors ever trim trees on the ground above underground lines? Does HECO or its contractors ever use herbicides on the ground above underground lines? What aboveground maintenance is performed for underground lines which lie below unpaved surfaces?*

There is essentially no above-ground vegetation maintenance for underground lines except incidental trimming to maintain access to vaults.

47 *The document lists a number of separate projects which are somehow linked together into one EOTP project. But there is no information on why (from a reliability, load, critical load, etc. perspective) that each one is included as a piece of something bigger.*

HECO disagrees with the commenter's characterization of the Draft EA as listing a number of separate projects and the conclusion drawn from that characterization. As set forth in the Draft EA and earlier in this response letter, the EOTP is designed to address two overload situations and two substation reliability concerns first identified in 1991 that affect the HECO 138kV transmission system in the East O'ahu area. The broad objective is to enhance the

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 33

overall reliability of the 138kV transmission system so that the potential for island wide or large area outages, as well as more localized outages, is reduced.

The first paragraph of Section 3.1 describes all of the individual tasks required for completion of Phase 1. Phase 1 includes various tasks in order to utilize the existing 46kV infrastructure to interconnect the three Pūkele Substation 46kV circuits with the four Downtown Substation 46kV circuits. (Section 3.1.1. of the EOTP Draft EA discusses the construction activities that will be involved in Phase 1. See also Figure 3-8 of the Draft EA.)

The second paragraph of Section 3.1 describes Phase 2, which involves the installation of an underground ductline and related work at the substations where the ductline will terminate. The objective of Phase 2 is to interconnect four out of the five remaining 46kV circuits served by the Pūkele Substation to three 46kV lines connected to HECO's Downtown Substations. (Section 3.1.2. of the EOTP Draft EA discusses the construction activities that will be involved in Phase 2. See also Figure 3-9 of the Draft EA.)

48 *11. For Downtown Transmission Service Area Load please answer the following questions*

(a) What is the minimum night-time load?

(b) What is the average night-time load?

(c) What is the maximum night-time load?

(d) What is the minimum day-time load?

(e) What is the average day-time load?

(f) What is the maximum day-time load?

(g) What is the minimum evening load?

(h) What is the average evening load?

(i) What is the maximum evening-time load?

The Downtown Transmission Service Area is defined as the area served by the Archer, Iwilei, School Street, Kamoku and the Kewalo Transmission Substations.

For the purpose of responding to this question, the following definitions apply.

- Night-Time is defined as the period that occurs from 9 P.M. to 7 A.M.
- Day-Time is defined as the period that occurs from 7 A.M. to 4 P.M.
- Evening-Time is defined as the period that occurs from 4 P.M. to 9 P.M.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 34

a) Based on data from January 1, 2004 to October 17, 2004, the minimum night-time load for the Downtown Transmission Service Area was 108 MW. For the year 2003, it was 107 MW.

b) Based on data from January 1, 2004 to October 17, 2004, the average night-time load for the Downtown Transmission Service Area was 169 MW. For the year 2003, it was 159 MW.

c) Based on data from January 1, 2004 to October 17, 2004, the maximum night-time load for the Downtown Transmission Service Area was 250 MW. For the year 2003, it was 243 MW.

d) Based on data from January 1, 2004 to October 17, 2004, the minimum day-time load for the Downtown Transmission Service Area was 136 MW. For the year 2003, it was 138 MW.

e) Based on data from January 1, 2004 to October 17, 2004, the average day-time load for the Downtown Transmission Service Area was 250 MW. For the year 2003, it was 242 MW.

f) Based on data from January 1, 2004 to October 17, 2004, the maximum day-time load for the Downtown Transmission Service Area was 308 MW. For the year 2003, it was 306 MW.

g) Based on data from January 1, 2004 to October 17, 2004, the minimum evening-time load for the Downtown Transmission Service Area was 138 MW. For the year 2003, it was 137 MW.

h) Based on data from January 1, 2004 to October 17, 2004, the average evening-time load for the Downtown Transmission Service Area was 225 MW. For the year 2003, it was 214 MW.

i) Based on data from January 1, 2004 to October 17, 2004, the maximum evening-time load for the Downtown Transmission Service Area was 296 MW. For the year 2003, it was 285 MW.

49 *11. For Koolau/Pukele Transmission Service Area Load please answer the following questions*

(a) What is the minimum night-time load?

(b) What is the average night-time load?

(c) What is the maximum night-time load?

(d) What is the minimum day-time load?

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 35

(e) What is the average day-time load?

(f) What is the maximum day-time load?

(g) What is the minimum evening load?

(h) What is the average evening load?

(i) What is the maximum evening-time load?

The Ko'olau/Pūkele Service Area is defined as the area served by the Ko'olau and Pūkele Transmission Substations.

For the purpose of responding to this question, the following definitions apply.

- Night-Time is defined as the period that occurs from 9 P.M. to 7 A.M.
- Day-Time is defined as the period that occurs from 7 A.M. to 4 P.M.
- Evening-Time is defined as the period that occurs from 4 P.M. to 9 P.M.

a) Based on data from January 1, 2004 to October 17, 2004, the minimum night-time load for the Ko'olau/Pūkele Transmission Service Area was 154 MW. For the year 2003, it was 151 MW.

b) Based on data from January 1, 2004 to October 17, 2004, the average night-time load for the Ko'olau/Pūkele Transmission Service Area was 225 MW. For the year 2003, it was 222 MW.

c) Based on data from January 1, 2004 to October 17, 2004, the maximum night-time load for the Ko'olau/Pūkele Transmission Service Area was 348 MW. For the year 2003, it was 361 MW.

d) Based on data from January 1, 2004 to October 17, 2004, the minimum day-time load for the Ko'olau/Pūkele Transmission Service Area was 118 MW. For the year 2003, it was 214 MW. The 118 MW value for 2004 is unusually low and is an indication that there may have been an outage on the distribution system, which caused the load to decrease to this lower level, or the transducers which communicate with the Energy Management System to record this data were inoperative for this hour. The next lowest load for the Ko'olau/Pūkele area was 207 MW, which may be more indicative of the minimum load during the day-time period.

e) Based on data from January 1, 2004 to October 17, 2004, the average day-time load for the Ko'olau/Pūkele Transmission Service Area was 306 MW. For the year 2003, it was 302 MW.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 36

f) Based on data from January 1, 2004 to October 17, 2004, the maximum day-time load for the Ko'olau/Pūkele Transmission Service Area was 366 MW. For the year 2003, it was 364 MW.

g) Based on data from January 1, 2004 to October 17, 2004, the minimum evening-time load for the Ko'olau/Pūkele Transmission Service Area was 273 MW. For the year 2003, it was 268 MW.

h) Based on data from January 1, 2004 to October 17, 2004, the average evening-time load for the Ko'olau/Pūkele Transmission Service Area was 337 MW. For the year 2003, it was 336 MW.

i) Based on data from January 1, 2004 to October 17, 2004, the maximum evening-time load for the Ko'olau/Pūkele Transmission Service Area was 407 MW. For the year 2003, it was 409 MW.

50 *11. For Central O'ahu Transmission Service Area Load please answer the following questions*

(a) What is the minimum night-time load?

(b) What is the average night-time load?

(c) What is the maximum night-time load?

(d) What is the minimum day-time load?

(e) What is the average day-time load?

(f) What is the maximum day-time load?

(g) What is the minimum evening load?

(h) What is the average evening load?

(i) What is the maximum evening-time load?

This information is not readily available. The EOTP relates to the HECO transmission system around the Downtown Area Substations and the Ko'olau/Pūkele Substation, not Central O'ahu.

51 *11. For West O'ahu Transmission Service Area Load please answer the following questions*

(a) What is the minimum night-time load?

(b) What is the average night-time load?

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 37

(c) What is the maximum night-time load?

(d) What is the minimum day-time load?

(e) What is the average day-time load?

(f) What is the maximum day-time load?

(g) What is the minimum evening load?

(h) What is the average evening load?

(i) What is the maximum evening-time load?

This information is not readily available. The EOTP relates to the HECO transmission system around the Downtown Area Substations and the Ko'olau/Pūkele Substation, not West O'ahu

52 *11. For Pukele Transmission Service Area Load please answer the following questions*

(a) What is the minimum night-time load?

(b) What is the average night-time load?

(c) What is the maximum night-time load?

(d) What is the minimum day-time load?

(e) What is the average day-time load?

(f) What is the maximum day-time load?

(g) What is the minimum evening load?

(h) What is the average evening load?

(i) What is the maximum evening-time load?

The Pūkele Service Area is defined as the area served by the Pūkele Substation.

For the purpose of responding to this question, the following definitions apply.

- Night-Time is defined as the period that occurs from 9 P.M. to 7 A.M.
- Day-Time is defined as the period that occurs from 7 A.M. to 4 P.M.
- Evening-Time is defined as the period that occurs from 4 P.M. to 9 P.M.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 38

a) Based on data from January 1, 2004 to October 17, 2004, the minimum night-time load for the Pūkele Service Area was 84 MW. For the year 2003, it was 89 MW.

b) Based on data from January 1, 2004 to October 17, 2004, the average night-time load for the Pūkele Service Area was 126 MW. For the year 2003, it was 125 MW.

c) Based on data from January 1, 2004 to October 17, 2004, the maximum night-time load for the Pūkele Service Area was 190 MW. For the year 2003, it was 193 MW.

d) Based on data from January 1, 2004 to October 17, 2004, the minimum day-time load for the Pūkele Service Area was 115 MW. For the year 2003, it was 119 MW. (Note that the minimum load recorded at the Pukele Substation during 2004 was 0 MW. The 0 MW value for 2004 occurred on March 3, 2004 during the loss of both 138kV transmission lines to the Pūkele Substation. During the outage of the two lines, the substation was unable to serve the load in the Pukele Service Area. A PUC report was filed on March 11, 2004 explaining the incident and a copy of the filed report was provided to Life of the Land in response to an information request in the East Oahu Project Docket No. 03-0417.)

e) Based on data from January 1, 2004 to October 17, 2004, the average day-time load for the Pūkele Service Area was 168 MW. For the year 2003, it was 167 MW.

f) Based on data from January 1, 2004 to October 17, 2004, the maximum day-time load for the Pūkele Service Area was 208 MW. For the year 2003, it was 216 MW.

g) Based on data from January 1, 2004 to October 17, 2004, the minimum evening-time load for the Pūkele Service Area was 138 MW. For the year 2003, it was 134 MW.

h) Based on data from January 1, 2004 to October 17, 2004, the average evening-time load for the Pūkele Service Area was 179 MW. For the year 2003, it was 180 MW.

i) Based on data from January 1, 2004 to October 17, 2004, the maximum evening-time load for the Pūkele Service Area was 213 MW. For the year 2003, it was 224 MW.

53 *11. For The Total Island Load, please answer the following questions*

(a) What is the minimum night-time load?

(b) What is the average night-time load?

(c) What is the maximum night-time load?

(d) What is the minimum day-time load?

(e) What is the average day-time load?

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 39

(f) What is the maximum day-time load?

(g) What is the minimum evening load?

(h) What is the average evening load?

(i) What is the maximum evening-time load?

The total system load represented in response to this comment represents the net-to-system load, which subtracts generating unit auxiliaries and system losses.

For the purpose of responding to this question, the following definitions apply.

- Night-Time is defined as the period that occurs from 9 P.M. to 7 A.M.
- Day-Time is defined as the period that occurs from 7 A.M. to 4 P.M.
- Evening-Time is defined as the period that occurs from 4 P.M. to 9 P.M.

a) Based on data from January 1, 2004 to October 17, 2004, the minimum night-time load for the HECO System was 544 MW. For the year 2003, it was 510 MW.

b) Based on data from January 1, 2004 to October 17, 2004 the average night-time, load for the HECO System was 725 MW. For the year 2003, it was 703 MW.

c) Based on data from January 1, 2004 to October 17, 2004, the maximum night-time load for the HECO System was 1,005 MW. For the year 2003, it was 993 MW.

d) Based on data from January 1, 2004 to October 17, 2004, the minimum day-time load for the HECO System was 721 MW. For the year 2003, it was 681 MW.

e) Based on data from January 1, 2004 to October 17, 2004, the average day-time load for the HECO System was 1,050 MW. For the year 2003, it was 1,019 MW.

f) Based on data from January 1, 2004 to October 17, 2004, the maximum day-time load for the HECO System was 1,245 MW. For the year 2003, it was 1,212 MW.

g) Based on data from January 1, 2004 to October 17, 2004, the minimum evening-time load for the HECO System was 820 MW. For the year 2003, it was 796 MW.

h) Based on data from January 1, 2004 to October 17, 2004, the average evening-time load for the HECO System was 1,045 MW. For the year 2003, it was 987 MW.

i) Based on data from January 1, 2004 to October 17, 2004, the maximum evening-time load for the HECO System was 1,275 MW. For the year 2003, it was 1,125 MW.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 40

54 *12. Costs: engineering costs, accounting costs, regulatory costs, etc. (a) Do the costs associated with different option include just engineering costs or all costs? (b) If all costs are included, what percentage is used by the Company for (1) the interest rate; (2) the discount rate? (3) carrying charge? (c) Do the costs differentiate between utility installation and third party installation? If so, please elaborate. (d) Are the costs calculated for (1) construction? (2) operation? (3) maintenance? (4) removal? (e) Are the costs calculate from a given number of years, or the average costs over the lifetime of the option? (f) Is the cost of fuel for different options considered?*

The costs associated with the different options include all costs.

When HECO evaluated the revenue requirements for these utility options, HECO used the forecast long-term weights and rates of the various financing instruments that comprise HECO's capital structure. The interest rates assumed were as follows: Short-term debt (6%); Long-term debt (6.5%); and Preferred Stock (8%).

Discount rates of 0%, 3%, 8.4%, and 12% were used in the net present value (NPV) of annual revenue requirement calculation, as one method in evaluating the economics of the various options.

If by "carrying charge" the commenter is referring to the Allowance for Funds Used During Construction (AFUDC) rate, the AFUDC rate is based on forecast capitalization balances and rates, and can vary year to year.

HECO labor rates are based on hourly wages, benefits and payroll taxes. Third party installation labor rates are based on actual costs from previous HECO projects.

Cost estimates for each option include initial installation, removal, new cycle, operation and maintenance and transmission system losses. Cost estimates for these alternatives were developed using various sources including previous HECO project estimates and actual costs, and costs from industry consultants and material suppliers.

Yearly costs associated with each of the alternatives were evaluated over a period of 50 years. It should be noted that this 50-year period is not a definitive life of the projects, but rather a period in which all alternatives can be compared over a definitive duration. Transmission, subtransmission and substation systems have different life expectancies due to their differences in technology and physical characteristics. Therefore, in our analysis we have identified specific cost factors that may be applicable to only certain options during certain years and have made every attempt to maintain consistency throughout our assumptions.

Transmission system losses were calculated for each alternative relative to the Kamoku-Pūkele 138kV Underground Transmission Line (HPFF) alternative. Differences in fuel costs was not a factor in the alternative selection process because the installation of any alternative would have a negligible effect on system transmission losses, which in turn would have a negligible effect on power generation.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 41

55 *13. Does HECO consider that most solar-thermal, solar-electric, combined heat and power systems, and wind energy systems use land as part of a multi-use, that is, they do not require vacant land?*

HECO recognizes that vacant land is not necessarily required to install photovoltaic (PV), CHP and wind energy systems. However, other factors in addition to land requirements must be considered. For instance, HECO considered adding renewable energy to resolve the Ko'olau/Pūkele Overload Situation, which would require approximately 47 MW of energy from renewable resources installed in the Ko'olau/Pūkele area in order to defer the Ko'olau/Pūkele Overload Situation to 2023 (beyond the 20-year planning study). One factor is that wind power and PV are intermittent generators and are not dispatchable. If there is no wind generation at the time of a potential overload condition on the 138kV transmission line supplying the Ko'olau/Pūkele area, there will be no possibility of reducing the overload. Energy storage devices could be installed with wind energy in order to make it available during overload conditions; however, energy storage is expensive and would require additional land space. See Section 3.2.3.5 of the Draft EA.

Photovoltaic generators require an extensive land area to achieve the 47 MW of energy required to defer the Ko'olau/Pūkele Overload Situation to 2023 and beyond. An estimate of 6 to 7 acres/MW of flat land with no exposure to salt and full exposure to sun would be required, which equates to approximately 280 to 330 acres for 47 MW. Even in a hypothetical situation where 280 to 330 acres of land space existed to install PV through a combined use of building roof tops, multi use areas and vacant land in the Ko'olau/Pūkele service area, the cost for PV makes it prohibitive to use this alternative. HECO estimates that PV costs are about $7,000-$10,000/kW, which calculates to a capital cost of $329 to 470 million to achieve the 47 MW of generation that would be required to defer the Ko'olau/Pūkele Overload Situation.

It should be noted that 47 MW was calculated using the August 2002 peak forecast. Load forecasts are updated regularly and could be higher or lower. If load growth increases faster than assumed in the EOTP study, additional PV/wind energy would be required, which would increase land requirements and costs. If load growth is lower than the forecasted growth rate in the August 2002 peak forecast, less PV/wind energy would be required, which would decrease land requirements and costs. Additional PV/wind would be required beyond 2022 and must match forecasted load growth in order to continue to defer the Ko'olau/Pūkele Overload Situation. Installing the EOTP would provide a long-term solution beyond 2022, which allows for normal load forecast variations.

56 *14. (a) What percentage of the load could be reduced through cost-effective energy efficiency measures? (b) What percentage of the load could be reduced through load shifting measures?*

The analysis conducted for the EOTP already included the impacts of forecasted cost-effective energy efficiency measures to determine the forecasted years for the Ko'olau/Pūkele Overload Situation and Downtown Overload Situation. Therefore the only additional decrease in load would come from installing cost-effective energy efficiency measures in

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 42

addition to what has already been evaluated. The cost was analyzed for a hypothetical situation where 47 MW of energy efficiency measures were achieved, which is the amount of load reduction that would be required to resolve the Ko'olau/Pūkele Overload Situation for the 20-year period studied. The analysis showed that if costs based upon historical program costs were used, which were considered to be the lowest cost that energy efficiency programs could be implemented at, using energy efficiency programs to resolve the Ko'olau/Pūkele Overload Situation would be more expensive than installing the EOTP. In addition, the energy efficiency programs would provide some reduction of load, however, would not be adequate to address the Pūkele Substation Reliability Concern. See Section 3.2.3.5 of the Draft EA.

57 *15. Are most outages in Waikiki caused by problems with transmission, subtransmission or distribution circuits?*

Most isolated outages, which may interrupt electrical service to individual customers or a group of customers fed from one transformer or distribution feeder within the WaikIkI area, are caused by distribution and subtransmission outages rather than transmission outages. However, an outage that interrupts electricity service to the entire WaikIkI area would be caused by a transmission system outage (i.e. loss of the two Ko'olau-Pūkele 138kV transmission lines). Based on historical data, most outages for customers within the WaikIkI area are caused by subtransmission or distribution circuits. The entire WaikIkI area experienced an interruption of service on March 3, 2004 with the loss the Ko'olau-Pūkele #1 and #2 138kV transmission lines. The entire WaikIkI area also experienced interruptions of service due to transmission system outages during the July 13, 1983 blackout and April 9, 1991 blackout.

58 *16. What time of day do blackouts usually happen at?*

Blackouts can occur at any time of the day. Based on historical data, the July 13, 1983 island-wide blackout occurred at 10:23 A.M. The April 9, 1991 island-wide blackout occurred at approximately 8:34 A.M. The last blackout prior to 1983 occurred about 40 years earlier. That the 1983 and 1991 blackouts occurred during the morning appears to be coincidental, and a conclusion that blackouts on the HECO system usually occur during the morning hours does not appear to be warranted.

59 *17. Are blackouts more common at night, during the morning, during the day or during the evening peak?*

As explained above, the July 13, 1983 and April 9, 1991 island-wide blackouts occurred during morning hours. The timing of these events appears coincidental, and a conclusion that blackouts on the HECO system usually occur in the morning hours is not warranted.

60 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 43

Substations, HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:

(a) Will upgrades at one of these substations have a greater impact on load, reliability, critical load, etc. than improvements at another substation?

The proposed improvements at various substations are required for terminating the 46kV lines, 46kV capacity increase, and reliability. New terminations are required for new 46kV lines emanating from the substations. A capacity increase is required due to reconfiguration of the 46kV lines. Replacing the obsolete substation bus switches and hydraulic operators with newer switches and operators improves reliability at the existing substations.

The upgrades proposed for the substations listed are part of the whole EOTP. Without implementing all of the upgrades at these substations, the EOTP would not be effective at resolving the East O'ahu transmission problems identified in Section 2 of the Draft EA. Therefore impacts on upgrades between the substations cannot be compared. For instance, upgrading the Kamoku Substation but not the Kapahulu Substation would not complete the EOTP, and, therefore, load could not be shifted to HECO's Southern 138kV Transmission Corridor and the Ko'olau/Pūkele Overload Situation could still occur.

61 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(b) What are the relative cost benefits for each substations improvements?

HECO is not sure what the commenter means by the term "relative cost benefit." Nonetheless, HECO provides the following: The work at Kamoku Substation involves the installation of a new 138-46kV, 80 MVA transformer with associated protective relaying. The addition of the transformer at Kamoku Substation allows loads currently served by Pūkele Substation in the northern transmission corridor to be fed from the southern transmission corridor. The cost for this work is estimated at $25,733,000.

The work at Kapahulu Substation involves the replacement of nine existing hydraulic operators with new motor operators including all associated control duct installations, battery banks, cabinets, and wiring and three 46kV switch interrupters. Hydraulic operators are based on obsolete technology and are no longer manufactured. As a result, replacement parts are unavailable. Switch operators facilitate the automatic opening and closing of the 46kV switches. Upgrading the hydraulic operators to motor operators improves reliability and will allow HECO to obtain replacement parts and components should repairs be required. The cost for this work is estimated at $1,089,000.

The work at Kūhiō Substation involves the replacement of three existing hydraulic operators with new motor operators including all associated control duct installations, battery banks,

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 44

cabinets, and wiring and the installation of one 46kV switch interrupter. Hydraulic operators are based on obsolete technology and are no longer manufactured. As a result, replacement parts are unavailable. Switch operators facilitate the automatic opening and closing of the 46kV switches. Upgrading the hydraulic operators to motor operators improves reliability and will allow HECO to obtain replacement parts and components should repairs be required. The cost for this work is estimated at $412,000.

The work at Waikiki Substation involves the replacement of six existing hydraulic operators with new motor operators including all associated control duct installations, battery banks, cabinets, and wiring and the installation of two 46kV switch interrupters. Hydraulic operators are based on obsolete technology and are no longer manufactured. As a result, replacement parts are unavailable. Switch operators facilitate the automatic opening and closing of the 46kV switches. Upgrading the hydraulic operators to motor operators improves reliability and will allow HECO to obtain replacement parts and components should repairs be required. The cost for this work is estimated at $677,000.

The work at 'Ena Substation involves the replacement of seven existing hydraulic operators with new motor operators including all associated control duct installations, battery banks, cabinets, and wiring and the installation of three 46kV switch interrupters. Hydraulic operators are based on obsolete technology and are no longer manufactured. As a result, replacement parts are unavailable. Switch operators facilitate the automatic opening and closing of the 46kV switches. Upgrading the hydraulic operators to motor operators improves reliability and will allow HECO to obtain replacement parts and components should repairs be required. The cost for this work is estimated at $871,000.

The work at Makaloa Substation involves the replacement of existing 4/0 bus sections between switches 4498 and 5405 and switches 4928 and 6089 with 750 MCM aluminum conductors to achieve a continuous bus rating of 800 amperes, and installation of three new three-phase 46kV group operated switches with associated steel work. The work at Makaloa Substation improves the transfer of 46kV loads from their primary circuit to their back-up circuit. The cost for this work is estimated at $2,582,000.

The work at Kewalo Substation involves the installation of 750 MCM aluminum conductors between switches 4919 and 5311 to achieve a continuous bus rating of 800 amperes. The work at Kewalo Substation improves the transfer of 46kV loads from their primary circuit to their back-up circuit. The cost for this work is estimated at $59,000.

The work at McCully Substation involves the replacement of three existing 46kV switches (4684, 4909, 4794) with new switches rated at 46kV, 800 amperes, the replacement of existing 4/0 bus sections between switches 4794 and 4752 with 750 MCM aluminum conductors to achieve a continuous bus rating of 800 amperes, and the installation of a termination structure complete with 46kV terminators and lightning arrestors under switch 4909. The work at McCully Substation improves the transfer of 46kV loads from their primary circuit to their back-up circuit. The cost for this work is estimated at $304,000.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 45

62 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(c) How does the Substation improvements fit into the project?

The improvements at various substations are required for terminating the 46kV lines, 46kV capacity increase, and reliability. New terminations are required for new 46kV lines emanating from the substations. A capacity increase is required due to reconfiguration of the 46kV lines. Replacing the obsolete substation bus switches and hydraulic operators with newer switches and operators improves the reliability of the existing substations.

All three of these activities are required in order to be able to use the lines and the cables on the 46kV system to shift load and provide the necessary back-up 46kV circuits to be able to address the four East O'ahu transmission problems identified in Section 2 of the Draft EA

63 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(d) What is the total cost and benefit for each Substation segment?

See answer to (b).

64 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(e) What technologies were considered for this project?

HECO looks to state-of-the-art technologies that have a proven track record within the industry, for example, at Kamoku Substation Gas Insulated Substation equipment is being used. Gas Insulated Substation equipment requires only a fraction of the space required by conventional open-air substation equipment and greatly facilitates smaller indoor substations. Other state-of-the-art equipment includes: solid state relaying equipment, motorized operators, and fiber optic communications equipment. Solid state relaying equipment provides the "brains" that sense system abnormalities and automatically react to protect personnel and equipment while minimizing the potential for outages. Motorized operators allow opening and closing of switches either by relay action or remotely. Fiber optic communications equipment allows equipment to be monitored and operated from remote locations.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 46

65 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(f) When did HECO first consider implementing this improvement? Please provide a list of all HECO documents that make reference to this substation.

The substation improvement was first considered in early 2003 and documented in a planning study conducted by HECO's Transmission Planning titled "East O'ahu Transmission Project Alternatives Study Update" dated December 2003. HECO declines to provide a list of all HECO documents that make reference to this substation as Chapter 343 does not require it in response to this comment.

66 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(g) Would there be any kind of benefit to installing a 138-kV Line to this substation? If so, please elaborate?

There would be no benefit to installing a 138kV transmission line to Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa and McCully distribution substations because there is no 138kV infrastructure at these substations. The Kamoku Substation currently has 138kV infrastructure because it has a 138kV transmission feed from the Kewalo Substation and is part of HECO's Southern 138kV Transmission Corridor. Kamoku Substation would benefit from the installation of a 138kV line, preferably from the Pūkele Substation, which would provide a second 138kV source for this substation. Note, however, that the EOTP does not propose this action.

67 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(h) Would strengthening (increasing the number of, increasing the capacity of, increasing the voltage of) the subtransmission and/or distribution lines from this station improving reliability concerns?

Reliability would be improved by increasing the number of 46kV lines from Pūkele Substation to the Kapahulu, Kūhiō, Waikīkī, 'Ena and McCully distribution substations or increasing the number of 46kV lines from the Archer Substation to the Kewalo, Makaloa and McCully distribution substations. This would provide a back-up 46kV circuit in the event the existing 46kV circuit from the Pūkele or Archer Substation to the distribution substation was

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 47

unavailable. Reliability would be improved by increasing the number of 12kV circuits from the Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa and McCully Substations to the customer's distribution transformers or increasing the number of 25kV circuits from Kamoku Substation to the customer's distribution transformers. *However, increasing the 46kV*, 25kV and 12kV circuits as described above would not address the Pūkele Substation Reliability Concern because loss of both 138kV lines feeding the Pūkele Substation would still result in an outage. The added 46kV, 25kV and 12kV circuits would only affect reliability on the subtransmission and distribution systems and would not address concerns on the 138kV transmission system.

Increasing the capacity of the Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa and McCully substations, for example, by installing a new transformer at each of these substations would improve reliability because the transformer could be used to serve load if two transformers at a substation were lost. HECO utilizes single contingency planning on the distribution system and therefore has the ability to serve the entire load at each of the distribution substations with the loss of one transformer. For instance there are currently four transformers at McCully Substation. If one of the four transformers were unavailable, all of the load served from these four transformers could be served by the three remaining transformers. In the hypothetical situation where HECO installed another transformer to increase the capacity of the distribution substation, this transformer would be useful in double contingency situations. Increasing the capacity as described, however, will not address the Pūkele Substation Reliability Concern because loss of the two 138kV lines to the Pūkele Substation will still result in an outage.

Increasing the voltage at the Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa and McCully Substations would not increase the reliability of the substations because increasing the voltage does not provide additional redundancy between the substations. A failure on one of the 46kV lines would result in an outage, even if the voltage were increased. Increasing the voltage at these substations would also be very expensive and require additional space to provide adequate clearances for higher voltage equipment. For example each 46kV-12kV transformer would need to be replaced. Furthermore, increasing the voltage at the listed substations will not address the Pūkele Substation Reliability concern because loss of the two 138kV lines to the Pūkele Substation will still result in an outage.

In the proposed EOTP, the Kamoku Substation will have new 46kV circuits, a new 138/46kV transformer (increased transformer capacity) and new 46kV infrastructure (Kamoku Substation currently has 138kV and 25kV infrastructure). Upgrades at the Kamoku Substation in combination with adding new 46kV terminations, increasing the capacity of existing 46kV lines between some of the listed distribution substations (Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa, and McCully distribution substations) and upgrades at the Kamoku Substation in combination with upgrades at Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa, and McCully distribution substations will create the ability to shift load from the Pūkele Substation on the Northern 138kV Transmission Corridor to the Kamoku and Archer Substations on the Southern 138kV Transmission Corridor and provide additional

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 48

back up 46kV circuits between Archer Substation and Pūkele Substation to be able to address the four East O'ahu Transmission problems identified in Section 2 of the Draft EA.

68 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(i) Would strengthening (increasing the number of, increasing the capacity of, increasing the voltage of) the subtransmission and/or distribution lines from this station improving overloading concerns?

The Pūkele Substation located on HECO's Northern 138kV Transmission Corridor serves the Kapahulu, Kūhiō, Waikīkī, 'Ena and a portion of the McCully distribution substations. The Archer Substation located on HECO's Southern 138kV Transmission Corridor serves the Kewalo, Makaloa and a portion of the McCully distribution substations. Increasing the number of 46kV lines between the Pūkele Substation and Kapahulu, Kūhiō, Waikīkī, 'Ena, and McCully distribution substations, increasing the capacity of these substations and increasing the voltages at these substations would not address the Ko'olau/Pūkele Overload Situation because load demand at Ko'olau and Pūkele Substations would remain the same. Increasing the number of 46kV lines from the Archer Substation to the Kewalo, Makaloa and McCully distribution substations, increasing the capacity of these substations and increasing the voltages at these substations would not address the Ko'olau/Pūkele Overload Situation because these loads are served from the Southern 138kV Transmission Corridor and not the Ko'olau or Pūkele Substations.

In the proposed EOTP, the Kamoku Substation will have new 46kV circuits, a new 138/46kV transformer (increased transformer capacity) and new 46kV infrastructure (Kamoku Substation currently has 138kV and 25kV infrastructure). Upgrades at the Kamoku Substation in combination with adding new 46kV terminations, increasing the capacity of existing 46kV lines between some of the listed distribution substations (Kapahulu, Kūhiō, Waikīkī, 'Ena, Kewalo, Makaloa, and McCully distribution substations) and improving the reliability of the 46kV system will create the ability to shift load from the Pūkele Substation on the Northern 138kV Transmission Corridor to the Kamoku and Archer Substations on the Southern 138kV Transmission Corridor and provide additional back up 46kV circuits between Archer Substation and Pūkele Substation to be able to address the four East O'ahu Transmission problems identified in Section 2 of the Draft EA.

69 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(j) What are the reliability metrics for this substation?

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 49

By the term "reliability metrics for this substation," we interpret the commenter to mean the measured reliability of the substations. Reliability metrics were not used to determine the need for substation upgrades that are a part of the EOTP. These upgrades are required to provide the necessary operational flexibility to insure switching could be done to transfer 46kV circuits to their back up circuits.

70 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(k) What would be the cost & benefit of the EOTP if all components of the EOTP were built except for this Substation improvement?

The benefit that the proposed upgrades at the various substations and installation of the proposed 46kV lines will provide is the ability to shift load from the Pūkele Substation in HECO's Northern 138kV Transmission Corridor to Archer and Kamoku Substations in HECO's Southern 138kV Transmission Corridor. These upgrades, which will be made as part of Phase 1 of EOTP, include the installation of an 80 MVA 138/46kV transformer at Kamoku Substation and two 46kV circuits in separate duct lines. The new 46kV circuits from the 80 MVA transformer at Kamoku Substation will be connected to the existing Pūkele 4 overhead 46kV circuit on Date Street in Mō'ili'ili. In addition, a connection of the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit will be made as part of Phase 1. This will allow some load from the Pūkele 4 and Pūkele 8 circuits to shift from the Pūkele Substation to the Kamoku Substation. Phase 1 will also include the installation of two new 46kV circuits in an existing single ductline to connect the existing Archer #46 and Archer #41 underground 46kV circuits at Makaloa Substation with the existing Pūkele #2 overhead 46kV circuit near the McCully Substation. This will shift the existing load on the Pūkele 2 circuit to the Archer Substation. The upgrades at the listed substations will be performed in order to increase the capacity and improve the reliability of the existing 46kV system because of the change in line configurations as explained in response to Comment #62.

The design and construction costs for the substation improvements are as follow:

Kamoku Substation	$8,603,000
Kapahulu Substation	$364,000
Kūhiō Substation	$138,000
Waikīkī Substation	$227,000
'Ena Substation	$291,000
Makaloa Substation	$863,000
Kewalo Substation	$20,000
McCully Substation	$101,000

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 50

Without the addition of these substation improvements, load could not be transferred from the Pūkele Substation to Archer and Kamoku Substations. If load cannot be shifted from Pūkele Substation to Archer and Kamoku Substations, the East O'ahu transmission problems would not be addressed and, consequently, no benefit would be realized.

71 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(1) Would the Pukele Substation Reliability Concern be impacted? If so, how? Would the Downtown Substation Reliability Concern be impacted? If so, how?

The Pūkele substation reliability concern is addressed by the implementation of the upgrades to these substations as well as by other portions of the scope of work for the EOTP. Some of Pūkele Substation's existing electrical load would be shifted to Archer Substation and Kamoku Substation with the implementation of EOTP. Therefore, if the two 138kV transmission lines serving Pūkele Substation were to be lost, the loads transferred to Archer Substation and Kamoku Substation would not experience an outage. The loads that continue to be served by Pūkele Substation would experience a momentary outage (approximately six seconds) as these loads are automatically transferred to Archer, Kamoku, and Ko'olau Substations.

Phase 1 would partially resolve the Downtown Substation Reliability Concern. It would provide a backup to about 38 MW, representing 39 percent of the load served by downtown substations (Archer, Kewalo, and Kamoku Substations) via 46kV subtransmission lines from Pūkele Substation if Archer Substation loses its two 138kV transmission line feeds. A momentary outage would occur while the load is automatically transferred to the Pūkele Substation. Under Phase 1, 61 percent of the load served by the downtown substations would not be served, resulting in outages in the affected areas.

Under Phase 2, it would be technically feasible to transfer all or most of the load served by Archer Substation to Pūkele Substation based on the current estimated loading at Archer Substation and the capacity of the Pūkele transformers. With this load transfer, however, there may be low voltage situations on the 46kV systems, and further analysis is needed to determine whether further steps should be taken to allow the complete transfer of the load at Archer Substation to Pūkele Substation. In the event of a catastrophic failure to the Archer 138kV duct line, HECO could consider transferring the Archer load to the Pūkele Substation by transferring load by feeders, ensuring that low voltage and overload situations do not occur on the 46kV system, until the Archer 138kV duct line and/or cables can be repaired. See Section 3.1.3.3 of the Draft EA.

72 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 51

Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:

(m) Would the Koolau/Pukele Overload Situation be impacted? If so, how? Would the Downtown Overload Concern be impacted? If so, how?

Phase 1 would allow substations in the Southern 138kV Transmission Corridor to provide service to some areas currently being served by Pūkele Substation. Specifically, 80 MW of electrical load would be transferred from the Ko'olau/ Pūkele area to the Archer and Kamoku Substations. The load shift is expected to remain in this configuration under normal operating conditions and would reduce the combined load at the Ko'olau and Pūkele Substations to a level below 362 MW, which is the amount of combined load that triggers an overload condition on the remaining line to Ko'olau Substation. The reduction in combined load with the implementation of Phase 1 would resolve the Ko'olau/Pūkele Overload Situation for the 20-year period studied.

Phase 2 would have no additional effect on the Ko'olau/Pūkele Overload Situation, as Phase 1 activities would resolve the concern.

The Downtown Overload Situation is not forecast to occur until after 2024. If the 80 MW transferred to Archer and Kamoku Substations continues to be served by these substations in situations in which two out of the three downtown 138kV transmission lines could be out of service, the Downtown Overload Situation will be accelerated. However, with the installation of the project, it is HECO's plan to shift load back to the Pūkele Substation if one of the downtown 138kV lines is taken out of service for maintenance, or experiences a prolonged forced outage.

After the installation of Phase 1, not all of the 80 MW of load shifted from Pūkele Substation to downtown substations can be transferred back to Pūkele Substation when maintenance is being performed on one of the downtown transmission lines. This is due to limitations on the load that can be carried by the 46kV circuits (taking into account the substation transformer loads normally served by the circuits, plus the additional loads that the circuits must be able to serve as a result of automatic load transfers due to outages of other circuits). Based on the planned circuit configuration, approximately 9 MW originally served by the Pūkele Substation would not be transferred back from the Archer Substation. The remaining 9 MW of load, which cannot be shifted, can be replaced by temporarily shifting 14 MW additional load from the Pi'ikoi Substation (located between the Archer and Pūkele Substations, and served from the Archer Substation) to the Pūkele Substation. These actions would restore the load to the 2004 level prior to the planned transfer of load in 2004 from Pūkele Substation to Archer Substation as described in Section 2.5, and avoid accelerating the Downtown Overload Situation.

If the Downtown Overload Situation continues to develop as projected, HECO could create the flexibility (with minor circuit modifications that are not currently planned) to shift additional load to Pūkele Substation when a Downtown Area transmission line is taken out of

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 52

service for maintenance, which could further defer the line overload situation for up to a few years.

Phase 2 activities would not provide additional relief from this situation.

73 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(n) What segment of the population would remain vulnerable to overload and/or reliability issues if this one segment were not built but everything else was built? Why?

The benefit that the proposed upgrades at the various substations and installation of the proposed 46kV lines will provide is the ability to shift load from the Pūkele Substation in HECO's Northern 138kV Transmission Corridor to Archer and Kamoku Substations in HECO's Southern 138kV Transmission Corridor. These upgrades, which will be made as part of Phase 1 of EOTP, include the installation of an 80 MVA 138/46kV transformer at Kamoku Substation and two 46kV circuits in separate duct lines. The new 46kV circuits from the 80 MVA transformer at Kamoku Substation will be connected to the existing Pūkele 4 overhead 46kV circuit on Date Street in Mō'ili'ili. In addition, a connection of the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit will be made as part of Phase 1. This will allow some load from the Pūkele 4 and Pūkele 8 circuits to shift from the Pūkele Substation to the Kamoku Substation. Phase 1 will also include the installation of two new 46kV circuits in an existing single ductline to connect the existing Archer #46 and Archer #41 underground 46kV circuits at Makaloa Substation with the existing Pūkele #2 overhead 46kV circuit near the McCully Substation. This will shift the existing load on the Pūkele 2 circuit to the Archer Substation. The upgrades at the listed substations will be performed in order to increase the capacity and improve the reliability of the existing 46kV system because of the change in line configurations as explained in response to Comment #62.

Without implementing all of the described line circuit connections and substation upgrades, load could not be transferred from the Pūkele Substation to Archer and Kamoku Substations. If load cannot be shifted from Pūkele Substation to Archer and Kamoku Substations, the Ko'olau/Pūkele Overload Situation would still exist and the entire population served by the Ko'olau and Pūkele Substation would remain vulnerable.

74 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(o) Using Generally Acceptable Accounting Procedures, what is the total cost of this segment (including the interest payments)?

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 53

HECO interprets the reference to "Generally Acceptable Accounting Procedures" to mean "Generally Accepted Accounting Principles (GAAP)" Using GAAP, the total design and construction costs of the substation improvements including interest payments are shown below:

Kamoku Substation	$8,603,000
Kapahulu Substation	$364,000
Kūhiō Substation	$138,000
Waikīkī Substation	$227,000
'Ena Substation	$291,000
Makaloa Substation	$863,000
Kewalo Substation	$20,000
McCully Substation	$101,000

75 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(p) What is the interest rate and discount rate used by the utility in pricing out alternatives? Does HECO consider only the cost of the infrastructure (lines, on-site generation)?

When HECO evaluated the revenue requirements for these utility options, HECO used the forecast long-term weights and rates of the various financing instruments that comprise HECO's capital structure. The interest rates assumed were as follows: Short-term debt (6%); Long-term debt (6.5%); and Preferred Stock (8%).

Discount rates of 0%, 3%, 8.4%, and 12% were used in the NPV of annual revenue requirement calculation, as one method in evaluating the economics of the various options.

Cost estimates for each option include initial installation, removal, new cycle, operation and maintenance and transmission system losses.

76 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(q) How does the utility account for differences in the price of fuels (oil, sunlight)?

Differences in the price of fuels were not a factor in the alternative analysis process because the increase in substation losses due to these upgrades would have a negligible effect on

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 54

overall system losses. This in turn would have a negligible effect on power generation requirements.

77 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(r) When did this proposed segment first appear in any engineering study? Please provide a copy of that document.

The substation improvements first appeared in a planning study conducted by HECO's Transmission Planning titled "East O'ahu Transmission Project Alternatives Study Update" dated December 2003 which was filed as Exhibit 5 with HECO's Application for Approval of the project.

78 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(s) When did this proposed segment first appear in HECO's Capital Expenditure Budgets filed yearly with the PUC? Please provide a copy of that document.

The proposed substation upgrades are related to the EOTP. The EOTP was first included in HECO's 2004 Capital Expenditures Budget, which was filed with the PUC on December 31, 2003.

79 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(t) When did this segment first get discussed in the Integrated Resource Planning process? Please provide a copy of that document.

HECO's current IRP plan, which was filed with the PUC on January 30, 1998, does not analyze the EOTP. Transmission and distribution (T&D) projects generally are not explicitly considered in the IRP process. The general assumption is that existing transmission lines will continue to be in service during the planning period, and that new or reconductored lines will be added as necessary or appropriate for reliability purposes and to provide for adequate transmission capacity, taking into account the location of supply-side resources and load growth.

The study that initially identified the East O'ahu transmission problems that are being addressed by the proposed project (i.e., the July 1991 "East O'ahu 138KV Requirements"

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 55

study, which was updated in August 1992, again in March 1998, and for a third time in the update finalized in December 2003) preceded not only the filing of HECO's first IRP plan in 1993, but also preceded the implementation of IRP in Hawai'i. EOTP is consistent with HECO's first and second cycle IRP Plans, which implicitly assumed that the transmission requirements identified in the studies preceding the plans would be implemented.

80 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(u) How many customers receiving power from this substation have been talking to the utility about ways of decreasing their need for grid-based electricity through on-site generation, efficiency devices and conservation measures? (measured in number of customers, or percent of customers, or load, or percentage of load)

HECO sent out five letters of intent as explained in Docket No. 03-0371 (Distributed Generation Docket) response to LOL-SOP-IR-82, page 20. Life of the Land is a party to the Docket. One of the customers is served by the substations listed above. Another of the customers is served from the Ko'olau Substation. The other three customers are not served by the Ko'olau, Pūkele or the Downtown Substations (listed above). In addition, HECO is working with another Waikīkī hotel on a possible CHP project.

HECO also offers demand side management ("DSM") programs as described in HECO's IRP-2 Evaluation Report filed with the Commission in December 2002. HECO maintains records on the program results, which are filed with the PUC annually in HECO's Annual Program Accomplishments and Surcharge Report ("A&S Report"). The A&S Report provides DSM savings for the entire island of O'ahu. HECO maintains records on the number of DSM applications processed by substation. 819 applications have been processed to date for customers served by the substations listed above. A mix of both commercial and residential DSM measures have been installed under these applications by customers served by these substations.

81 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(v) What is the size (in acres) of the substation? What are the restrictions as to the acreage that buildings/ infrastructure could be built at the substation? What are the restrictions as to the height that buildings/ infrastructure could be built at the substation?

HECO is limited as to how much of a substation property can be developed based on Land Use Ordinance (LUO) zoning or HCDA requirements depending on its location. These requirements are shown in the table below:

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 56

Yard Setback Requirements

TMK	Acres	LUO Zoning/ HCDA Designation	Height Limit (feet)	Front (feet)	Back (feet)	Side (feet)
Kamoku 2-7-19-14	1.220	A-3	350	10	10	10
Kapahulu 3-1-23-55	0.238	R-3.5 (Residential)	25	30	15	15
Kūhiō 2-6-29-22	0.038	Apartment Precinct	220	10	10	10
Waikīkī 2-6-17-64	0.0.2	Apartment Precinct	300	10	10	10
Kewalo 2-3-4-61	0.442	Kaka'ako Community Development District Mauka Area Rules	45	15	10	10
Makaloa 2-3-21-27	0.268	BMX-3	250	5	0	0
McCully 2-3-33-3	0.230	A-2	150	10	10	10

In addition to these requirements, the Institute of Electrical and Electronics Engineers (IEEE) recommends that electrical live parts are located a safe distance from the fence line such that there is a "safety clearance zone." The intent of this zone is to provide a reasonable safety clearance so that if someone were to insert an object through the substation fence, that person would not contact live parts or come close enough to the live parts to cause a flashover. In the case of 46kV equipment, IEEE recommends that equipment be 16 feet back from the fence line.

To put this into perspective, the area of a substation property that is 10,000 square feet (100 feet by 100 feet) that can actually be developed is 2,304 square feet when 10-foot front, back and side set backs and a 16-foot safety clearance zone on all sides are considered.

82 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(w) How much could the substation be expanded (acres, height, number of distribution lines, number of transmission lines, number of subtransmission lines, transformers? Could photovoltaic be installed at the site?

The substations listed are all "landlocked" meaning the substation property boundaries can not be expanded without acquiring additional property from adjacent landowners. In terms of

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 57

additional equipment, based on the current configuration of the substation, land use zoning, other regulatory requirements and technology, the following can be installed in the existing substation sites:

Substation	138-46kV Transformers	138-25kV Transformers	46-12kV Transformers	138kV Transmission Lines	46kV Subtransmission Lines	25kV Distribution Lines	12kV Distribution Line
Kamoku	2	3	0	4	4	12	0
Kapahulu	0	0	0	0	0	0	0
Kūhiō	0	0	0	0	0	0	0
WaikīkI	0	0	1	0	1	0	2
'Ena	0	0	0	0	0	0	0
Kewalo	0	0	2	0	0	0	4
Makaloa	0	0	1	0	0	0	2
McCully	0	0	2 or 0*	0	0 or 2*	0	4 or 0*

*At McCully Substation, there is room to add two new terminations. These can be either two transformers or two lines.

For distributed generation to provide the same reliability improvements as the Kamoku-Pūkele line, it was estimated that at least 200 MW of distributed generation would have to be installed up front in the neighborhoods of Mānoa, Pālolo, Wai'alae/Kāhala, Kaimukī, Kapahulu, McCully/Mō'ili'ili, and WaikīkI. Photovoltaic requires approximately 6 to 7 acres of flat land per megawatt. Therefore, 200 MW would require 1,200 to 1,400 acres of land. This is equivalent to approximately 1.3% to 1.5% of land in the Ko'olau/Pūkele service area that is a part of the State Urban District, assuming that the land is flat, not exposed to salt and fully exposed to the sun, and is available. This amount of land is not available at these substation sites.

83 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(x) The Gas Company has an urban underground gas pipeline in the area -- how close is the nearest gas line? Could on-site generation be built at the site? Please elaborate and include discussion on size (MW), acreage, reliability, load impacts of on-site generation?

The location of the nearest underground gas pipeline from The Gas Company ranges from 10 to 60 feet to the nearest property edge of the Kamoku, Kapahulu, Kūhiō, WaikīkI, 'Ena, Kewalo, Makaloa, and McCully Substations. A fuel source for distributed generation facilities is only one factor when considering the feasibility of installing on-site generation. A detailed study for installing DG at all of HECO's substations in the East O'ahu area was performed in Exhibit 5 of HECO's Application. The result of the analysis concluded that there was inadequate space for DG at HECO's substations to address the Ko'olau/Pūkele Overload Situation. In addition, HECO performed a study on distributed generation to

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 58

address the East O'ahu Transmission problems in March 2000. The March 2000 DG Alternatives Study focused on the practical issues of installing DG as an option to the 138kV partial overhead, partial underground 138kV line between Pūkele and Kamoku Substations. In order to provide the same reliability as the new 138kV line, approximately 200 MW of DG was required to backup the entire Pūkele Substation. Successful implementation of a project of this magnitude would depend on the availability of land in the Mānoa, Pālolo, Wai'alae/Kāhala, Kaimukī, Kapahulu, McCully, Mō'ili'ili and Waikīkī areas, the development of fuel supply and maintenance resources, interconnection requirements, permitting issues and the ability to use existing "emergency" back-up generators for this purpose. Costs for DG were estimated to be several times more expensive than the partial underground, partial overhead Kamoku-Pūkele 138kV transmission line and the conclusion of the study recommended installing the Kamoku-Pūkele line because of economic and practical reasons. A copy of the March 2000 DG Alternatives Study was provided in section 10-A of the Revised EIS for the Kamoku-Pūkele 138kV Transmission Line Project.

84 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

(v) Has HECO considered expanding capacity between this substation and other substations in Waikiki? If not, why not?

HECO interprets the question regarding "expanding the capacity between" the listed substations and other substations in Waikīkī as referring to increasing the current carrying capacity of the 46kV lines that presently serve these substations. The EOTP in part proposes to reconnect the existing 46kV lines in a different electrical configuration with the installation of the new 46kV lines. As explained earlier, the proposed upgrades at the various substations and installation of the proposed 46kV lines are required to provide the ability to shift load from the Pūkele Substation in HECO's Northern 138kV Transmission Corridor to Archer and Kamoku Substations in HECO's Southern 138kV Transmission Corridor. The load shift reduces the load demand at the Pūkele Substation, which in turn results in a lower load demand at the Ko'olau Substation. As a result, the Ko'olau/Pūkele Overload Situation would be resolved for the 20-year period studied. Increasing the capacity of the existing 46kV lines connecting the listed substations would not resolve the East O'ahu transmission problems, whereas shifting loads as described earlier will. The existing lines are adequately sized to facilitate the proposed load shifts. Thus, it is unnecessary to increase the capacities of these existing lines because doing so would add no significant benefit to shifting loads to address the East O'ahu transmission problems.

85 *18. HECO listed several substations that will be upgraded as a result on this project. They include: the Kamoku, Kapahulu, Kuhio, Waikiki, 'Ena, Kewalo, Makaloa, and McCully Substations. HECO states that these substations need upgrading. With regard to each of these substations, please explain the following:*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 59

(z) Has HECO considered expanding capacity between this substation and other substations in Waikiki? If not, why not?

Comment 18(z) is identical to comment 18(y) above. Please see response to comment 18(y).

86 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(a) How does the segment fit into the project?

One circuit is required to connect the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit near the intersection of Mo'oheau Avenue and Winam Avenue in Kapahulu.

For the proposed 46kV line on Pumehana Street (yellow line shown in Figure 3-2 of the Draft EA), another routing option was considered. The purpose of this proposed line is to connect the new Archer 46 46kV underground line near McCully Substation to the existing Pūkele 2 46kV overhead line on Date Street near the intersection of Date and Pumehana Streets. The proposed 46kV line provides a direct underground connection between these two circuits.

Two circuits are required in separate duct lines to connect the new 138-46kV, 80MVA transformer at Kamoku Substation to the existing Pūkele 4 overhead 46kV circuit on Date Street fronting Kamoku Substation in Mō'ili'ili.

The Winam Subtransmission line (brown line, EOTP DEA Figure 3-2), the subtransmission line along Pumehana (yellow line, EOTP DEA Figure 3-2, and the Kamoku Substation Lines (green lines, EOTP DEA Figure 3-2) together with other upgrades and lines proposed for both Phase 1 and Phase 2 of the EOTP are required to address the four East O'ahu Transmission problems identified in Section 2 of the Draft EA.

87 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2): the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(b) What is the total cost and benefit for just the segment?

The benefit that the proposed upgrades at the various substations and installation of the proposed 46kV lines will provide is the ability to shift load from the Pūkele Substation in HECO's Northern 138kV Transmission Corridor to Archer and Kamoku Substations in HECO's Southern 138kV Transmission Corridor. These upgrades, which will be made as part of Phase 1 of EOTP, include the installation of an 80 MVA 138/46kV transformer at Kamoku Substation and two 46kV circuits in separate duct lines. The new 46kV circuits from the 80 MVA transformer at Kamoku Substation will be connected to the existing Pūkele 4 overhead

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 60

46kV circuit on Date Street in Mō'ili'ili. In addition, a connection of the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit will be made as part of Phase 1. This will allow some load from the Pūkele 4 and Pūkele 8 circuits to shift from the Pūkele Substation to the Kamoku Substation. Phase 1 will also include the installation of two new 46kV circuits in an existing single ductline to connect the existing Archer #46 and Archer #41 underground 46kV circuits at Makaloa Substation with the existing Pūkele #2 overhead 46kV circuit near the McCully Substation. This will shift the existing load on the Pūkele 2 circuit to the Archer Substation. The upgrades at the listed substations will be performed in order to increase the capacity and improve the reliability of the existing 46kV system because of the change in line configurations as explained in response to Comment #62.

One circuit is required to connect the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit near the intersection of Mo'oheau Avenue and Winam Avenue in Kapahulu. The estimated design and construction costs for this segment are $370,000.

The purpose of the proposed 46kV line on Pumehana Street (yellow line shown in Figure 3-2 of the Draft EA), is to connect the new Archer 46 46kV underground line near McCully Substation to the existing Pūkele 2 46kV overhead line on Date Street near the intersection of Date and Pumehana Streets. The proposed 46kV line provides a direct underground connection between these two circuits. The estimated design and construction costs for this segment are $483,000.

Two circuits are required in separate duct lines to connect the new 138-46kV, 80MVA transformer at Kamoku Substation to the existing Pūkele 4 overhead 46kV circuit on Date Street fronting Kamoku Substation in Mō'ili'ili. The estimated design and construction costs for this segment are $438,000.

88 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(c) What other routes were considered for this project?

For the proposed 46kV line on Winam Avenue (brown line shown in Figure 3-2 of the Draft EA), no other routes were considered. The purpose of this proposed line is to connect the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue, which is perpendicular to Winam Avenue, to the Pūkele 8 overhead 46kV circuit on Winam Avenue. At this particular location, the Pūkele 4 and Pūkele 8 circuits are approximately 420 feet away from each other. Connecting these circuits at another location would be much more circuitous and require routing through the same type of residential area as the current proposal.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 61

For the proposed 46kV line on Pumehana Street (yellow line shown in Figure 3-2 of the Draft EA), another routing option was considered. The purpose of this proposed line is to connect the new Archer 46 46kV underground line near McCully Substation to the existing Pūkele 2 46kV overhead line on Date Street near the intersection of Date and Pumehana Streets. The proposed 46kV line provides a direct underground connection between these two circuits. Another routing option considered was to utilize the existing Archer 41 46kV circuit on Pumehana Street to make this connection. To use this circuit, the new Archer 46 46kV underground line would have to be connected to the Archer 41 circuit at McCully Substation and a new 46kV underground connection would have to be made at the intersection of Date and Pumehana Streets to connect the Archer 41 circuit to the Pūkele 2 circuit. This option would cost less but would eliminate the operational flexibility currently available with the existing Archer 41 circuit. The Archer 41 circuit currently has no current flow under normal operating conditions, which makes this circuit readily available for use in contingency situations such as maintenance or unplanned outages. The proposed line maintains no current flow in the Archer 41 circuit while the other option would put this circuit into daily operation.

For the proposed 46kV lines out of Kamoku Substation (green lines in shown in Figure 3-2 of the Draft EA), no other routes were considered. The purpose of these proposed lines is to split the existing Pūkele 4 overhead 46kV line into two separate circuits. The Pūkele 4 line runs along Date Street fronting the Kamoku Substation. Therefore, no other practical routing options are available for these new circuits.

89 *19. For the W'inam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(d) What other technologies were considered for this project?

HECO has evaluated other technologies for mitigating the described transmission problems. (Refer to Section 2 of the Draft EA). Some of the technologies studied are included in Section 3.2.3.5, which included newer generation technology such as renewable resources, DG at HECO substations, and CHP. Various factors were considered when reviewing these options, which include cost, land requirements, permitting requirements and the operation and maintenance costs for generating units compared to transmission facilities. These options were not feasible for different reasons which include higher cost compared to EOTP, inadequate land space, and inability for the option to address the transmission overloads and reliability concerns that the EOTP is designed to resolve. In addition, transmission technologies such as static and dynamic line re-rating, re-tensioning and re-conductoring were considered. These transmission technologies were not feasible because of higher costs compared to EOTP, the process would be time consuming, difficult, and expensive, particularly given the logistics of stringing new conductors in the mountainous areas traversed by the lines, and the work would necessitate prolonged outages of the lines, which would increase the possibility of an overload occurring if a second line serving the Ko'olau Substation becomes unavailable for any reason. HECO also hired an independent third-party

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 62

consultant to review the feasibility of performing live line maintenance on the transmission lines. The consultant concluded that live line maintenance was not practical for much of the HECO system.

90 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(e) When did HECO first consider implementing this segment?

The proposed 46kV line on Winam Avenue (brown line shown in Figure 3-2 of the Draft EA) and the 46kV lines out of Kamoku Substation (green lines in shown in Figure 3-2 of the Draft EA) were first considered in early 2003.

The proposed 46kV line on Pumehana Street (yellow line shown in Figure 3-2 of the Draft EA) was first considered in 2004.

91 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(f) Please provide a list of all HECO documents that make reference to this segment.

As this request for documents is not a comment on the Draft EA, no response is required.

92 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(g) What would be the cost and benefit of the EOTP if all components of the EOTP were built except for this segment? (1) Would reliability increase for anyone? If so, for whom? (2) Would the Pukele Substation Reliability Concern be impacted? If so, how? (3) Would the Koolau/Pukele Overload Situation be impacted? If so, how? (4) Would the Downtown Substation Reliability Concern be impacted? If so, how? (5) Would the Downtown Overload Concern be impacted? If so, how? What segment of the population would remain vulnerable? Why?

The benefit that the proposed upgrades at the various substations and installation of the proposed 46kV lines will provide is the ability to shift load from the Pūkele Substation in HECO's Northern 138kV Transmission Corridor to Archer and Kamoku Substations in HECO's Southern 138kV Transmission Corridor. For example Phase 1 of EOTP includes the installation of a 80 MVA 138/46kV transformer at Kamoku Substation and two 46kV circuits in separate duct lines. The new 46kV circuits from the 80 MVA transformer at Kamoku

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 63

Substation will be connected to the existing Pūkele 4 overhead 46kV circuit on Date Street in Mō'ili'ili. In addition, a connection of the existing Pūkele 4 overhead 46kV circuit on Mo'oheau Avenue with the existing Pūkele 8 overhead 46kV circuit will be made as part of *Phase 1. This will allow some load from the Pūkele 4 and Pūkele 8 circuits to shift from the* Pūkele Substation to the Kamoku Substation. Phase 1 will also include the installation of two new 46kV circuits in an existing single ductline to connect the existing Archer #46 and Archer #41 underground 46kV circuits at Makaloa Substation with the existing Pūkele #2 overhead 46kV circuit near the McCully Substation. This will shift the existing load on the Pūkele 2 circuit to the Archer Substation. The upgrades at the listed substations will be performed in order to increase the capacity and improve the reliability of the existing 46kV system because of the change in line configurations as explained in response to 1014-62.

Please refer to the response to Comment #71 for an explanation on how the Pūkele and Downtown Substation Reliability Concerns are addressed with the EOTP.

Please refer to the response to Comment #72 for an explanation on how Ko'olau/Pūkele and Downtown Overload Situations are addressed with the EOTP.

The design and construction costs for the listed line segments are as follows:

Winam Avenue	$370,000
Pumehana Street	$483,000
Kamoku Substation lines	$438,000

Without implementing all of the described line circuit connections and substation upgrades, load could not be transferred from the Pūkele Substation to Archer and Kamoku Substations. Thus, the East O'ahu transmission problems would still exist and the populations served by the Ko'olau, Pūkele, and Downtown Substations would remain vulnerable.

93 *19. For the Winam Subtransmission Line(brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(h) Using Generally Acceptable Accounting Procedures, what is the total cost of this segment (including the interest payments)?

HECO interprets the reference to "Generally Acceptable Accounting Procedures" to mean "Generally Accepted Accounting Principles (GAAP)." Using GAAP, the total estimated design and construction costs of the segments including interest payments are shown below:

Winam Avenue	$370,000
Pumehana Street	$483,000
Kamoku Substation lines	$438,000

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 64

94 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(i) What is the interest rate and discount rate used by the utility in pricing out alternatives?

When HECO evaluated the revenue requirements for these utility options, HECO used the forecast long-term weights and rates of the various financing instruments that comprise HECO's capital structure. The interest rates assumed were as follows: Short-term debt (6%); Long-term debt (6.5%); and Preferred Stock (8%).

Discount rates of 0%, 3%, 8.4%, and 12% were used in the NPV of annual revenue requirement calculation, as one method in evaluating the economics of the various options.

95 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(j) Does HECO consider only the cost of the infrastructure (lines, on-site generation)? How does the utility account for differences in the price of fuels (oil, sunlight)?

No, HECO does not consider only the cost of infrastructure. HECO includes initial installation, removal, new cycle, operation and maintenance, and transmission system losses. Transmission system losses were calculated for each 46kV alternative relative to the Kamoku-Pūkele 138kV Underground Transmission Line (high pressure fluid filled [HPFF]) alternative. Differences in fuel costs was not a factor in the 46kV alternative selection process because the installation of any alternative would have a negligible effect on system transmission losses, which in turn would have a negligible effect on power generation.

96 *19. For the Winam Subtransmission Line((brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(k) When did this proposed segment first appear in any engineering study? Please provide a copy of that document.

The first engineering study that the proposed 46kV line on Winam Avenue (brown line shown in Figure 3-2 of the Draft EA) and the 46kV lines out of Kamoku Substation (green lines in shown in Figure 3-2 of the Draft EA) appeared in was the "East O'ahu Transmission Project Alternatives Study Update" dated December 2003 which was filed as Exhibit 5 with HECO's Application before the PUC on this project.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 65

The first engineering study that the proposed 46kV line on Pumehana Street (yellow line shown in Figure 3-2 of the Draft EA) appeared in was a HECO memo dated July 16, 2004, which was filed as Exhibit HECO-ST-201 in HECO's Supplemental Testimonies before the PUC on this project.

97 *19. For the Winam Subtransmission Line(brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(l) When did this proposed segment first appear in HECO's Capital Expenditure Budgets filed yearly with the PUC? Please provide a copy of that document.

The proposed substation upgrades are related to the EOTP. The EOTP was first included in HECO's 2004 Capital Expenditures Budget which was filed with the PUC on December 31, 2003.

98 *19. For the Winam Subtransmission Line(brown line, EOTP DEA Figure 3-2); the Subtransmission Line along Pumehana et al (yellow line, EOTP DEA Figure 3-2); and the Kamoku Subtransmission Lines (green lines, EOTP DEA Figure 3-2), please explain the following:*

(m) When did this segment first get discussed in the Integrated Resource Planning process? Please provide a copy of that document.

HECO's current IRP plan, which was filed with the PUC on January 30, 1998, does not analyze the Winam Subtransmission Line, the Subtransmission Line along Pumehana et al or the Kamoku Subtransmission Lines as described above. T&D projects generally are not explicitly considered in the IRP process. The general assumption is that existing transmission lines will continue to be in service during the planning period, and that new or reconductored lines will be added as necessary or appropriate for reliability purposes and to provide for adequate transmission capacity, taking into account the location of supply-side resources and load growth.

The study that initially identified the East O'ahu transmission problems that are being addressed by the proposed project (i.e., the July 1991 "East O'ahu 138KV Requirements" study, which was updated in August 1992, again in March 1998, and for a third time in the update finalized in December 2003) preceded not only the filing of HECO's first IRP plan in 1993, but also preceded the implementation of IRP in Hawai'i. EOTP is consistent with HECO's first and second cycle IRP Plans, which implicitly assumed that the transmission requirements identified in the studies preceding the plans would be implemented.

99 *20. Power Factor (Average Usage): What is the power factor (or average use or average percent of capacity used) on the Downtown transmission and subtransmission grids? What is the power factor in the Kamoku transmission service area?*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 66

The commenter's parentheticals confuse the meaning of "power factor." When defining terms used to describe electricity use, active power represented as "P" and measured in watts (W) or megawatts (MW) is commonly referred to as the average power, real power, or true power. Real power occurs when the voltage is in phase with the current. Apparent power represented as "S" and measured in volt-amperes (VA) or megavolt-amperes (MVA) is made up of active power and reactive power. Reactive power measured in volt-amperes-reactive (VAR) or megavolt-amperes-reactive (MVAR) occurs when the voltage is out of phase with the current and is represented as "Q." Some customer loads have characteristics which cause the voltage and current to be out of phase with each other such as an induction motor, which causes the current to lag behind the voltage and results in reactive power. Power factor refers to the ratio between real and apparent power (P divided by Q).

The power factor for power flowing through each of the three 138kV lines serving the Downtown Area Substations is based on 2003 Day Peak conditions, which were simulated using the PSS/E load flow model. The power factor for power flowing through the Halawa-School 138kV transmission line at the School Street Substation is 0.96. The power factor for power flowing through the Halawa-Iwilei 138kV transmission line at the Iwilei Substation at the Iwilei Substation is 0.965. The power factor for the power flowing through the Makalapa-Airport-Iwilei 138kV transmission line at Iwilei Substation is 0.93. The Power factor for the subtransmission system in the Downtown area is not readily available. The power factor for power flowing through the Kewalo-Kamoku 138kV transmission line measured at Kamoku Substation is 0.93.

100 *21. In the downtown area, can future overload issues be deferred through locating power conditioning systems (such as ElectroFlow, www.electroflow.com/) at Transmission Substations, Distribution Substations and/or for major loads?*

HECO has not evaluated the devices referred to by the commenter and cannot make a representation as to such devices' safety, efficacy, efficiency, or cost-effectiveness. Based on the information from the website, the ElectroFlow device is designed to address industrial and commercial power quality issues. ElectroFlow claims that their device can perform a variety of functions such as power factor correction, harmonic filtering and three phase balancing. ElectroFlow claims that this optimization of the load will lead to a reduction in real power (MW), reactive power (MVAR) and apparent power (MVA), and as a result, load can be added without changing existing transformers or distribution systems within a commercial plant.

This type of power conditioning device does not exist for application on high-voltage bulk transmission systems (e.g., 138kV substations where various loads are fed). Individual customers on the HECO system could evaluate whether a power conditioning system could benefit its operations. If installed by individual customers, these devices could hypothetically result in some reduction of power demand, although the reduction is expected to be very small to the utility unless multiple customers utilize these devices. The Downtown Overload Situation occurs because the current flowing through the 138kV transmission line exceeds the current carrying rating of the line when two of the other 138kV transmission lines feeding the

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 67

downtown area are unavailable. The current flow is based on the amount of load demand from the Downtown Area Substations, which can be from the addition of new loads (i.e. new businesses or residential communities) and an increase in power consumption from existing loads. The increase in load demand is the driving factor for line overloads rather than power conditioning issues. Therefore future overload issues will not be deferred by installing power conditioning systems at transmission or distribution systems. In summary, individual customers could decide that a power conditioning device is a worthwhile investment, however the impact to the HECO system would be small and overloads would most likely not be deferred.

101 *22. In the downtown area, can HECO increase reliability and/or defer new load requirements through the addition of harmonic filtering, surge suppression, transient suppression, etc at Transmission Substations, Distribution Substations and/or for major loads?*

The HECO transmission system in general does not have reliability issues attributable to harmonics. Therefore addition of harmonic filtering on the transmission system serving the Downtown area will not increase the reliability of the system. If harmonic issues arise, they will most likely be with individual customer's equipment that can be resolved on a case-by-case basis.

It is unclear from the question what is meant by new load requirements. New load requirements can refer to load growth on the HECO system, which includes the addition of new loads (i.e. new businesses or residential communities) and an increase in power consumption from existing loads. The addition of harmonic filtering will not defer this new load growth. New load requirements can also refer to requirements from the customer on the quality of power (i.e. acceptable voltage, current and frequency deviations) that is delivered. For this situation, a power quality problem can be defined as any problem caused by voltage, current, or frequency deviations that result in failure or misoperation of customer equipment. The Pūkele Substation Reliability Concern and the Downtown Substation Reliability Concern deal with HECO's ability to serve the load demand at these substations and is not a power quality issue. Therefore installing harmonic filtering is not an alternative to the EOTP.

Surge suppression and transient suppression are used when protecting against overvoltage situations that could occur under circumstances such as lightning strikes to transmission equipment. HECO currently does not have issues with overvoltage protection for the transmission system serving the Downtown area as a whole. Reliability will not be increased with the addition of surge suppression or transient suppression. If overvoltage situations exist, HECO will address them on a case-by-case basis. Surge suppression and transient suppression will not defer new load growth. The Pūkele Substation Reliability Concern and the Downtown Substation Reliability Concern deal with HECO's ability to serve the load demand at these substations and is not an issue about overvoltage protection. Therefore installing surge suppression and transient suppression is not an alternative to the EOTP.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 68

102 *23. In the Kamoku transmission service area, can future overload issues be deferred through locating power conditioning systems (such as ElectroFlow, www.electroflow.com/) at Transmission Substations, Distribution Substations and/or for major loads?*

See response to Comment #100.

103 *24. In the Kamoku transmission service area, can HECO increase reliability and/or defer new load requirements through the addition of harmonic filtering, surge suppression, transient suppression, etc at Transmission Substations, Distribution Substations and/or for major loads?*

See response to Comment #101.

104 *25. In the downtown service area, are some transmission components less effective due to excessive heat?, and in turn, is this affecting power quality in the area?*

In the service area served by the Downtown Substations, HECO is not aware of specific components that are overheating and therefore operating under a derated rating.

105 *26. What are the benefits of increasing the power factor in a transmission service area?*

Theoretically, the benefit of increasing the power factor in a transmission service area is that the reactive power is reduced, which would result in a small decrease in transmission losses and current flowing through the transmission lines. In addition, adding devices that can supply reactive power (VARS) will not be required for the transmission system which would reduce cost. The VAR capability of HECO's generating units and the operation of existing capacitors at Hālawa, Ko'olau, Makalapa and Pūkele Substation are able to manage the reactive requirements on the HECO system. Therefore increasing the power factor may result in a small benefit in the form of possible transmission loss savings and slight decrease in line currents. It should be noted that power factor on a networked transmission system will change from time to time depending on how loads are distributed over the network.

106 *27. Can power needs be reduced through the installation of capacitors at strategic points on the distribution system?*

Theoretically, installing capacitors at locations such as distribution substations could reduce VAR losses, which will result in lowering the demand for power. Note that HECO tariff rules contain provisions that specify that a customer with low power factors must provide power factor correction at the customer's expense to not less than 0.85 power factor. Some of HECO's rate schedules offer incentives for power factor correction. KWh and KVARh meters are installed at the customer site and the power factor for the customer facility is calculated. Also as explained earlier, the power factors on the transmission system for the Downtown Substations range from 0.93-0.965 and for the Ko'olau and Pūkele Substations the power factors range from 0.98 to unity.

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 69

107 *28. Would the additional of capacitors at transmission/ distribution substations improve power quality and reliability?*

Adding capacitors on the distribution system can theoretically improve the power quality of the distribution system because capacitors used on a radial distribution system can improve the power factor so that it approaches 1.0. Increasing the power factor on the distribution system reduces the amount of reactive power, which translates to an improvement in power quality. But capacitors on the distribution system would not improve the reliability of the system because capacitors cannot replace real power. For example, in the case where a customer installs a capacitor at his business and it helps to improve the power quality of his system, if the line feeding this customer is suddenly lost, the capacitor is unable to transmit real power to the customer. Therefore reliability to the customer is not improved.

Hypothetically, adding capacitors on the transmission system could provide voltage support to areas of the system where there are low voltage issues. With the operation of the Honolulu Power Plant and operation of existing capacitors at Hālawa, Ko'olau, Makalapa and Pūkele Substation, there are no voltage violations on the HECO system for 20-year period studied for the EOTP. Therefore, adding capacitors to the HECO system at this time would not improve power quality. Capacitors on the transmission system would not improve reliability of the transmission system for the same reasons as stated for the distribution system above.

108 *29. Can T&D efficiencies be improved so as to decrease the need for new load (capacity)?*

From the context of the previous questions, HECO interprets the term "T&D efficiencies" to refer to improvement of the transmission system and distribution system power factors. Hypothetically, the power factor for the transmission and distribution system could be increased to near unity, which would improve the efficiency of the T&D system because there would be a smaller reactive power factor. This would require that reactive equipment such as capacitors be installed at the customer sites to correct customer power factors to unity along with capacitors at distribution substations because distribution lines and transformers also affect the power factor and capacitors at the transmission level. An analysis has not been done to determine the impact of efficiency improvements on the T&D system. Note, however, that (1) the power factor on the system will change throughout the day and therefore it would be difficult to continually set the power factor of the T&D system to unity and (2) load growth on the HECO system includes the addition of new loads (i.e. new businesses or residential communities) and increases in power consumption from existing loads. This load growth would overcome the small decrease in load demand from increasing the efficiency of the T&D system and the EOTP would still be needed in order to address the identified East O'ahu transmission problems.

109 *30. Has HECO analyzed power factors on its transmission system?*

Power factor analysis is not generally done for the transmission system. Power factor is the ratio of active power to apparent power as described in response to Comment #99. Power factor at the distribution level is generally associated with customer load and will depend on

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 70

what types of equipment customers install. For instance a commercial customer that has large motors to run its operation will have a lower power factor compared to a residential customer load. Although a power factor analysis is not performed for the HECO transmission system, there are instruments at the substations that measure the amount of real and reactive power, which can be used to calculate the power factor on the various transmission lines. As previously noted in this response letter, the various lines serving the Downtown area have power factors that range from 0.93 through 0.965, which approach the ideal power factor of unity. These are based on measured power factors for 2003 Day Peak conditions. The power factors for the Ko'olau/Pūkele transmission lines range from 0.98 to unity.

110 *31. Has HECO investigated the potential for increasing the use of capacitors and/or capacitor banks on its transmission system?*

Yes, HECO has looked at installing additional capacitor banks on the transmission system in other studies. As noted earlier in this response, installing capacitors will not resolve the East O'ahu Transmission problems and the EOTP is still needed.

111 *32. What is the relationship between power factor and capacity?*

Power factor refers to the relationship between real and apparent power (i.e. MW to MVA). Active power represented as "P" is also commonly referred to as the average power, real power, or true power. Apparent power represented as "S" defines the capacity of apparent power in MVA that is required to deliver P. In other words, apparent power is defined by the amount of active power, P, and reactive power referred to as "Q." For example, if a customer load is 100 MW at a 0.90 power factor, the customer transformer must be rated at least 100 MW/0.90 = 111 MVA (The customer is the interconnection point between the utility and the customer, where the power is transformed from a higher voltage to a level that the customer can utilize.).

112 *33. Regarding the March 3, 2004 outage: (a) What steps have been taken, but have not been finished, that need to be completed to prevent the recurrence of such an outage? (b) What steps have not been taken, but need to be completed to prevent the recurrence of such an outage?*

With regard to the March 3, 2004 outage at Pūkele Substation, a subsequent investigation (May 11, 2004 report filed with the PUC) identified various short and long term actions to prevent the recurrence of such an outage. All identified short-term actions have been completed. These actions included replacing defective communication modules (suspected cause of the outage) and rearranging communication signals to prevent unnecessary tripping of circuit breakers. As a long-term action, the investigation noted that if the Proposed Action had been in place on March 3, 2004, most customers in the Pūkele Substation service area would have been unaffected when the two 138kV transmission lines serving Pūkele went out of service. The remaining customers would have experienced at most a 6-second interruption in service. HECO is currently seeking approval from the PUC to implement the Proposed

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 71

Action. Therefore, all identified actions from the investigation that would prevent the recurrence of a similar outage have been completed or are underway as noted above.

113 *34. HECO (2004): "Pukele Substation serves about one-sixth of Oahu's power demand" (a) Does this statement mean that the Pukele service area accounts for one-sixth of HECO's total electricity produced in a typical year? (b) Does this statement mean that the Pukele service area accounts for one-sixth of HECO's total electricity produced in the one hour period when the island system is peaking? (c) Does this statement mean that the Pukele service area accounts for one-sixth of HECO's total electricity produced in the one hour period when the Pukele service area is peaking?*

The statement the "Pūkele Substation serves about one-sixth of O'ahu's power demand" represents the relationship between the load demand of the Pūkele Substation to the load demand of the entire HECO system at the time of the Day Peak. For example, in 2002, the Day Peak was 1,168 MW net (not accounting for generating unit auxiliaries and system losses) and the Pūkele Substation load at the time of the Day Peak was 192 MW. Therefore 192 MW divided by 1,168 MW x 100 percent equals approximately 16 percent, which can be approximated in fractional form to 1/6.

114 *35. HECO (2004): "For noise, contractors will be required to abide by Department of Health noise permits and variances" What are the typical variances that HECO requests for this type of construction?*

The only variance HECO seeks is the ability to work in the evening. As part of the variance, allowable noise levels are prescribed. Generally, the variance requires that all "noisy work" be performed early in the evening. In addition to this, sound recorders are placed on site to ensure compliance. Should high noise levels be observed or recorded, HECO will initiate corrective action immediately.

115 *36. HECO (2004): "HECO has also met and continues to work closely with the descendents of the Hawaiian families who are associated with the ahupuaa in which this project lies to gain their insights and hear their concerns." (a) Which ahupuaa are you referencing? (b) Which Hawaiian families are you consulting with?*

Your comment references testimony before the Public Utilities Commission on Docket No. 03-0417, East O'ahu Transmission Project, on September 1, 2004. To respond to your questions regarding this testimony, the project area lies within the ahupua'a of Honolulu and Waikīkī. A coalition of Hawaiian families who have been recognized as cultural descendants in Waikīkī by the State Historic Preservation Division, Burials Program, were contacted regarding this project.

116 *HECO (2004): "With respect to the facilities of other utilities, HECO would coordinate scheduling with those agencies to minimize construction in the same area at the same time." (a) Doesn't it make more sense the coordinate construction with other agencies to maximize construction in the same area at the same time? (b) If more than one agency performs*

Mr. Henry Q Curtis
January 7, 2005
2004.33.0800 / 04EP-236
Page 72

simultaneous construction, wouldn't (1) the total construction time go down?; and (2) the total cost of construction go down?

HECO routinely meets with other utilities and government agencies regarding their activities and upcoming projects. As part of that effort, HECO will coordinate its scheduling with other agencies to minimize construction activities in the same area. This serves to avoid a situation where work zones overlap and/or the traffic control from one project impacts another. An example of this situation occurred in Pearl City, where DOT was working on H1 and HECO was constructing a ductline on Kamehameha Highway. When DOT issued advisories to H1 motorists to use alternate routes, HECO suspended work on Kamehameha Highway.

Multiple installations in the same area/same time (including joint trenches) are usually precluded by technical requirements, material costs, and increased construction impacts.

Technical requirements: Gas, water, sewer, electric and communication lines, require minimum separation distances (relative to each other). This would result in a net increase of excavated and backfilled material if simultaneous construction were undertaken.

Cost: The actual per unit cost for each utility installation increases.

Construction Impacts: The wider deeper trenches result in more traffic impact (more lane closures), and extended work duration at each location.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

City and County of Honolulu • State of Hawaii

October 8, 2004

FILED
Oct 8 1 52 PM '04
PUBLIC UTILITIES COMMISSION

Carlito Caliboso, Chair
Janet Kawelo, Member
Wayne Kimura, Member
Public Utilities Commission

Dear Mr. Caliboso, Ms. Kawelo, and Mr. Kimura:

SUBJECT: East Oahu Transmission Project (Docket No. 03-0417)

Chair Caliboso and members of the Commission, thank you for the opportunity to testify on this significant concern of our constituency.

We understand that there are many other concerned citizens that have expressed or will be expressing their concerns on various aspects of this proposed project. For the purpose of brevity, we will focus our comments on HECO's recommended routing of its 46kV transmission line as proposed in Phase 1 of this proposed project (installation of a 46kV transmission line between the Makaloa and McCully Substations). We believe that HECO should utilize the route identified as Alternative Alignment 1 in its Draft Environmental Assessment instead of its recommended proposal.

HECO's proposal is that the 46kV transmission line be routed through a largely residential area and alongside Lunalilo School. Due to the potential health risks to children that exposure to electromagnetic fields (EMF) poses, we recommend that HECO utilize the alternative alignment it describes in its Draft Environmental Assessment, (Alternative Alignment 1, Item 3.2.2.1.1, page 3-45-46), as the preferred transmission line alignment. This alternative alignment would route the transmission line primarily along Kapiolani Boulevard, thus avoiding potential exposure by the students and faculty of Lunalilo School to EMFs emitted by the transmission line.

Under HECO's recommended proposal, in certain areas, existing ductlines and conduits will be used for the routing of 46kV transmission line. According to the information provided by HECO, much of this existing ductline is routed under, or very close to, existing residences and Lunalilo School, particularly in the Fern Street area. HECO's recommendation would put the 46kV transmission lines closer to where people live, work, and go to school, thus increasing their exposure to EMFs.

Although no "smoking gun" has been found that directly links EMF exposure to certain diseases, EMF exposure has been linked to the occurrence of childhood leukemia by the National Institute of Environmental Health Sciences (NIEHS). In addition, in a recent risk evaluation conducted by three scientists on behalf of the California Public Utilities Commission, all three scientists were inclined to believe that EMF exposure can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's Disease, and miscarriage (Executive Summary, California EMF Risk Evaluation Study 2002).

We understand that HECO's position on EMF exposure is that studies have indicated that there is no conclusive evidence that links power line configurations (wire codes) with illnesses such as childhood leukemia. However, the NIEHS states that, although there is no conclusive evidence linking power line configurations to childhood leukemia, there is an association between measured fields of EMFs and childhood leukemia.

In fact, in a recent meta-analysis of nineteen studies related to residential EMF exposure and childhood leukemia conducted by Daniel Wartenberg, PhD, and funded by the Public Health Institute of the California Department of Health Services and the NIEHS, Dr, Wartenberg determined that it was not uncommon for individual EMF studies to be inconclusive with regard to finding a link between EMF exposure and childhood leukemia. However, his meta-analysis found that when the results of the studies he reviewed are combined, ". . . many people believe there are no data to support an association between residential magnetic field exposure and childhood leukemia. To the contrary, the data strongly and relatively consistently support such an association, although the estimated magnitude of risk is moderate." The meta-analysis goes on to conclude that, "[i]f one chooses to use these summary estimates for interpretation, given the widespread exposure to magnetic fields the suggest perhaps as much as a 15-25% increase in the childhood leukemia rate, which is a large and important public health impact."[1]

It can be argued that the findings of this meta-analysis carry more credibility than findings of an individual study in that when utilized properly, meta-analytic tools create a composite estimate with greater statistical power than individual studies.

According to our review of existing research material on this issue, of the forty-four studies conducted across the world on this issue since 1979, ten studies found some association between EMFs and an adverse human health condition. Of those ten, seven found an increased health risk to children.

Exposure to measured fields of EMFs can be likened to the constant adding of additional weight (additional EMF exposure) to a camel's back (human body). At some point, any additional weight (EMF exposure) will cause the camel's back to

[1] Wartenberg D. Residential EMF Exposure and Childhood Leukemia: Meta-Analysis and Population Attributable Risk. Bioelectromagnetics Supplement 5: S86-S104, 2001

break or, in the case of a human, adverse consequences to the person's health and well being. While a certain amount of EMF exposure is unavoidable in our everyday lives (e.g., EMFs emitted from televisions, microwave ovens, etc.), we as a society can do something about lessening the amount of any additional EMF exposures experienced by our citizens. Aligning HECO's 46kV transmission line along HECO's proposed Alternate Alignment 1 would help avoid the unnecessary additional EMF exposure by humans along Fern Street and at Lunalilo School because it would: (1) require HECO to route its power line down the middle of Pumehana Street, rather than close to residences as proposed in HECO's recommendation; and (2) avoid additional EMF exposure to children attending Lunalilo School.

Regardless of findings that power line configurations probably have limited, if any, effect on human health and well being, the fact that another significant emitter of EMFs is being placed in a residential area and next to Lunalilo School only increases the risk of additional long term exposure to EMFs. Studies have indicated that, at certain measured levels, long term exposure to EMFs have been linked to human illness (e.g., chronic lymphocytic .leukemia in adults and childhood leukemia).

With this in mind, the most prudent and logical course of action would be to keep large-scale EMF emitters (e.g., 46kV transmission lines) away from schools and residences. Although routing the proposed 46kV transmission line between the Makaloa and McCully Substations would be more cost effective for HECO since it utilizes, to a certain extent, existing ductlines; in the long term, the potential health risk to area residents (since existing ductlines and conduits are so close to residences) and to schoolchildren outweighs HECO's short-term cost savings on this project.

In its Draft Environmental Assessment, HECO states that if the Alternative Alignment 1 is used, additional inconvenience may be encountered by motorists due to the need to excavate sections of Kapiolani Boulevard in order to underground the 46kV transmission line. However, this inconvenience to motorists and immediate area residents could be easily mitigated, and the construction costs to HECO minimized, if HECO collaborated with the Honolulu Board of Water Supply in its existing eighteen-month Kapiolani Boulevard water and sewer line improvement project.

We contacted Clifford S. Jamile, Manager and Chief Engineer of the Honolulu Board of Water Supply, and obtained an outline of their project's scope, timeline (see attached correspondence from Board of Water Supply). According to the Board of Water Supply's project outline, the Board's Kapiolani Boulevard water and sewer line improvement project is anticipated to begin on July 5, 2005, and scheduled to be completed on March 31, 2007.

This water and sewer line improvement project tracks along the exact same traffic corridor as HECO's Alternative Alignment 1, with the exception of the diversion up Kaheka Street and onto Makaloa Street on the westernmost section, and the extension from Kalakaua Boulevard and onto Pumehana Street on the southeasternmost boundary of HECO's Alternative Alignment 1. The project timeline of the Board of

Water Supply's project could coincide with HECO's 46kV transmission line installation project. If HECO collaborates with the Board of Water Supply and coordinates the implementation of their respective projects, both entities could realize reduced construction costs and lessen the inconvenience to area residents and motorists.

As such, we believe that by utilizing the Alternative Alignment 1 of HECO's Draft Environmental Assessment HECO has the opportunity to safeguard the health of area residents and Lunalilo School attendees by ensuring that the 46kV transmission line is aligned in a manner that, as much as possible, mitigates the potential adverse effects of EMF exposure. Use of the Alternative Alignment 1 also provides an opportunity for the private (HECO) and public sector (Board of Water Supply) to work together to lessen inconveniences to the public and to reduce costs. Such collaboration would truly be a "win-win" solution to this issue and serve as a model for public/private sector collaboration.

In closing, we ask that the Commission accede to the community's request to require HECO to reroute its proposed installation of a 46kV transmission line between the Makaloa and McCully Substations from its current proposed route to a route that primarily follows Kapiolani Boulevard as described in Alternative Alignment 1 of its Draft Environmental Assessment.

Sincerely,

Carol Fukunaga, Senator
11th District (Makiki-Pawaa-Punchbowl)
Hawaii State Senate

Scott K. Saiki, Representative
22nd District (Moiliili-McCully-Kaimuki)
Hawaii State House of Representatives

Ann Kobayashi, Councilwoman
5th District (Kaimuki-Manoa-McCully-Kakaako)
City Council of the City and County of Honolulu

FILED
Oct 8 1 52 PM '04
PUBLIC UTILITIES
COMMISSION

BOARD OF WATER SUPPLY

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

October 1, 2004

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
HERBERT S.K. KAOPUA, SR.
DAROLYN H. LENDIO

RODNEY K. HARAGA, Ex-Officio
LARRY J. LEOPARDI, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

DONNA FAY K. KIYOSAKI
Deputy Manager and Chief Engineer

The Honorable Carol Fukunaga
Senate
State Capitol, Room 216
Honolulu, Hawaii 96813

Dear Senator Fukunaga:

Subject: Your Letter of September 30, 2004 on Timeline for Kapiolani Boulevard Water Line Project

Our 12-inch water main along Kapiolani Boulevard is to be installed during the same time frame as the rehabilitation of the 36-inch sewer main from Kalakaua Avenue to Ward Avenue. In addition, the 12-inch water main along Atkinson Drive from Kapiolani Boulevard to Ala Moana Boulevard will be replaced, and the 36-inch sewer main along Kamakee Street from Kapiolani Boulevard to Auahi Street will be rehabilitated.

We will solicit bids on the joint project in mid-January 2005 and begin construction in May 2005. The duration of the project is 18 months with a completion of late October 2006. After the installation of the water and sewer mains, Kapiolani Boulevard will be resurfaced under a separate contract.

If you have any questions, please contact Howard Tanaka at 748-5700.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

FILED
OCT 8 1 52 PM '04
PUBLIC UTILITIES
COMMISSION

Water for Life . . . Ka Wai Ola

KAPIOLANI BOULEVARD WATER AND SEWER LINE IMPROVEMENTS

PROJECT SCHEDULE

6-Oct-04

Notes: 1) Tentatively, no construction will be allowed from November 22 to January 3. (Dates to be revised as required.)
2) Night work will be utilitized to the maximum extent possible

Plans and Specifications	October 15, 2004	
File Noise Variance	November 1, 2004	
Public Relations		
Public Meetings (4 meetings)	December 1, 2004 to	March 31, 2007
Business Meetings		
The Bus		
Oahu Transportation Orgainization		
Waikiki Business Association		
Ala Moana Center		
Hawaii Convention Center		
Hawaiian Groups		
etc....		
Approval by DPP	January 31, 2005	
Final Noise Variance Approval	Februray 15, 2005	
Advertise & Bid	February 14, 2005	
Bid Opening	March 24, 2005	
Complete Contract Execution	May 2, 2005	
NTP	May 10, 2005	
Start Construction	July 5, 2005	
Kapiolani Boulevard from Ward to Kamakee		
Water line Replacement Work		
Kapiolani Boulevard from Kamakee to Kalakaua		
Sewer Rehabilitation Work		
Water line Replacement Work		
Curb Ramp Upgrade (7 Each)		
Kamakee Street from Auahi to Kapiolani		
Sewer Rehabilitation Work		
Atkinson from Kapiolani to Ala Moana		
Water line Replacement Work		
Curb Ramp Upgrade (2 Each)		
Kalakaua Anvenue from Ala Wai Bridge to Kapiolani		
Construction Sewer Force Main and Appertenances		
Project completion	March 31, 2007	

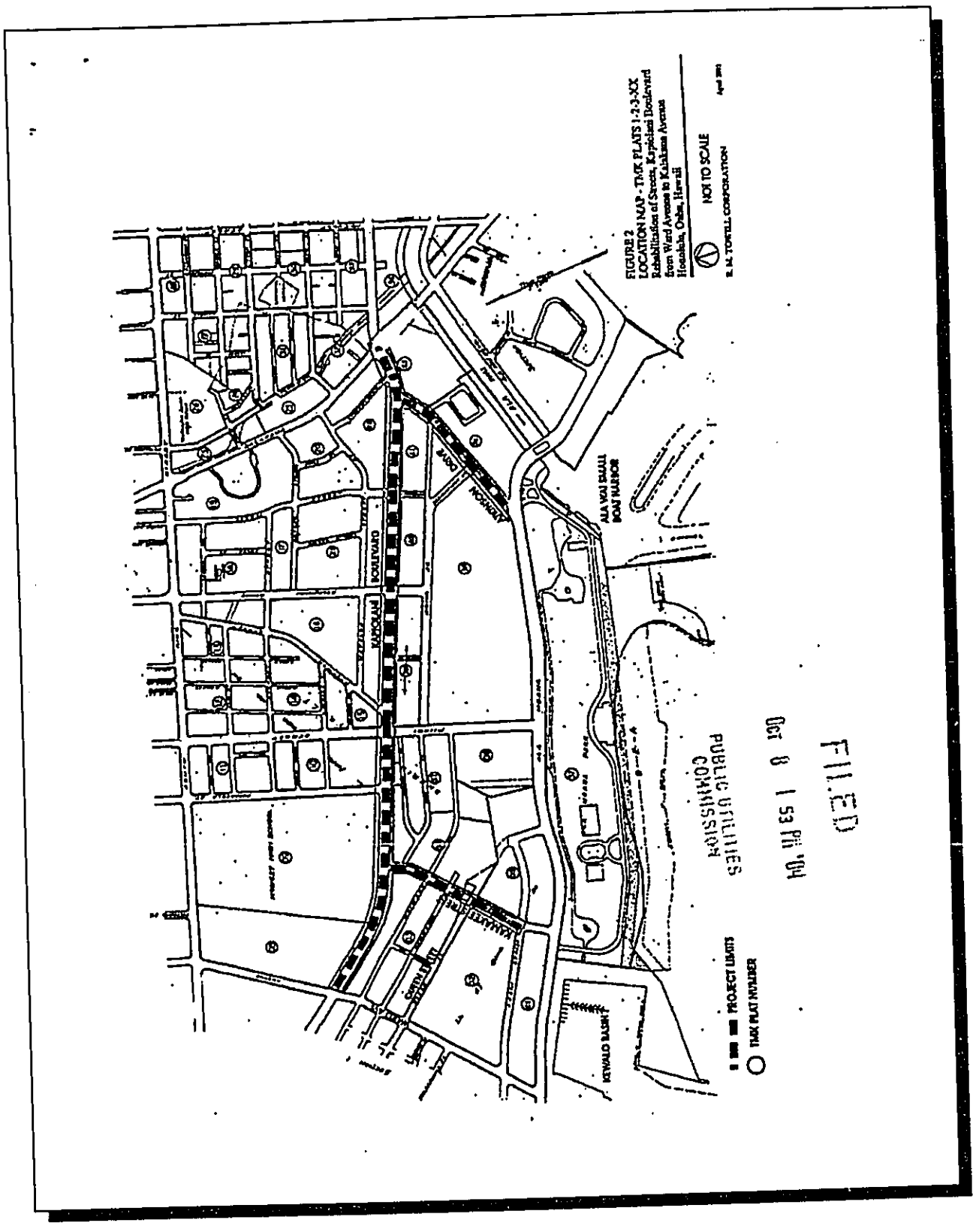


FIGURE 2
LOCATION MAP - TMK PLATS 1-2-3-XX
Rehabilitation of Streets, Kapiolani Boulevard
from Ward Avenue to Kalakaua Avenue
Honolulu, Oahu, Hawaii

FILED
Oct 8 1 53 PM '04
PUBLIC UTILITIES COMMISSION

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-232

The Honorable Scott K. Saiki
22nd Representative District
Hawai'i State Capitol, Room 438
415 South Beretania Street
Honolulu, HI 96813

The Honorable Carol Fukunaga
11th Senatorial District
Hawai'i State Capitol, Room 216
415 South Beretania Street
Honolulu, HI 96813

The Honorable Ann Kobayashi
City and County of Honolulu City Council
Council District 5
530 South King Street
Honolulu, HI 96813

Dear Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi:

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

1 *HECO's proposal is that the 46kV transmission line be routed through a largely residential area and alongside Lunalilo School. Due to the potential health risks to children that exposure to electromagnetic fields (EMF) poses, we recommend that HECO utilize the alternative alignment it describes in its Draft Environmental Assessment, (Alternative Alignment 1, Item 3.2.2.1.1, page 3-45-46), as the preferred transmission line alignment. This alternative alignment would route the transmission line primarily along Kapiolani Boulevard, thus avoiding potential exposure by the students and faculty of Lunalilo School to EMFs emitted by the transmission line.*

In response to your concern regarding potential exposure by the students and faculty of Lunalilo School to electric and magnetic fields (EMF), we note that Section 4.13.3 of the Draft EA states that "For the Lunalilo Elementary School, projected 2009 magnetic fields of about 4.0 mG with the existing power line configuration would decrease to about 3.3 mG with the proposed configuration under normal loading (due to some field cancellation)."Thus, at least for Lunalilo Elementary School, this project is a positive step in terms of reducing EMF from the Pumehana Street lines.

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 2

We also note that Alternative Alignment 1, Item 3.2.1.1 on page 3-45 of the Draft EA, provides an alternative alignment between the Makaloa Substation and the McCully Substation. Utilization of this alternative alignment would not affect the magnetic fields associated with the connection of the new Archer 46 underground 46kV circuit near McCully Substation with the existing Pūkele 2 overhead 46kV circuit at the intersection of Date Street and Pumehana Street in McCully (described on page 3-4 of the Draft EA as activities 1C-1, 1C-2 and 1E-2)

2 *Under HECO's recommended proposal, in certain areas, existing ductlines and conduits will be used for the routing of 46kV transmission line. According to the information provided by HECO, much of this existing ductline is routed under, or very close to, existing residences and Lunalilo School, particularly in the Farn Street area. HECO's recommendation would put the 46kV transmission lines closer to where people live, work, and go to school, thus increasing their exposure to EMFs.*

As discussed in Section 4.13.3 of the Draft EA, Enertech Consultants of Santa Clara, Inc. (Enertech) measured magnetic fields in everyday environments at ten different locations in Honolulu. These measurements were performed to provide a range of magnetic field levels encountered in everyday locations and for comparison with the magnetic field levels associated with the proposed EOTP. Magnetic fields measured from 0.1 mG to over 99 mG in everyday environments. Many of these magnetic field sources are common appliances and electrical devices such as refrigeration units in supermarkets, electric stoves in food preparation areas, library security gates, escalators, vending machines, display counters, video games, cash registers and ATM machines.

The magnetic field levels described in Enertech's *Magnetic Field Evaluation* (Draft EA Section 4.13.3 and Appendix D1), are within the range of magnetic field levels found at numerous locations in the local environment. The line locations are mainly in the street, and the forecasted increases occur predominantly in the street and sidewalk, and so would be mostly a source of brief intermittent exposure to the population. Magnetic field levels decrease with distance away from the source, and the project magnetic field levels beyond the sidewalks for any of the segments evaluated by Enertech are well within the range of levels encountered in the local area and in other communities.

3 *Although no "smoking gun" has been found that directly links EMF exposure to certain diseases, EMF exposure has been linked to the occurrence of childhood leukemia by the National Institute of Environmental Health Sciences (NIEHS). In addition, in a recent risk evaluation conducted by three scientists on behalf of the California Public Utilities Commission, all three scientists were inclined to believe that EMF exposure can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's Disease, and miscarriage (Executive Summary, California EMF Risk Evaluation Study 2002).*

We understand that HECO's position on EMF exposure is that studies have indicated that there is no conclusive evidence that links power line configurations (wire codes) with illnesses such as childhood leukemia. However, the NIEHS states that, although there is no conclusive evidence linking power line configurations to childhood leukemia, there is an association between measured fields of EMFs and childhood leukmia.

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 3

HECO has no "position" on EMF exposure studies, but instead relies on the independent scientific reviews of scientific organizations, including the review on behalf of the California Public Utilities Commission (PUC), as summarized in the EA in Section 4.13.2.4 (pages 4-89 to 4-92.) The Draft EA acknowledges the statistical associations, or "links" reported in some studies, as does the National Institute of Environmental Health Sciences (NIEHS), as reflected in the summary statement that was included in the Draft EA (page 4-91). However, statistical associations, or correlations, are not a direct indicator of cause and effect. This issue is discussed at length in Dr. Erdreich's supplemental direct testimony before the Hawai'i PUC in Docket No. 03-0417, a copy of which is enclosed.

NIEHS and other reviewers based their assessment on a scientific approach, which considers all of the scientific evidence, including laboratory research. As quoted in the Draft EA, regarding the association in epidemiologic studies, the NIEHS observes "This association is difficult to interpret in the absence of reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia."

The Draft EA summarizes evaluations of EMF research by national and international scientific organizations including NIEHS, the National Academy of Sciences National Research Center (NAS/NRC), the International Agency for Research on Cancer (IARC), the International Commission on Nonionizing Radiation Protection (ICNIRP), the Health Council of the Netherlands (HCN), and the National Radiological Protection Board of Great Britain (NRPB).

In Hawai'i, general transmission line safety standards are established by the State of Hawai'i PUC in General Order Nos. 6 (Rules for Overhead Electric Line Construction) and 10 (Rules for Construction of Underground Electric and Communications Systems). On issues not covered by General Orders 6 and 10, the National Electrical Safety Code may be used as guidance. These rules primarily address the electrical safety of the public but do not specifically address EMF. Although a few states within the United States have set non health-related standards for levels of electric and magnetic fields, neither the federal government nor any of the State governments have established health-related standards specifically for 60-hertz EMF.

Although there are no Hawai'i health-related standards for 60-hertz EMF, HECO follows a policy of "Prudent Avoidance" in its transmission facility planning. The concept of Prudent Avoidance was adopted by the State of Hawai'i Department of Health in their policy position paper, a copy of which is enclosed. Prudent Avoidance was subsequently explained by the Hawai'i PUC in its Decision and Order No. 13201 in Docket No. 7256 as follows:

> Prudent avoidance is an approach to making decisions about risks. This decision-making process is based on judgment and values, can be applied to groups and individuals, and can be considered for all aspects of our lives, not just EMFs. Prudent avoidance applied to EMFs suggests adopting measures to avoid EMF exposures when it is reasonable, practical, relatively inexpensive and simple to do so. This position or course of action can be taken even if the risks are uncertain and even if safety issues are unresolved.

HECO has implemented Prudent Avoidance in planning the EOTP as described in Section 4.13.4 of the Draft EA. Reduction of EMF levels can be achieved for multiple circuit power

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 4

lines with similar loads by optimizing the cable placement and phasing arrangement within the cable ducts. Enertech studied a variety of cable placements and phasing arrangements for the 46kV circuit cable sections to determine the optimum phase configuration for EMF reduction. Enertech's calculated results for multiple circuit 46kV cables show that use of optimum phase placement in the cable ducts can reduce EMF levels by a maximum amount of 87 percent when all circuits have identical loads. HECO has applied Prudent Avoidance in its engineering design for ductlines with multiple circuits by optimizing the cable placement and phasing arrangement within the cable ducts.

4 *In fact, a recent meta-analysis of nineteen studies related to residential EMF exposure and childhood leukemia conducted by Daniel Wartenberg, PhD, and funded by the Public Health Institute of the California Department of Health Services and the NIEHS, Dr[.] Wartenberg determined that it was not uncommon for individual EMF studies to be inconclusive with regard to finding a link between EMF exposure and childhood leukemia. However, his meta-analysis found that when the results of the studies he reviewed are combined, ". . . many people believe there are no data to support an association between residential magnetic field exposure and childhood leukemia. To the contrary, the data strongly and relatively consistently support such an association, although the estimated magnitude of risk is moderate." The meta-analysis goes on to conclude that, "[i]f one chooses to use these summary estimates for interpretation, given the widespread exposure to magnetic fields the [sic] suggest perhaps as much as a 15-25% increase in the childhood leukemia rate, which is a large and important public health impact."*

It can be argued that the findings of this meta-analysis carry more credibility than findings of an individual study in that when utilized properly, meta-analytic tools create a composite estimate with greater statistical power than individual studies.

HECO agrees that when utilized properly, "meta-analytic tools create a composite estimate with greater statistical power than individual studies." However, the most appropriate use for meta-analysis is for combining data from clinical studies, in which subjects are randomly assigned to treatment or control groups, and the studies share a common protocol. It is widely recognized that meta-analysis cannot overcome limitations in observational epidemiology studies such as limitations in exposure assessment, differences in exposure assessment, differences in the types of people included in the studies, confounding by unmeasured risk factors, and biases in the study design. Such limitations are not overcome by meta-analysis methods, and underlie the basic principle that an association in epidemiological studies is not sufficient to define the relationship as cause and effect.

Dr. Wartenberg's study is one of three meta-analyses that include the recent epidemiologic studies. The results of two recent meta-analyses of epidemiologic studies of residential exposure to magnetic fields (Ahlbom et al, 2000;[1] Greenland et al, 2000[2]) were considered in the evaluations of EMF research by national and international scientific organizations reviewed in the Draft EA (Draft EA Section 4.13.2.5, pages 4-89 to 4-91). The results, strengths, and limitations of these meta-analyses of the epidemiologic research are discussed

[1] Ahlbom A, Day N, Feychting M, et al. A pooled analysis of magnetic fields and childhood leukemia. Brit J Cancer, 83:692-698, 2000.
[2] Greenland S, Sheppard AR, Kelsh MA, Kaune WT. A pooled analysis of magnetic fields, wire codes, and childhood leukemia. *Epidemiology*, 11:624-634, 2000.

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 5

in Dr. Erdreich's supplemental direct testimony in Docket No. 03-0417 before the Hawai'i PUC, a copy of which is enclosed.

Dr. Wartenberg's analysis was more limited that the other meta-analyses because it was based on grouped data, rather than on pooling the raw data of the original studies as the other two meta-analyses had done. The results that Dr. Wartenberg reported were similar to those of the other meta-analyses, though weaker. The limitations of the original epidemiologic studies remain a concern, which is one of many reasons why his analysis does not change the interpretation of the epidemiological studies. In addition, the laboratory observations in animals and in cells do not show evidence of a link with leukemia or any form of cancer, and there is no known biological mechanism to explain how magnetic fields could cause leukemia.

In their annual update on electromagnetic fields and health, the HCN specifically discussed the impact of Dr. Wartenberbg's study, and concluded:

> The committee therefore sees no reason to modify its earlier conclusion that the association is not likely to be indicative of a causal relationship (HCN 2001 pg. 40[3]).

In response to your comment that, these summary estimates "suggest as much as a 15 to 25% increase in the childhood leukemia rate," HECO notes that the number (15 percent) is called the population attributable risk (PAR). Two scientists who participated in the discussion at the workshop where this paper was presented criticized these calculations. Dr. Buffler "questioned the wisdom of attempting PAR estimates before having resolved all the doubts, which still linger, about EMF epidemiology." Dr. Savitz noted that "this exercise relies heavily on assumptions that may or may not be good, and the result may or may not be right either." In this discussion, Dr. Wartenburg noted that this estimate only applies "if one believes it is causative."

5 *According to our review of existing research material on this issue, of the forty-four studies conducted across the world on this issue since 1979, ten studies found some association between EMFs and an adverse human health condition. Of those ten, seven found an increased health risk to children.*

HECO expects that there are far more than 44 studies related to health effects of electric and magnetic fields. Section 4.13.2.5 of the Draft EA responds to public concern regarding possible health risks from residential and occupational exposure to low-strength, low-frequency electric and magnetic fields and acknowledges that "Public concern regarding possible health risks . . . has generated considerable debate among scientists and public officials." (Draft EA page 4-87.) The Draft EA also acknowledges that although epidemiological studies reported statistical associations between magnetic fields and human health effects, the number of well-designed studies supporting this association are not sufficient in themselves to conclude that the association is causal. Other explanations, such as systematic bias, have not been ruled out. Mechanistic and animal toxicology studies have failed to demonstrate any consistent pattern of biological effect, including increased cancers

3 Health Council of the Netherlands (HCN). ELF electromagnetic fields committee. Electromagnetic fields: annual update 2001. *The Hague: Health Council of the Netherlands.* Publication No. 2001/14, 2001.

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 6

in animals. This lack of connection between human data (epidemiology) and the experimental data (mechanistic and animal) weakens the belief that this association is actually due to EMF.

The Draft EA *does not* rely *on* HECO's own conclusions regarding health effects of electric and magnetic fields but instead summarizes evaluations of EMF research by national and international scientific organizations including NIEHS, NAS/NRC, IARC, ICNIRP, HCN, and NRPB which all agree that there is little evidence that EMF is associated with adverse health effects, including most forms of adult and childhood cancer, heart disease, Alzheimer's disease, depression, and reproductive effects. However, all of the assessments concluded that epidemiology studies in total suggest a possible association between magnetic fields at higher exposure levels (annual average greater than 4 mG) and childhood leukemia. All agree that the experimental laboratory data do not support a causal link between EMF and any adverse health effect, including leukemia, and have not concluded that EMF is, in fact, the cause of any disease. These organizations have not recommended exposure limits or required measures to reduce exposures since they have not concluded that a causal relationship between EMF and adverse health effects exists.

Despite extensive study, neither the federal government nor any of the State governments have developed health-related standards specifically for 60-hertz EMF.

6 *Exposure to measured fields of EMFs can be likened to the constant adding of additional weight (additional EMF exposure) to a camel's back (human body). At some point, any additional weight (EMF exposure) will cause the camel's back to break or, in the case of a human, adverse consequences to the person's health and well being. While a certain amount of EMF exposure is unavoidable in our everyday lives (e.g., EMFs emitted from televisions, microwave ovens, etc.), we as a society can do something about lessening the amount of any additional EMF exposures experienced by our citizens. Aligning HECO's 46kV transmission line along HECO's proposed Alternate Alignment 1 would would help avoid the unnecessary additional EMF exposure by humans along Fern Street and at Lunalilo School because it would: (1) require HECO to route its power line down the middle of Pumehana Street, rather than close to residences as proposed in HECO's recommendation; and (2) avoid additional EMF exposure to children attending Lunalilo School.*

The enclosed Hawai'i Department of Health Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources recommends a "Prudent Avoidance" policy, and states that "'Prudent Avoidance' means that reasonable, practical, simple and relatively inexpensive actions should be considered to reduce exposure." The selection of Alternative Alignment 1 would require installation of new ductlines along the entire length from the Makaloa Substation to the McCully Substation. From the Makaloa Substation, the circuits in new ductline would exit the substation to Makaloa Street, proceed in the Koko Head Direction until Kāheka Street, and continue on Kāheka Street in the makai direction on Kapi'olani Boulevard to Pumehana Street. At Pumehana Street, the circuits in new ductline would then proceed in the mauka direction to Lime Street at the McCully Substation. The construction of new ductline for the entire length from Makaloa Substation to the McCully Substation is not a "reasonable, practical, simple and relatively inexpensive action" to reduce exposure. As discussed in Section 4.4.2.2 of the Draft EA, selection of Alternative Alignment 1 could increase traffic impacts from 60 to more than 71 days, whereas the Proposed Action would

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 7

utilize existing ductline and would only increase traffic impacts for a total of only 35 to 48 days. In addition, selection of Alternative Alignment 1 would more than double the cost of the EOTP.

7 *Regardless of findings that power line configurations probably have limited, if any, effect on human health and well being, the fact that another significant emitter of EMFs is being placed in a residential area and next to Lunalilo School only increases the risk of additional long term exposure to EMFs. Studies have indicated that, at certain measured levels, long term exposure to EMFs have been linked to human illness (e.g., chronic lymphocytic leukemia in adults and childhood leukemia).*

With this in mind, the most prudent and logical course of action would be to keep large-scale EMF emitters (e.g., 46kV transmission lines) away from schools and residences. Although routing the proposed 46kV transmission line between the Makaloa and McCully Substations would be more cost effective for HECO since it utilizes, to a certain extent, existing ductlines; in the long term, the potential health risk to area residents (since existing ductlines and conduits are so close to residences) and to school children outweighs HECO's short-term savings on this project.

Please see responses above regarding HECO's implementation of prudent avoidance for the EOTP, EMF levels at Lunalilo School and HECO's response to EMF health concerns.

8 *In its Draft Environmental Assessment, HECO states that if the Alternative Alignment 1 is used, additional inconvenience may be encountered by motorists due to the need to excavate sections of Kapiolani Boulevard in order to underground the 46kV transmission line. However, this inconvenience to motorists and immediate area residents could be easily mitigated, and the construction costs to HECO minimized, if HECO collaborated with the Honolulu Board of Water Supply in its existing eighteen-month Kapiolani Boulevard water and sewer line improvement project.*

We contacted Clifford S. Jamile, Manager and Chief Engineer of the Honolulu Board of Water Supply, and obtained an outline of their project's scope, timeline (see attached correspondence from Board of Water Supply). According to the Board of Water Supply's project outline, the Board's Kapiolani Boulevard water and sewer line improvement project is anticipated to begin on July 5, 2005, and scheduled to be completed on March 31, 2007.

This water and sewer line improvement project tracks along the exact same traffic corridor as HECO's Alternative Alignment 1, with the exception of the diversion up Kāheka Street and onto Makaloa Street on the westernmost section, and the extension from Kalakaua Boulevard and onto Pumehana Street on the southeasternmost boundary of HECO's Alternative Alignment 1. The project timeline of the Board of Water Supply's project could coincide with HECO's 46kV transmission line installation project. If HECO collaborates with the Board of Water Supply and coordinates the implementation of their respective projects, both entities could realize reduced construction costs and lessen the inconvenience to area residents and motorists.

HECO has reviewed the scope of the City and County of Honolulu's Kapiolani Revised Sewer System Project ("City Sewer Project") and/or the Honolulu Board of Water Supply Kapiolani Water Line Project ("BWS Water Project") and has been in contact with the City

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 8

and BWS with respect to their projects. Based on HECO's review, scheduling the projects concurrently does not appear possible as BWS intends to go out to bid in January 2005 and proceed expeditiously on the BWS Water Project. In addition, based on HECO's review, scheduling the East O'ahu Transmission Project concurrently with the City Sewer Project and/or BWS Water Project would not result in any cost savings on the East O'ahu Transmission Project.

As set forth below, there are a number of technical constraints that HECO is faced with in having the projects run concurrently with one another as well as additional challenges in mitigating traffic impacts.

Alternative Alignment 1 coincides with only a portion of the City Sewer Project and/or BWS Water project. Based on the October 1, 2004 BWS letter attached to the commenter's letter, BWS's project involves a 12-inch water main installation on Kapi'olani Boulevard between Ward Avenue and Kalākaua Avenue, and a 12-inch water main replacement on Atkinson Drive from Kapi'olani Boulevard to Ala Moana Boulevard. The City's 36-inch sewer main rehabilitation project involves refurbishing the existing 36-inch sewer main on Kapi'olani Boulevard between Ward Avenue and Kalākaua Avenue, and the existing 36-inch sewer main along Kamake'e Street from Kapi'olani Boulevard to Auahi Street. Alternative Alignment 1 would only coincide with the water and sewer projects on Kapio'lani Boulevard from Kāheka Street to Kalākaua Avenue, which is approximately 1,450 feet (i.e., approximately 38 percent) out of the total 3,800 feet of new ductline proposed from the Makaloa Substation to the McCully Substation for Alternative Alignment 1.

In this particular area where the projects do coincide, HECO, the City and BWS are required to comply with minimum separation distances between waterlines and electrical ductlines and sewer and electrical ductlines in order to facilitate future maintenance and repair work for each respective utility. The minimum separation distances are: (1) 36 inches between waterlines and electrical ductlines, and (2) 24 inches between sewer and electrical ductlines. There are also minimum depth and cover requirements that HECO, the City and BWS must comply with. For example, in the City right-of-way, HECO 46kV ductlines are located a minimum of 24 inches below the roadway and 30 inches below the sidewalk. According to the Water System Standards, water mains 12 inches in diameter require a minimum of 3 feet cover. According to the Design Standards of the Department of Wastewater Management, Volume I, 4 feet minimum cover is required over sewers in paved areas and 3 feet in sidewalk areas. Having all three lines installed in the same trench would result in an increase in cost for everyone due to an increase of excavated and backfilled material that must be used in order to comply with all standards. Having to use wider and deeper trenches in order to accommodate the lines would also have an impact on traffic due to more lane closures and extended work duration for each section of the project.

Another alternative that HECO has looked into is the construction of two separate trenches simultaneously. However, this would result in the closure of two lanes, which the City may not approve, since it will have a major traffic impact on Kapi'olani Boulevard.

Further research has indicated that only a very narrow corridor is available on Kapi'olani Boulevard to install a 46kV underground ductline. Thus, HECO will need to obtain waivers from BWS and other City agencies on the minimum separation distances from their respective facilities in order to install the required 46kV manholes. BWS and the City will

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 9

probably have encroachment concerns about access to their own lines. In general, waivers are granted only when there are no other options available to locate the lines.

In addition, research indicates that there is a section on Kapi'olani Boulevard (near Atkinson Drive) where there is no corridor available at the typical depth for a 46kV underground ductline. As such, HECO will be required to install the ductline approximately 7 feet deeper to avoid conflicts with other lines, which will result in additional costs and lengthen the construction time for that particular area.

Given the Commission's Procedural Schedule, outlined in PUC Order No. 20968 in Docket No. 03-0417, the earliest HECO could begin to construct Alternative Alignment 1 (without some form of interim or expedited approval to proceed with this part of the project) would be early 2006. This assumes HECO is able to obtain the necessary permits and approvals from the City and County of Honolulu in a timely manner. As noted earlier, HECO has been informed by BWS that it plans to go out to bid in January of 2005 and proceed expeditiously on the BWS Water Project. It is also uncertain how much schedule and budget flexibility, if any, the BWS and/or City may have to move the timing of the Kapi'olani portion of their work to coincide with HECO's schedule. Typically, when timing constraints are placed on contractors, it usually comes at a cost. Accordingly, in light of fiscal concerns, BWS and/or the City may not be able to time their work to coincide with HECO's schedule if cost becomes a factor.

9 *As such, we believe that by utilizing the Alternative Alignment 1 of HECO's Draft Environmental Assessment HECO has the opportunity to safeguard the health of area residents and Lunalilo School attendees by ensuring that the 46kV transmission line is aligned in a manner that, as much as possible, mitigates the potential adverse effects of EMF exposure.*

Please see HECO's response to your first comment above regarding Alternative Alignment 1 and Lunalilo School.

10 *Use of the Alternative Alignment 1 also provides an opportunity for the private (HECO) and public sector (Board of Water Supply) to work together to lessen inconveniences to the public and to reduce costs. Such collaboration would truly be a 'win-win' solution to this issue and serve as a model for public/private sector collaboration.*

HECO concurs that anytime the private and public sectors can collaborate together on projects, it is a 'win-win' solution. However, as noted earlier in this response letter, such an opportunity to collaborate that would truly produce less inconveniences and costs savings to the general public does not appear to exist in this case.

11 *In closing, we ask that the Commission accede to the community's request to require HECO to reroute its proposed installation of a 46kV transmission line between the Makaloa and McCully Substations from its current proposed route to a route that primarily follows Kapiolani Boulevard as described in Alternative Alignment 1 of its Draft Environmental Assessment.*

Your request that HECO utilize Alternative Alignment 1 is noted. For the reasons explained above, this Alignment does not appear to be better than the proposed alignment. If however, the PUC determines that, challenges and costs notwithstanding, the preferred alignment is

Senator Fukunaga, Representative Saiki and Councilwoman Kobayashi
January 7, 2005
2004.33.0800 / 04EP-232
Page 10

Alternative Alignment 1, HECO will make that alignment work and will ask BWS for a waiver of the 3-foot minimum clearance rule for the 46kV manholes on Kapi'olani Boulevard.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

Enclosures:
Dr. Erdreich's supplemental direct testimony before the PUC in Docket No. 03-0417
State of Hawai'i Department of Health Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

HECO ST-11A
DOCKET NO. 03-0417

SUPPLEMENTAL DIRECT TESTIMONY OF
LINDA S. ERDREICH, PH.D.

SR. MANAGING SCIENTIST
EXPONENT, INC.

Subject: EMF: Epidemiology

HECO ST-11A
DOCKET NO. 03-0417
PAGE 1 OF 22

INTRODUCTION

Q. Please state your name and business address.

A. My name is Linda S. Erdreich, Ph.D. My business address is 420 Lexington Avenue, Suite 408, New York, NY 10170.

Q. What is your occupation?

A. I am an epidemiologist with 25 years of experience in conducting and evaluating scientific research to identify factors that affect human health. I am a Senior Managing Scientist at Exponent, Inc., a research and consulting firm with a broad spectrum of expertise in science and technology. I work in the Health Group, which focuses primarily on the application of epidemiology methods to address a variety of topics in the health sciences. I have done a great deal of work evaluating potential biological and health impacts of electrical facilities, such as transmission lines, substations, and electrified railroad lines.

Q. Could you describe for us what epidemiology is?

A. Epidemiology is the science that studies the patterns of health and disease in human populations. Epidemiologists study the characteristics and exposures of people to determine what affects their health and the occurrence of disease. The objective of environmental epidemiology is to measure and evaluate the associations between exposures to environmental factors (e.g., air pollutants) and health outcomes (e.g. lung disease). Epidemiologic studies can help suggest links or associations between exposures and disease, and they provide direct evidence of possible effects in humans.

Q. Please briefly describe your prior work experience?

A. My curriculum vitae (HECO-ST-1100A) summarizes my prior work experience. Throughout my career I have been responsible for the assessment of the health

impacts of environmental agents, including chemicals and electric and magnetic fields (EMF).

I worked at the U.S. Environmental Protection Agency (EPA), where I conducted research to develop methods for setting exposure limits for chemicals to protect human health. These methods have been applied, for example, to the development of standards for water quality. The process of identifying potential effects and the exposure levels at which they occur is called health risk assessment. Health risk assessment is the process of determining, from scientific data, whether exposure to a specific factor in the environment is related to disease, and identifying what level of exposure is necessary to cause or affect the risk of disease. This process relies on a variety of data from toxicological (laboratory) and epidemiologic studies.

Q. Could you describe your educational background for us?

A. I received a B.A. in Biological Sciences and a M.Ed. in Science Education from Temple University, in Philadelphia, Pennsylvania. Subsequently I was awarded an M.S. in Biostatistics and Epidemiology (1977), and a Ph.D. in Epidemiology from the University of Oklahoma (1979).

Q. Are you a member of any professional organizations or associations?

A. I am a member of the Society for Epidemiologic Research, the Bioelectromagnetics Society, and the Institute of Electrical and Electronic Engineers. I am a Fellow of the American College of Epidemiology.

Q. What, if any, universities are you affiliated with?

A. I have been an adjunct associate professor in the Department of Environmental and Community Medicine at the Robert Wood Johnson Medical School in New Jersey since 1992. I held a similar position at the University of Cincinnati in Ohio

HECO ST-11A
DOCKET NO. 03-0417
PAGE 3 OF 22

from 1982 to 1989.

Q. What experience have you had with health and biological issues related to power lines?

A. I have 25 years experience in analyzing and conducting research to assess the potential biological and health impacts of EMF. I am actively involved in advising various parties regarding health issues related to electrical facilities such as transmission lines, substations, and electrified railroad lines.

I have been asked to review research concerning transmission lines for federal agencies. I have also worked with the U.S. National Institute of Occupational Health and Safety (NIOSH), the Oak Ridge National Laboratories, the U.S. Department of Energy (USDOE), and the U.S. Federal Rail Administration (FRA) to review and evaluate health issues related to EMF from other sources. I have consulted with the Medical Services Division at the United Nations in New York.

I am a member of the Institute of Electrical and Electronics Engineers (IEEE), an international technical organization, and I participate in IEEE committees that develop exposure limits, or standards. One of these committees develops exposure limits, or standards, for EMF in the low frequency range 0 to 3000 Hz, the range that includes fields from power lines and other electrical sources. I have published papers in scientific journals, and have prepared book chapters and technical reports. I routinely serve as a reviewer for scientific journals that specialize in epidemiology and public health research, and others that specialize in electromagnetic energy.

Q. Have you provided expert testimony in any other proceedings? If so, what were they?

A. Because of my background and experience, I have been asked to provide information on EMF in a number of different forums, including state Public Service Commissions or similar organizations. I have testified in legal proceedings.

Q. Were you qualified as an expert in those proceedings?

A. Yes, I was.

METHODS FOR EVALUATING SCIENTIFIC RESEARCH

Q. How do scientists determine whether an environmental exposure poses a health risk?

A. Scientists determine whether an environmental exposure poses a health risk based on a systematic assessment of all relevant scientific research, which includes epidemiologic and laboratory studies of humans, laboratory studies in animals (*in vivo*), and laboratory studies in cells and tissues (*in vitro*). This process is designed to be unbiased and comprehensive to ensure that more weight is given to those studies of better quality, and that studies with a given result are not selected from those available to favor a preconceived idea of effect.

Data from both epidemiology and laboratory studies are considered together for several reasons. Epidemiology studies and laboratory studies have strengths as well as limitations, but taken together, the strengths and limitations balance one another. For example, epidemiological studies include people in their natural environment, which is an advantage. However, humans vary in their diet, behaviors and habits, exposures and genetics, all of which may relate to their risk of disease. Additionally, the exposure being studied is not under the control of the investigator. In the laboratory, animals, or human volunteers are selected for

similar characteristics and are exposed to precisely defined and measured quantities. However, laboratory animals are not the same as people, and *laboratory conditions do not always reflect real world conditions.* When we consider these studies together, we get more information than if we relied on only one type of study.

Critical evaluation of this information is important because no one study is perfect; each study has its strengths and weaknesses. For this reason, repeating a laboratory research study is important because a reproducible result increases confidence that the observation is correct and not the result of an unforeseen error.

This approach for assessing potential risk to human health from environmental exposures is described as a *weight-of-evidence* approach. Scientists, scientific organizations, and regulatory agencies worldwide use it. These organizations include the International Agency for Research on Cancer (IARC), which routinely evaluates substances such as drugs, chemicals, and occupational exposures that may cause cancer (e.g., IARC, 2002), and the EPA (USEPA, 2003).

Q. What scientific information is available about EMF and potential effects on health?

A. The published scientific information on EMF and health includes hundreds of epidemiological studies of people whose exposure was assessed at their place of work or at their residence, and laboratory data collected on cells, tissues, or animals. The research also includes studies of people exposed under controlled conditions for short periods of time. Descriptions of the research can be found in peer-reviewed scientific journals and in technical reports.

Q. Do scientists follow special procedures to critically evaluate epidemiology

1 studies?

2 A. Yes, critical evaluation of epidemiologic studies is important to determine
3 whether a statistical association is an indicator of cause and effect. *Association*
4 means that two things tend to occur together, although an association does not
5 prove by itself that one is the cause of the other. One example of a strong
6 association is that of a rooster crowing and the sun rising. Although they always
7 occur together, one would not conclude that the rooster causes the sun to rise.
8 Similarly, the increase in price of a subway ride in New York has been correlated
9 with an increase in the price of pizza, but again, increases may occur in the same
10 year, but there is no reason to conclude that the price of transportation causes an
11 increase in the price of pizza, or vice versa. It is possible that the state of the
12 economy is the underlying cause of each of these increases.

13 A major part of analyzing epidemiology studies is to determine whether
14 intervening (confounding) variables, chance, or bias, has influenced the results
15 (IARC, 2002). In the example about the subway fare and pizza, the state of the
16 economy may be the confounding factor. In scientific terms, bias does not
17 necessarily refer to prejudice or other subjective factors; rather, it refers to the
18 deviation of results or inferences from the truth and also refers to any process
19 leading to such deviation (Last, 2001). Any approach in the collection, analysis,
20 interpretation, publication, or review of data that can lead to conclusions that are
21 systematically different from the truth is a source of bias.

22 Epidemiologists also typically refer to a set of criteria to guide them in
23 determining whether the associations reported in epidemiologic studies support a
24 cause and effect relationship between exposure and disease. These are often
25 referred to as the Hill criteria, after the British physician who originally proposed

them (Hill, 1965).

Q. Can you explain how epidemiologists use these criteria to determine whether an association indicates causality?

A. Yes. These criteria are not answered with a simple "yes" or "no", rather, they serve as guidance for weighing the evidence to reach a decision about cause and effect. The more firmly these criteria are met by the data, the more convincing the evidence.

The observed statistical associations are more likely to indicate cause and effect, as follows: (1) Strength: the stronger the associations between the disease and the agent in question the more persuasive the evidence; (2) Consistency: consistent results across different study populations are more convincing than isolated observations; (3) Dose-response: an increase in disease with an increase in the level of exposure, that is, a dose-response relationship, is more likely to be observed if an association is causal; (4) Biological plausibility: epidemiologic results are much more convincing if they are supported by the biological evidence, and if there is a demonstrated mechanism to explain the effect; (5) Specificity: a statistical association is more convincing if the specific exposure is associated with a specific disease or condition; (6) Temporality: the data must provide evidence of correct temporality, that is, the exposure to the purported cause must be documented to have occurred prior to the observed effect, with sufficient time for any induction period related to the disease (e.g., cancer) and; (7) Coherence: a causal association is a more likely explanation of the data if it is compatible with other scientific evidence.

These criteria are included in epidemiology textbooks, and are presented in the *Reference Manual on Scientific Evidence* as factors to consider in making a

judgment about causation (Green et al, 2000).

EVALUATION OF SCIENTIFIC RESEARCH
REGARDING EMF AND HEALTH

Q. What do the epidemiological studies indicate about residential or community exposures to EMF and cancer?

A. Some early epidemiology studies reported that a few more of the cases (children who had cancer) had lived closer to certain types of power lines, or were exposed to higher estimated magnetic fields than the controls (children in the study without cancer) (Wertheimer et al, 1979; Savitz et al, 1988; Feychting and Ahlbom, 1993). This statistical association between power lines and disease was not considered an indication of cause and effect because of limitations of these specific studies, such as small study size or imprecise measures of exposure. To clarify the meaning of these earlier studies, larger and better studies were undertaken. These larger studies have not shown convincing, consistent associations between power lines and any specific type of cancer (e.g., Linet et al, 1997; Preston Martin et al, 1996a, 1996b; McBride et al, 1999; Kleinerman et al, 2000; UK Childhood Study investigators, 1999, 2000a,b, 2002). However, because of the small number of children in these studies with high exposures, the possibility of an association between higher magnetic field levels and childhood leukemia cannot be excluded.

In 2000, researchers reanalyzed data from all the previous epidemiology studies of magnetic fields and childhood leukemia that assessed exposure to magnetic fields using 24-hour measurements or calculations based on the characteristics of the power lines and current load (Ahlbom et al, 2000; Greenland et al, 2000). In each of these analyses, the researchers pooled data on individuals from each of the studies, creating a study with a much larger number of subjects

and therefore greater statistical power to detect an effect if there were one, than any single study.

One of the main results of these analyses was that pooling these data did not suggest an association between childhood leukemia and magnetic fields for long-term average exposures below 3 milligauss (mG). However, a weak statistical association with leukemia was found for long-term average exposures greater than 3-4 mG. This statistical finding must be evaluated carefully, according to general principles and criteria described above. First, in these studies, few children, if any, had exposures that averaged above 3 mG. Thus, there is considerable statistical uncertainty, making it more difficult to rule out the role of chance. Second, pooling of the data from individual studies does not address their individual limitations. For example, in some studies, sources of potential bias could not be ruled out.

Q. What do laboratory studies indicate about the possible role of EMF in cancer?

A. Studies in which laboratory animals receive high exposures provide an important basis for evaluating the safety of chemicals and medicine, and of EMF as well. The most informative laboratory research for assessing cancer and health risks are studies in which laboratory animals, usually mammals such as rats or mice, have received high exposure over a time period up to the average life span of the species. At the end of the exposure period, the animals' organs are carefully examined for any evidence of cancer.

In several recent studies, groups of rats or mice were exposed to magnetic fields for a time equivalent to their normal lifespan. In these studies, neither overall cancer occurrence nor the occurrence of specific types of cancer such as brain cancer, breast cancer or leukemia were higher in animals exposed to

magnetic fields than in unexposed, control animals, even at the highest exposure levels (e.g., Yasui et al, 1997; Babbitt et al, 1998; McCormick et al, 1999).

Studies of tumor formation and the advancement of tumor development (tumor promotion) in animals have not shown that magnetic fields promote the growth of cancer in general, or breast or brain cancer in particular (e.g., DiGiovanni et al, 1999; Boorman et al, 1999a, b; Anderson et al, 1999; Mandeville et al, 2000), although there have been suggestive findings from one laboratory (discussed in Anderson et al, 2000). In a study of a different design, Morris et al (1999) used an animal model for progression of leukemia that involves transplanting leukemia cells into young rats prior to exposure. In this study, exposure to magnetic fields did not alter or increase the speed in which the cells developed into leukemia.

My review of the combined animal bioassay results and other laboratory research does not find persuasive evidence that magnetic fields cause, enhance, or promote the development of leukemia, lymphoma, or mammary cancer (see also Boorman et al, 2000a, b).

Q. What does the scientific research show about exposure to EMF and its effects on pregnancy and miscarriage?

A. There are many studies designed to examine effects on reproduction. As for any other potential effect on health, it is important to consider studies in the laboratory, particularly on mammals, as well as epidemiology studies of people.

Laboratory studies of mammals (rats, mice) have exposed the animals to 60-Hz electric or magnetic fields before or during pregnancy, and in some studies exposure occurred over several generations. The animals in the litters were examined externally and internally, and no changes were found that would

indicate an increase in miscarriage, birth defects, or loss of fertility. Exposed and unexposed litters did not differ in the amount of fetal loss and the number and type of birth defects, indicating no adverse reproductive effect of magnetic fields (e.g., Rommerein et al, 1990; Sienkiewicz et al, 1994; Ryan et al, 1999; Ryan et al, 2000; Huuskonen et al, 2001).

Several epidemiology studies have examined effects of exposures to magnetic fields on pregnancy, including miscarriages (spontaneous abortion). These studies reported no association with birth weight or fetal growth retardation after exposure to sources of relatively strong magnetic fields, such as electric blankets, or sources of typically weaker magnetic fields such as power lines (Bracken et al, 1995; Belanger et al, 1998; Lee et al, 2000). Two recent studies of EMF and miscarriage reported a positive association between miscarriage and exposure to high maximum, or instantaneous, peak magnetic fields from all sources based on a 24-hour measurement period (Li et al., 2002; Lee et al., 2002). These high peak field levels are typical of electric appliances, devices with electric motors and electric transit. However, no reliable associations were found with higher *average* magnetic field exposures during the day, the typical way of assessing exposure.

There are several possible issues to be considered in assessing whether these statistical associations with the maximum magnetic field exposure during the day are possibly causal in nature. First, the studies include possible biases. For example, each of the studies had a low response rate, which means that the study groups may not be comparable because those who participated in the studies may have differed from those who declined (selection bias). Second, these studies found no reliable association with higher daily average exposure, that is, the

average of all the measurements recorded throughout the day. Third, despite years of research, there is no biological basis to indicate that EMF increases the risk of miscarriage.

EVALUATIONS OF EMF RESEARCH
BY NATIONAL AND INTERNATIONAL SCIENTIFIC ORGANIZATIONS

Q. What conclusions about EMF have been reached by scientific and regulatory organizations in the United States?

A. Scientists have been convened by several organizations to work together to review the scientific information on EMF. These panels included representatives from diverse organizations, who had expertise in several different scientific disciplines including the biological sciences (toxicology, genetics, epidemiology, cancer biology) and the physical sciences (physics or engineering).

In 1992, Congress mandated an EMF research program, which was managed by National Institute of Environmental Health Sciences (NIEHS). In 1998, the NIEHS convened a Working Group to evaluate the results of this research program and other EMF research. They concluded that the epidemiologic data was limited, but they categorized EMF as possibly carcinogenic. Using the methods routinely applied by of the National Toxicology Program (NTP) of the National Institutes of Health, the NIEHS concluded that EMF exposure would not be listed in the NTP Report on Carcinogens as a "known human carcinogen" or as "reasonably anticipated to be a human carcinogen."

The NIEHS prepared a report to the US Congress and concluded that the probability that EMF is a health hazard is relatively small and evidence is insufficient to warrant aggressive regulatory actions (NIEHS, 1999). They suggested that "the power industry continue its current practice of siting power

lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards" (p. 38).

Q. Has research subsequent to this review modified these findings?

A. The epidemiological and laboratory data published after the NIEHS report was completed in 1998 have provided additional evidence that EMF does not contribute to childhood cancer. For example, a large (more than 1,000 cases) and well-designed epidemiologic study of childhood leukemia was conducted in England by the United Kingdom Childhood Cancer Study investigators (UKCCS, 1999). These researchers reported no increased risk of leukemia in those children with average annual exposures to EMF from 2 mG up to 4 mG in the home and school. No statistically significant increase was found for children whose exposure was above 4 mG, that is, a small increase was reported but chance could not be excluded as an explanation. Investigators at the National Cancer Institute reported no association between childhood leukemia and EMF in their study (Linet et al, 1997), and a reanalysis using a different measure of exposure also found no evidence of cancer risk (Kleinerman et al, 2000). In addition, the majority of studies of breast cancer have not supported an association with residential EMF (Gammon et al, 1998; Forssén et al, 2000; Kabat et al, 2003; London et al, 2003; Schoenfeld et al, 2003).

Laboratory studies published after the NIEHS report, some of which were part of the research program and available for review by the NIEHS, provide evidence for a lack of carcinogenicity, or provide no basis to conclude that EMF affects the development or promotion of cancer (e.g., Babbitt et al, 1998; Anderson et al, 1999; Boorman et al, 1999; McCormick et al, 1999; Morris et al,

1 1999; Mandeville, 2000).

2 Q. Have other organizations outside of the United States sponsored independent
3 *reviews of EMF research by multidisciplinary groups of scientists?*

4 A. Yes, several organizations have conducted or sponsored comprehensive reviews.
5 The International Agency for Research on Cancer (IARC), the International
6 Commission on Nonionizing Radiation Protection (ICNIRP), the Health Council
7 of the Netherlands (HCN), the National Radiological Protection Board of Great
8 Britain (NRPB) have all convened large groups of independent scientists with
9 different expertise (epidemiologists, toxicologists, biologists, neurobiologists,
10 physicists, etc.) to review the body of literature surrounding EMF and health.
11 Each organization has produced a report that is available to the public.
12 Reviews of the scientific research regarding EMF and health by the HCN
13 were published in 2000 and updated in 2001 and 2004. ICNIRP published its
14 review in 2003. The NRPB published reviews in 2001 and 2004, which included
15 comprehensive discussions of the individual research studies.

16 Q. What overall conclusion did the IARC Working Group reach regarding childhood
17 leukemia?

18 A. IARC reviewers evaluated the animal data and concluded that they were
19 "inadequate" to support a risk for cancer. The scientists stated that the EMF data
20 does not merit the category "carcinogenic to humans" or the category "probably
21 carcinogenic to humans," nor did they find that "the agent is probably not
22 carcinogenic to humans." Many hypotheses have been suggested to explain
23 possible carcinogenic effects of electric or magnetic fields; however, no scientific
24 explanation for carcinogenicity of these fields has been established (IARC, 2002).
25 The Working Group concluded that the epidemiologic studies do not

provide support for an association between childhood leukemia and residential magnetic fields at intensities less than 4 mG. Overall, magnetic fields were evaluated as "possibly carcinogenic to humans" (Group 2B), *based on the* statistical association of higher-level residential magnetic fields with childhood leukemia. Other agents and mixtures have been classified as 2B as well, including coffee, pickled vegetables, and gasoline engine exhaust.

In the rating system used by IARC, the recognition of an association between exposure and cancer in epidemiology studies is considered "limited evidence" of carcinogenicity. A rating of "limited evidence" for epidemiology studies, even without any evidence from laboratory studies that an exposure might pose a cancer risk, requires that the exposure be categorized as a "possible carcinogen," even though chance, bias and confounding cannot be ruled out with reasonable confidence (IARC, 2002).

Q. Why did the IARC Working Group not regard the association between magnetic fields and childhood leukemia as reflecting a causal relationship?

A. They did not regard the association as causal because there was insufficient evidence from epidemiology studies that magnetic fields caused cancer in humans, insufficient evidence that magnetic fields caused cancer in laboratory studies of animals, and no evidence for a mechanism to lead to cancer.

Q. What are the conclusions of the other review groups, and how do they compare with IARC?

A. The assessments by the NIEHS, IARC, ICNIRP, NRPB, and HCN agree that there is little evidence that EMF is associated with adverse health effects, including most forms of adult and childhood cancer, heart disease, Alzheimer's disease, depression, and reproductive effects. However, all of the assessments concluded

that epidemiology studies in total suggest a possible association between magnetic fields at higher exposure levels (annual average greater than 4 mG) and childhood leukemia. All agree that the experimental laboratory data do not support a causal link between EMF and any adverse health effect, including leukemia, and have not concluded that EMF is, in fact, the cause of any disease. These organizations have not recommended exposure limits or required measures to reduce exposures since they have not concluded that a causal relationship between EMF and adverse health effects exists.

Q. Are there other reviews or summaries published about EMF and health?

A. Yes, other organizations have provided perspectives on EMF and health. These include a report from the California EMF Program and a more recent summary from the NIEHS.

In response to a request from the California Public Utilities Commission, three scientists from the California EMF program (two epidemiologists and a physicist) reviewed the scientific research regarding EMF and health (Neutra et al, 2002). The scientists agree that EMF is not a universal carcinogen. They evaluated data regarding 13 health conditions and concluded that the epidemiologic data provided little support for an association of EMF with nine of the conditions. For the rest, they expressed the belief "that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's disease, and miscarriage." Their median "confidence ratings" for these conditions, however, were not high enough to indicate any strong certainty or "high probability" that EMF was a cause of these conditions.

At the time the conclusions of the California EMF Program became available, the NIEHS published a brochure on questions and answers on EMF and

health (NIEHS, 2002). The status of EMF and health is summarized by NIEHS as:

> Over the past 25 years, research has addressed the question of whether exposure to power-frequency EMF might adversely affect human health. For most health outcomes, there is no evidence that EMF exposures have adverse effects. There is some evidence from epidemiology studies that exposure to power-frequency EMF is associated with an increased risk for childhood leukemia. This association is difficult to interpret in the absence of reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia (p. 57).

The NIEHS also noted that:

> At the current time in the United States, there are no federal standards for occupational or residential exposure to 60-Hz EMF (p. 57).

MAGNETIC FIELDS ASSOCIATED WITH THE EAST OAHU TRANSMISSION PROJECT

Q. What else have you considered to assess the health impact of this project?

A. I have considered the general description of the project and available information on the assessment of EMF levels from the proposed underground power lines. This included a description of the background and alternatives in the testimony of HECO's project manager Kerstan J. Wong, and the testimony of HECO's William Bonnet regarding EMF policy issues. I reviewed the magnetic field evaluation and measurements for the proposed power lines prepared by Enertech Consultants of Santa Clara, Inc. ("Enertech"), and the testimony of Michael Silva of Enertech.

Q. Did you review the magnetic field levels expected to occur with the proposed project?

HECO ST-11A
DOCKET NO. 03-0417
PAGE 18 OF 22

A. Yes. Enertech's Magnetic Field Evaluation projected the magnetic field levels that would be associated with both the existing and the proposed configurations for the load forecasted for 2009. This evaluation indicated that some increases would occur with the proposed configuration in some of the route segments. I also reviewed the levels that were projected to occur at public institutions near the proposed project, and the levels measured at eleven different areas in Honolulu.

Q. Based on your review, how would you characterize the magnetic field levels related to the proposed line?

A. These levels are within the range of magnetic field levels found at numerous locations in the local environment. The line locations are mainly in the street, and the forecasted increases occur predominantly in the street and sidewalk, and so would be mostly a source of brief intermittent exposure to the population (Enertech, 2004). Magnetic field levels decrease with distance from the source, and the projected magnetic field levels beyond the sidewalks for any of these segments are well within the range of levels commonly encountered in the local area and in other communities.

The magnetic field levels projected for six selected public institutions within 100 feet of the proposed route indicated either no influence of the fields or a minimal increase. For example, the projected magnetic field under normal operating conditions is less than 4 mG at a corner of the Lunalilo Elementary School, which represents no increase over the existing configuration.

Q. How do the projected magnetic fields calculated by Enertech, or the magnetic fields measured in the local area, relate to personal magnetic field exposure?

A. A magnetic field value calculated or measured at a particular location at an instant in time is <u>not</u> a measure of human exposure. What we mean by exposure are the

magnetic field levels encountered by a person as averaged over a specific period of time. For example, it takes about a second to measure a magnetic field. Over that second, the exposure and the measurement would be the same, i.e., the value displayed on the meter. However, if I took readings every second over an entire year wherever I went, the average of those 31,536,000 measurements would represent my average annual exposure to magnetic fields.

An individual's exposure to magnetic fields reflects the contribution from all of the magnetic field sources encountered in all the locations where she spends time. Because people typically spend most of their time at home, the sources there are frequently the major determinant of their time averaged exposures.

Misunderstandings arise however, because both measured (or projected) field values and exposures are both expressed in units of milligauss, though they represent quite different concepts.

Q. What do the projected magnetic field values at the curb given in Enertech's 2004 report represent?

A. They are calculated values at a particular location and cannot be meaningfully compared to estimates of long-term exposure to magnetic fields referenced in epidemiologic studies.

Q. Why are estimates of long-term exposure to magnetic fields of interest?

A. They are of interest because the strongest data supporting the existence of any health effect from magnetic fields are reports of associations between estimates of magnetic field exposure and childhood leukemia. This association is based primarily upon two published statistical evaluations of the epidemiology studies of childhood leukemia and long-term exposures (Greenland et al 2000; Ahlbom et al, 2000). Note that 4 mG refers to an estimated long-term average exposure. The

goal of these epidemiology studies has been to estimate the average exposure of an individual over a long time, not the fluctuating level at any single spot, whether it is in the playground, a school, or a place in the home.

The reason for our focus on long-term exposures is based upon the knowledge that chemicals and agents in the environment that are known to cause cancer, e.g., tobacco smoke, alcohol, and sunlight, require repeated exposures at elevated levels over long periods of time. Therefore, scientists do not expect an association with these diseases to exist for persons with infrequent or very low-level exposures to these agents. The same rationale has been applied by epidemiologists in the study of magnetic fields; while opportunities for short-term exposures to magnetic fields in excess of a few mG or even 100 mG abound in our environment, the exposure of interest is a person's long-term average exposure.

Thus, a calculated or measured magnetic field greater than 4 mG in a playground, school or even a small area of a residence would not necessarily indicate that a child would have an average exposure greater than 4 mG.

Q. Based on your review of the scientific data, what do you conclude regarding EMF and public health?

A. I conclude that EMF exposures at typical environmental levels are not harmful to people, whether they are exposed from transmission lines, other power line sources, or other sources in homes. Electric and magnetic fields can be harmful at very high levels, but not at the levels associated with power lines. With certain electric appliances, the user is exposed to magnetic fields that can be tens to hundreds of times higher than transmission line fields. Electric fields from power lines are generally well below levels that would cause harmful effects, and must be low in order to meet electrical safety standards.

Q. Based on your review, will the EMF levels expected to occur with the proposed line have an unreasonable adverse effect on public health, safety, and welfare?

A. No. The weight of the evidence that I have reviewed does not support a conclusion that exposure to EMF at the levels associated with the proposed project would have adverse effects on human health, compromise normal function, or cause cancer.

SUMMARY

Q. Could you briefly summarize the basis for your conclusions?

A. This conclusion is based on my knowledge of the relevant scientific literature, the results of expert scientific panels that have examined epidemiologic and laboratory research on 60-Hz electric and/or magnetic fields and health, and the field levels anticipated from the operation of this transmission line. The *weight-of-evidence* analysis I conducted follows procedures used by scientists, scientific organizations, and regulatory agencies worldwide. I evaluated each of the individual epidemiologic studies of magnetic fields and health in order to assess the strengths and limitations of each, and assign more weight to those with better design. I assessed the epidemiologic studies collectively, and considered the results of the controlled laboratory research studies in cells and in animals, including those of long-term exposure of laboratory animals to magnetic fields. The Hill Criteria for causality guided my review. I considered that the epidemiology studies reported only weak, inconsistent associations, and there is no convincing evidence of a dose-response relationship. The laboratory data do not provide sufficient evidence that the association is biologically plausible.

There is insufficient evidence to conclude that there is a causal

HECO ST-11A
DOCKET NO. 03-0417
PAGE 22 OF 22

relationship between magnetic field exposure and childhood leukemia (or other cancer), based on these data, taking into account the fact that there is neither a plausible mechanism nor a biologic basis to support such an association.

Q. Are the references cited in your testimony listed in HECO-ST-1101A.

A. Yes.

Q. Does this conclude your testimony?

A. Yes, it does.

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
HEER OFFICE

January 19, 1994

DOH POLICY RELATING TO ELECTRIC AND
MAGNETIC FIELDS FROM POWER-FREQUENCY SOURCES

The Department of Health, in response to continuing but inconclusive scientific investigation concerning electric and magnetic fields (EMF) from low-frequency power sources, recommends a "prudent avoidance" policy. "Prudent avoidance" means that reasonable, practical, simple, and relatively inexpensive actions should be considered to reduce exposure.

A cautious approach is suggested at this time concerning exposure to electric and magnetic fields (EMF) around low-frequency sources, such as electric appliances and power lines. The existing research data on possible adverse health effects, including cancer, are inconclusive and not adequate to establish or quantify a health risk. For example, the biological mechanisms that might underlie any apparent relationship between EMF and cancer have yet to be clearly defined. Also, some epidemiological studies suggest that, if these fields increase the risk of cancer, it is a very small increase. Other epidemiological studies suggest that there is no increased risk.

The Department of Health will continue to collect and evaluate information on possible health hazards associated with electric and

magnetic fields. If adequate data ever become available to establish what levels may be harmful, appropriate standards will be established.

OCT-08-2004 FRI 04:26 PM UH-ENVIRONMENTAL CNTR. 99563980 P. 01

FAX TRANSMITTAL SHEET

ENVIRONMENTAL CENTER
University of Hawaii
2500 Dole Street, Krauss Annex 19, Honolulu, HI 96822
Telephone: (808) 956-7361 Fax: (808) 956-3980

DATE: 10/8/2004

FROM: John Harrison

TO: Carlito Caliboso, Public Utilities Commission (586-2066)

Lesley Matsumoto, Belt Collins (538-7819)

Kerstan Wong, HECO (543-7898)

OEQC (586-4186)

SUBJECT: East Oahu Transmission Project:
46kV Phased Project (DEA)

OCT-08-2004 FRI 04:51 PM 99563980 P. 01

OCT-08-2004 FRI 04:27 PM UH-ENVIRONMENTAL CNTR. 99563980 P. 02

UNIVERSITY OF HAWAI_I AT MANOA
Environmental Center

October 8, 2004

EA: 0304

Mr. Carlito Caliboso, Chairman
State of Hawai'i Public Utilities Commission
465 South King Street, First Floor
Honolulu, Hawai'i 96813

Dear Mr. Caliboso:

Draft Environmental Assessment
East O'ahu Transmission Project 46 kV Phased Project
O'ahu, Honolulu

Hawaiian Electric Company, Inc. (HECO) proposes to reconfigure and connect existing 46 kilovolt (kV) circuits from Pukele Substation at the end of HECO's Northern 138 kV Transmission Corridor with existing and new 46 kV circuits at Archer Substation and Kamoku Substation in HECO's Southern 138 kV Transmission Corridor. The proposed project involves two phases: Phase 1 involves installation of 0.5 mile of new underground ductline for 46 kV lines and related work at eight existing substations, including the removal and replacement of existing 46 k and 12 kV cables in 0.4 mile of existing ductline. Phase 2 involves installation of 1.9 miles of new underground ductline for 46 kV transmission lines, predominantly along King Street. Construction activities would include open trenching, installation of new ductline and circuits, removal of existing circuits and installation of new cable, and repaving of trenched areas.

This review was conducted with the assistance of Kazutoshi Najita, Electrical Engineering; and Lyn Zhang, Civil and Environmental Engineering.

Electromagnetic Fields

Our reviewers note that discussion of human health effects related to Electromagnetic Field (EMF) radiation is appropriate, given public concerns surrounding this issue. Instances of grave impacts on human health attributable to EMF radiation from high power transmission lines have been widely reported, and as a result, epidemiological studies have been conducted seeking confirmation of EMF risks. Results have been inconclusive, and moreover, no convincing scientific or physiological basis for detrimental health effects of EMF presently exists. As a consequence of conflicting views on this issue, it is most appropriate to adopt a

2500 Dole Street, Krauss Annex 19, Honolulu, Hawai'i 96822-2313
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

An Equal Opportunity/Affirmative Action Institution

OCT-08-2004 FRI 04:52 PM 99563980 P. 02

October 8, 2004
Page 2 of 2

prudent avoidance approach. HECO has taken this approach in this project and has placed multiple circuit lines into cable ducts. The phasing of cables is alternated and the loading of the circuits is balanced so that the magnetic fields will tend to cancel and not have impacts at even short distances outside of the cable ducts. Measured magnetic fields of existing electrical facilities (12kv, 25kv, and 46kv underground and overhead distribution lines) vary from a few tenths of a mG (milliGauss) to about 40 mG. There are no Federal or State of Hawai'i health standard for 60 Hertz magnetic fields.

Traffic Impact Study

Our reviewers examined the Traffic Impact Study (TIS) prepared by Wilbur Smith Associates for and found it generally comprehensive in terms of structure, methodology, explanations and incorporation of enough technical details to allow for an informed review.

The TIS assesses the potential construction impacts of the proposed project upon the traffic system within the central Honolulu area and proposes actions to minimize those impacts. Overall, the document appears to be well written and comprehensive in its approach to most issues. However, there are some concerns regarding the traffic analysis as listed below.

1. For capacity and LOS analysis, there is no evidence shown in the TIS that peak hour factors (PHF) were applied to adjust traffic volumes.
2. The project will significantly affect the operations of the King Street intersections with Ward Ave. and Kalakaua Ave (with average delay during afternoon peak hours greater than 250 sec.). However, no detailed mitigation plan was proposed to address this issue.
3. Traffic volume forecasts throughout the draft were based on historical traffic volumes with a simple annual growth rate of 0.75%. However, the opening of the new Wal-Mart along Keeaumoku Street would significantly increase traffic volumes especially on Makaloa Street and Kapiolani Boulevard. The TIS should consider the volume increase due to the development of the new Wal-Mart.

Thank you for the opportunity to comment on this Draft EIS.

Sincerely,

John T. Harrison, Ph.D.
Environmental Coordinator

cc: OEQC
L.Matsumoto, Belt Collins
K. Najita
L. Zhang
James Moncur

BeltCollins

January 7, 2007
2004.33.0800 / 04EP-237

Mr. John Harrison
Environmental Coordinator
University of Hawai'i at Mānoa
Environmental Center
2500 Dole Street
Krauss Annex 19
Honolulu, HI 96822

Dear Mr. Harrison:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *Our reviewers note that discussion of human health effects related to Electromagnetic Field (EMF) radiation is appropriate, given public concerns surrounding this issue.*

Thank you for your comment.

2 *Our reviewers examined the Traffic Impact Study (TIS) prepared by Wilbur Smith Associates for and found it generally comprehensive in terms of structure, methodology, explanations and incorporation of enough technical details to allow for an informed review.*

Thank you for your comment.

3 *1. For capacity and LOS analysis, there is no evidence shown in the TIS that peak hour factors (PHF) were applied to adjust traffic volumes.*

The peak hour factors were kept constant for the future year analysis with and without the Proposed Action. Where there is constrained traffic flow, the peak hour factors could have been increased closer to 1.00 to reflect a consistent flow rate through the bottleneck section throughout the analysis hour. This would have the effect of reducing (improving) the resultant volume-to-capacity ratios and the average delay per vehicle as provided by the Highway Capacity Software capacity analysis of the individual intersections. Thus the *Traffic Impact Study*, by not adjusting the peak hour factor, has provided a more conservative assessment (overstatement) of the Proposed Action impacts.

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. John Harrison
January 7, 2005
2004.33.0800 / 04EP-237
Page 2

4 *2. The project will significantly affect the operations of the King Street intersections with Ward Ave. and Kalakaua Ave (with average delay during afternoon peak hours greater than 250 sec.). However, no detailed mitigation plan was proposed to address this issue.*

The delays greater than 250 seconds at the intersections of King Street and Ward Avenue and King Street and Kalakaua Avenue are estimated during the afternoon peak hours. Appropriate mitigation for these intersections would be to conduct ductline installation during the night to avoid lane reduction during the peak traffic hours (the afternoon period). This is not expected to be an issue as the Proposed Action includes nighttime trenching.

5 *3. Traffic volume forecasts throughout the draft were based on historical traffic volumes with a simple annual growth rate of 0.75%. However, the opening of the new Wal-Mart along Keeaumoku Street would significantly increase traffic volumes especially on Makaloa Street and Kapiolani Boulevard. The TIS should consider the volume increase due to the development of the new Wal-Mart.*

The traffic estimates provided in the EOTP TIS included the traffic generated by the Wal-Mart development, as obtained from the Traffic Impact Report prepared for that project, to the traffic estimates developed for Makaloa Street and Kapi'olani Boulevard using the historic growth rates.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

October 7, 2004

Carlito Caliboso, Chair
Public Utilities Commission
465 S. King Street, #103
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment for the East Oahu Transmission Project

Thank you for the opportunity to review the subject document. We have the following comments.

1. Please delete any reference to voluntary environmental assessment. This project meets the applicable criteria (use of county land and Waikiki Special District) of Chapter 343, HRS. The project also needs discretionary approval from HCDA, PUC and DPP.

2. The purpose of this project is to deal with overload conditions on East Oahu. The majority of the power plants on Oahu are located in West Oahu. Please consider the alternative of building a power plant in East Oahu.

3. Please provide more details about the type of cables that will be used. This information may be useful to evaluate impacts of potentially hazardous materials and EMF.

4. Please make another attempt to interview more cultural practitioners. Please also review the Cultural Impact Assessment for the BRT project for more information.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

FILED
Oct 11 10 02 AM '04
PUBLIC UTILITIES COMMISSION

Sincerely,

Genevieve Salmonson
Director

C: Belt Collins
HECO

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-238

Ms. Genevieve Salmonson
Director
State of Hawai'i Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 93813

Dear Ms. Salmonson:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

Thank you for your letter concerning the EOTP 46kV Phased Project Draft Environmental Assessment (EA). Our responses to your comments follow.

1 *1. Please delete any reference to voluntary environmental assessment. This project meets the applicable criteria (use of county land and Waikiki Special District) of Chapter 343, HRS. The project also needs discretionary approval from HCDA, PUC and DPP.*

HECO respectfully disagrees with your interpretation of the application of Chapter 343 to this project. For the reasons explained below, HECO does not require any discretionary consent from a governmental agency to construct the EOTP.

The Hawaiian Electric Company, Inc. is the legally franchised public utility responsible for the production, purchase, transmission, distribution, and sale of electricity on the Island of O'ahu, Hawai'i. HECO's Franchise dates back to 1903; a copy of the current HECO Franchise, dated 1925, with amendments dated 1961 and 1974, is attached to this letter for your reference. The Franchise is a law, first of the Kingdom, then of the Territory, and finally of the State of Hawai'i.

The Franchise expressly provides that "the company shall have the right to place, construct, erect, or otherwise build poles, wires, pipes, and other appurtenances in, on, above, along, or under public rights of way, provided that the proposed installation meet standards prescribed by the public utilities commission governing such installation."

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Ms. Genevieve Salmonson
January 7, 2005
2004.33.0800 / 04EP-238
Page 2

In view of this Franchise, HECO does not require any discretionary consent from Hawai'i Community Development Authority (HCDA), the Public Utilities Commission (PUC) or Department of Planning and Permitting (DPP) to construct the project. Hawai'i Revised Statutes (HRS) Section 343-2 defines "discretionary consent" as "a consent, sanction, or recommendation from an agency for which judgment and free will may be exercised by the issuing agency, as distinguished from a ministerial consent." The approvals that HECO will obtain for this project are ministerial as HECO has the legal right to use the right of way. For this reason, while HECO may use county land in the sense that it will construct in the public right of way, it has a right do so as a matter of law and does not require discretionary approval to do so.

With respect to the Waikīkī Special District, the Draft EA describes the work that would be performed in the Waikīkī and 'Ena substations. At the Waikīkī substation, six existing hydraulic operators would be replaced with new motor operators and two 46kV switch interrupters would be installed. All of this work is within the existing substation structure. Similarly with regard to the 'Ena substation, seven existing hydraulic operators would be replaced with new motor operators and three 46kV switch interrupters would be installed. All of this work is within the existing structure.

This work at these substations does not require any agency approval, discretionary or ministerial. Since it does not require a discretionary approval, the work does not trigger Chapter 343. Even if it did, this limited activity falls within two of the exempt classes of action identified in Hawai'i Administrative Rules (HAR) 11-200-8:

1) Operations, repairs, or maintenance of existing structures, facilities, equipment, or topographical features, involving negligible or no expansion or change of use beyond that previously existing; [and]

2) Replacement or construction of existing structures and facilities where the new structure will be located generally on the same site and have substantially the same purpose, capacity, density, height, and dimensions as the structure replaced.

Based on the foregoing, we conclude that Chapter 343 is not triggered by this project. While the power lines will be placed in a county roadway, HECO has a franchise to construct in the public right of way and does not need a discretionary consent to do so. While there is work within two substations in Waikīkī, that work does not require a discretionary approval and is so minor that it comes within the exemptions set forth in the Council's rules.

Ms. Genevieve Salmonson
January 7, 2005
2004.33.0800 / 04EP-238
Page 3

Even though HECO does not believe that an EA is required, it nonetheless concluded that the EA process would afford the public an opportunity to review and comment on this project. For this reason, the EA is voluntary. The document refers to the voluntary nature of this EA only twice: At page 1-6, of the report, "HECO's decision to voluntarily prepare this EA was in response to requests made at the McCully/Mō'ili'ili neighborhood board..." and at page 1 of Appendix A, "This request was made to HECO by the City agency during the course of a consultation meeting for the voluntary environmental assessment being prepared for the project." At your request, without waiving the analysis provided in this response, we will delete the reference to voluntary in both places.

2 *2. The purpose of this project is to deal with overload conditions on East Oahu. The majority of the power plants on Oahu are located in West Oahu. Please consider the alternative of building a power plant in East Oahu.*

The purpose of the Proposed Action is to address four problems relating to the 138kV transmission system in the East O'ahu area: (1) Pūkele Substation Reliability Concern, (2) Ko'olau/Pūkele Overload Situation, (3) Downtown Substation Reliability Concern, and (4) Downtown Overload Situation.

The line overload situations increase the risk of catastrophic power outages. A catastrophic outage has the potential to take down the entire island system for many hours. Restarting generation facilities is a very complex and time-consuming process; therefore, a significant number of customers could be without power for many hours until the system can be restored. The substation reliability concerns could be characterized as localized outage problems. Although the latter are limited to a certain area, certain localized power outages are of significant concern because of the number and critical nature of the customers affected and the potential duration of the outages.

With regard to your comment on building a new power plant in East O'ahu, it is assumed that your comment refers to a fossil-fuel type facility. HECO has considered this concept in the past. However, the air emissions restrictions, incompatible surrounding land uses, and the need to truck fuel over long distances through densely populated areas have made siting a new facility in East O'ahu unrealistic. Even if it was possible to overcome the noted challenges with siting a new power plant in East O'ahu, new transmission lines would still be required to connect the facility to the existing transmission grid.

HECO also considered renewable resource generating plants (e.g. wind and solar) and distributed generation (DG) in East O'ahu. In general, it was concluded that renewable resource generating plants were not a viable alternative to address the

Ms. Genevieve Salmonson
January 7, 2005
2004.33.0800 / 04EP-238
Page 4

transmission problems note above. The lack of suitable sites, the large land requirements, the non-firm nature of wind and solar resources, and the costs and need for interconnection lines and battery energy storage systems were the main reasons that this alternative was not viable for this project.

DG refers to the installation of small generating units located at or near the load demands. Various technologies such as internal combustion engines (ICE) (which in Hawai'i are often diesel generators), fuel cells, micro-turbine generators, and renewable energy generators (wind and photovoltaic) are often suggested for DG applications. In principle. installation of DG resources can defer the need for new transmission and distribution (T&D) capacity by providing customers with a nearby redundant source of electricity that otherwise would have been provided by T&D upgrades. Thus, for DG to address the transmission problems noted above, small generating units would need to be located within the East O'ahu area. However, uncertainties with land, fuel supply, interconnection, and permitting with the installation of small generating units in the East O'ahu area made this alternative not viable for this project.

3 *3. Please provide more details about the type of cables that will be used. This information may be useful to evaluate impacts of potentially hazardous materials and EMF.*

XLPE or cross-linked polyethylene cables consist of an aluminum conductor with a semi-conducting strand shield, cross-linked polyethylene insulation, an insulation shield, semi-conducting bedding tape, metallic tape and/or copper wires shield semi-conductor and a polyethylene jacket. A sketch of this arrangement is attached.

4 *4. Please make another attempt to interview more cultural practitioners. Please also review the Cultural Impact Assessment for the BRT project for more information.*

In order to identify knowledgeable sources for use in obtaining information pertinent to the Cultural Impact Assessment in accordance with the Hawai'i State Department of Health Act 50 "Guidelines for Cultural Impact Assessments," meetings with the following agencies and organizations were conducted: State Historic Preservation Division, Archaeological Program; the State Historic Preservation Division, Burial Program; the Office of Hawaiian Affairs; the Waikīkī Descendents Group; and Van Diamond, representing the O'ahu Burial Council. Information obtained from these resources was documented in the Cultural Impact Analysis.

In addition to the meetings referenced above, an Unmarked Burial Site Notice for this project was published in the *Honolulu Advertiser* and *Honolulu Star Bulletin* on October 1, 3, and 6, 2004, and published in *Ka Wai Ola o Oha* in the October 2004

Ms. Genevieve Salmonson
January 7, 2005
2004.33.0800 / 04EP-238
Page 5

issue. No cultural practitioners or information about burials were received, nor did any of the responders to the Draft EA suggest other knowledgeable individuals or organizations to contact.

Both the Final Environmental Impact Statement (EIS) and the Cultural Impact Assessment for the Bus Rapid Transit (BRT) of the Primary Corridor Transportation Project have been reviewed. The types of cultural practices that were identified in the BRT project will not be affected by the proposed HECO project, as the proposed HECO project consists of below ground surface activities. The Archaeological and Cultural Impact Assessments conducted for the HECO project have identified areas that may be affected by the subsurface work.

Again, your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

Enclosures:

Copy of the current HECO Franchise, dated 1925, with amendments dated 1961 and 1974

Sketch of XLPE or cross-linked polyethylene cables

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

FRANCHISES

ELECTRIC LIGHT AND POWER

(R. L. H. 1925)

Electric Light and Power, Honolulu. L. 1903, c. 48, as modified by 33 Sts. at L. 227, c. 1405; R. L. 1915, c. 57; am. L. 1915, cc. 23, 224; as am. L. 1915, c. 23, ratified, etc., June 16, 1916, 39 Sts. at L. 229, c. 155, s. 4; 39 Sts. at L. 229, c. 155, s. 5.

Sec. 1. Definitions. The following words and phrases, wherever they are used or appear in this chapter, shall, unless the same be clearly inconsistent with the context, be construed to mean and be held to have the force and effect as follows:

(a) The "company" shall mean, include, and represent The Hawaiian Electric Company, Limited, and its successors and assigns. (33 Sts. at L. 227, c. 1405; R. L. s. 872; R. L. 1915, s. 836; am. L. 1915, c. 23, s. 1; am. June 16, 1916, 39 Sts. at L. 229, c. 155, s. 1.)

For taxation, etc., district of Honolulu, see c. 14, this Revision.

Sec. 2. Electric power, manufacture, sale, and so forth. The right is hereby granted to The Hawaiian Electric Company (Limited) as a body corporate under that or such other name as the said company may hereafter adopt, and its successors and assigns, to manufacture, sell, furnish and supply electric light, electric current, or electric power on the island of Oahu, Territory of Hawaii, for lighting the streets, roads, public or private buildings, or for motive power, or for any other purpose which it or they may deem advisable, and from time to time, for the purposes above mentioned, to construct, maintain, and operate suitable poles, lines, wires, cables, lamps, lamp-posts, conductors, conduits, and such other appliances and appurtenances as may from time to time be necessary for the transmission, distribution, or supply of electricity to the consumers thereof, under, along, upon, and over the streets, sidewalks, roads, squares, bridges, alleys, and lanes in said island of Oahu and to connect the said lines, wires, and conductors with any manufactory, private or public building, lamp, lamp-post, or other structure

or object with the place of supply. (33 Sts. at L. 228, c. 1405; R. L. s. 873; R. L. 1915, s. 837; am. L. 1915, c. 23, s. 2; am. June 16, 1916, 39 Sts. at L. 229, c. 155, s. 2.)

Sec. 3. Power houses, and so forth. Said company shall also have the right to maintain and operate its present light and power station on the corner of Halekauwila and Alakea Streets in Honolulu, said island of Oahu, and also to construct, maintain, and operate, at such points as may from time to time be necessary, light and power stations or houses, or such other buildings and structures as may be necessary and proper, and to use machinery therein for the purposes of the company. (33 Sts. at L. 228, c. 1405; R. L. s. 874; R. L. 1915, s. 838; am. L. 1915, c. 23, s. 3; am. June 16, 1916, 39 Sts. at L. 229, c. 155, s. 3.)

Sec. 4. Meters; rates. Said company shall also have the right to maintain, operate, and use electric meters or other means of measuring electric light, power, or current supplied from time to time, and to locate the same at such places as may be deemed necessary for their protection; and said company shall also have the right to charge, receive, and collect from all consumers of electricity such reasonable prices as may from time to time be fixed and determined by the company, but such charge shall not at any time exceed seventeen cents per kilowatt hour or one thousand watt hours; provided, however, that the company shall have the right to charge, receive, and collect from each consumer of electricity for lighting the sum of two dollars per month, and from each consumer of electricity for power the sum of one dollar per month per horsepower of apparatus connected to the service of the company; provided, that power is hereby conferred upon the public utilities commission at all times and upon the petition of any consumer or the company to hear and determine from time to time what rate or rates are reasonable, and to enforce the same by appropriate judgment or decree. (33 Sts. at L. 228, c. 1405; R. L. s. 875; R. L. 1915, s. 839; am. March 28, 1916, 39 Sts. at L. 38, c. 53.)

Sec. 5. Expense of connections. Said company shall also have the right to charge consumers, or applicants for the use of electricity, for one-half of the cost and expense of making connections between the company's main lines and the premises where the electricity is to be used; such cost and expense to include the price of all wires, poles, insulators, and other materials, and labor necessary to be used in making such connections: provided, however, that the company shall not be required to make, construct, or maintain said connections as aforesaid for supplying light or

- 2 -

power unless the applicant or applicants for such light or power, if required, shall deposit in advance with the company a sum of money sufficient to pay one-half of the cost and expense of making and constructing such connections and for current for the period of one month. (33 Sts. at L. 228, c. 1405; R. L. s. 876; R. L. 1915, s. 840.)

Sec. 6. Extensions of main lines. The company shall not be required to extend, construct, or maintain its main lines beyond a distance of three hundred feet unless there be an applicant for each three hundred feet of extension or fraction thereof, and unless each applicant shall, in addition to the other requirements in this chapter provided, agree to take, install, and maintain five sixteen-candle-power lights or one horsepower of power apparatus for not less than one year: provided, however, that if the company is unable to furnish power or light applied for by reason of lack of capacity of the apparatus for producing electricity, the company shall be allowed a reasonable time, not to exceed nine months from the date of any application, to procure such additional apparatus as may be necessary to furnish such applicant. (33 Sts. at L. 229, c. 1405; R. L. s. 877; R. L. 1915, s. 841.)

Sec. 7. Cutting off service. The company shall have the right to discontinue or cut off the supply of electricity to any consumer who shall refuse or fail to pay the amount due for electricity supplied by said company within such reasonable time as said company may fix for the payment of the same, and such discontinuance of service or supply of electricity shall not prejudice the right of the company to any remedies now or which may hereafter be authorized by law for the recovery and collection of said amount. (33 Sts. at L. 229, c. 1405; R. L. s. 878; R. L. 1915, s. 842.)

Sec. 8. Rules, regulations. The superintendent of public works is hereby authorized to make, and from time to time to change, amend, or add to, reasonable rules regulating the placing of poles and wires, the insulation of wires and apparatus carrying the electric current, and the maintenance in good repair of all poles, wires, and apparatus, and generally concerning the manufacture and supply of electricity, which may be necessary or proper for the public safety and welfare.

No person, firm, or corporation shall be allowed to place or maintain poles or wires along, upon, or across any public street except such as are authorized by the superintendent of public works. Any person violating this provision last above mentioned shall, upon conviction, be deemed guilty of a misdemeanor and be punished by a

- 3 -

fine of not exceeding fifty dollars or by imprisonment not exceeding three months. The superintendent of public works may at any time cause such poles or wires to be removed at the expense of the person, firm, or corporation placing them or causing them to be placed in such position.

If at any time the company, after reasonable notice given to it in writing, shall fail to observe or execute the rules and regulations hereinbefore provided for, relative to the placing of poles and wires, the insulation of wires and apparatus carrying electric current, and the repair of all poles and apparatus, the superintendent of public works shall, after giving the company reasonable notice thereof in writing of his intentions so to do, proceed to remedy such failure, and the cost of such repairs or changes may be recovered from the company by the Territory. (33 Sts. at L. 229, c. 1405; R. L. s. 879; R. L. 1915, s. 843.)

Sec. 9. Inspection of plant, books, etc. The entire plant, operation, books and accounts of the company shall at all times be subject to the inspection of the public utilities commission or other officer appointed by it for that purpose. (33 Sts. at L. 229, c. 1405; R. L. s. 880; R. L. 1915, s. 844; am. March 28, 1916, 39 Sts. at L. 38, c. 53.)

Sec. 10. Annual payments to City and County of Honolulu. The said company shall, within one month after the expiration of each calendar year, file with the public utilities commission a statement showing the gross receipts from the sale of electric light and power furnished by the company, and shall at the same time pay to the treasurer of the City and County of Honolulu, two and one-half per centum of the gross receipts of the company from all electric light or power furnished to consumers during the calendar year preceding. (33 Sts. at L. 230, c. 1405; R. L. s. 881; R. L. 1915, s. 845; am. L. 1915, c. 224, s. 1; am. March 28, 1916, 39 Sts. at L. 38, c. 53; am. June 16, 1916, 39 Sts. at L. 232, c. 158.)

Sec. 11. Acquisition of property. The said company shall have the right to acquire, hold, or take over, either by purchase or lease, property, both real, personal, or mixed, and such other property as may be necessary or incidental to the proper conduct of its business; said company shall, however, not have the right to purchase franchises and property of whatever nature of another company of like nature. (33 Sts. at L. 230, c. 1405; R. L. s. 882; R. L. 1915, s. 846.)

- 4 -

Sec. 12. Mortgaging, bonding. The said company, whenever from time to time it shall be deemed expedient in the furtherance of the objects of the company, shall have the power to borrow money and to secure the payment thereof, with the interest agreed upon, by mortgage of all or any portion of the property, and the franchises and privileges granted or obtained by virtue of this chapter, or if it be deemed advisable, bonds may be issued, secured by deed of trust of such property as aforesaid, not to exceed sixty per centum of the actual value *thereof*, together with all future acquired property, as well as the income and receipts of the property from whatever source derived, and in such form and under such terms as said company may deem advisable; provided, that nothing in this section contained shall operate to prevent said company from obtaining the usual business credits and to make promissory notes without security. (33 Sts. at L. 230, c. 1405; R. L. s. 883; R. L. 1915, s. 847.)

Sec. 13. Forfeiture of franchise. Whenever said company refuses or fails to do or perform or comply with any act, matter or thing requisite or required to be done under the terms of this chapter, and shall continue so to refuse or fail to do or perform or comply therewith, after reasonable notice given by the superintendent of public works or the public utilities commission, as the case may be, to comply therewith, the said superintendent of public works or the public utilities commission, as the case may be, shall, with the consent of the governor and the attorney general, cause proceedings to be instituted before the proper tribunal to have the franchise granted by this chapter and all rights and privileges granted thereunder forfeited and declared null and void. (33 Sts. at L. 230, c. 1405; R. L. s. 884; R. L. 1915, s. 848; am. March 28, 1916, 39 Sts. at L. 38, c. 53.)

Sec. 14. Penalties for injuring company's property. Any person who shall wilfully or intentionally injure, molest, or destroy any of the poles, lines, wires, meters, or other appliances, or the material or property belonging thereto, or shall without permission or authority of the company connect or cause to be connected by poles and wires, or by any device, with the wires, cables, or conductors of the company, for the purpose of obtaining electric current for light, heat, or power, or whoever shall, without such permission or authority, cut or cause to be cut wires or other devices connected with any meter or meters erected or set up for the purpose of registering or recording the amount of electric current supplied to any consumer by the company, or change or shunt the wiring leading to or from any such meter, or by any device, appliance, or means whatsoever, tamper with any such meter in such manner that such

- 5 -

meter or meters will not measure or record the amount of electric current supplied to any consumer by the company, shall be guilty of a misdemeanor, and upon conviction thereof in the district court of Honolulu, or other court having jurisdiction thereof, shall be punished by a fine not exceeding one hundred dollars or by imprisonment not exceeding six months: provided, however, that nothing herein contained shall be deemed to affect the right of the company to recover by action at law damages for any injury done by such unlawful action. (33 Sts. at L. 230, c. 1405; R. L. s. 885; R. L. 1915, s. 849.)

Sec. 15. Franchise not exclusive. It is expressly provided that nothing herein contained shall be so construed as to grant to the company the exclusive right to furnish, sell, or supply electric light or power. (33 Sts. at L. 231, c. 1405; R. L. s. 886; R. L. 1915, s. 850.)

Public Utilities Commission

Sec. 16. Public Utilities Commission. This franchise, and the person or corporation holding the same, shall be subject as to reasonableness of rates, prices, and charges, and in all other respects to the provisions of chapter one hundred and twenty-eight of the Revised Laws of Hawaii, nineteen hundred and fifteen, creating a public utilities commission, and all amendments thereof, for the regulation of the public utilities in said Territory, and all the powers and duties expressly conferred upon or required of the superintendent of public works or the courts by said act creating said franchise are hereby conferred upon and required of said public utilities commission. (L. 1915, c. 23, s. 4 ratified, etc., June 16, 1916; 39 Sts. at L. 229, c. 155, s. 4.)

Sec. 17. Extensions of service lines. The public utilities commission of the Territory of Hawaii is hereby granted the power to order the Hawaiian Electric Company (Limited), its successors or assigns, to make extensions of its service lines within the island of Oahu, whenever it shall be made to appear that said extension is a public necessity and that said extension or extensions can be made to earn a reasonable profit on the cost and maintenance of the same: provided, that all orders of the public utilities commission herein provided for shall be subject to review by the courts of said Territory. (39 Sts. at L. 229, c. 155, s. 5.)

- 6 -

Sec. 18. Franchise subject to amendment or repeal. Congress or the legislature of the Territory of Hawaii, with the approval of Congress, may at any time alter, amend, or repeal this chapter. (33 Sts. at L. 231, c. 1405; R. L. 1915, s. 851.)

- 7 -

ACT 134

AN ACT RELATING TO PUBLIC UTILITIES

Be it Enacted by the Legislature of the State of Hawaii:

SECTION 1. (a) Subject to Act 1, Second Special Session of the First State Legislature 1959, the provisions of chapter 104 of the Revised Laws of Hawaii 1955, as amended by this Act, and all other laws concerning the functions, powers and duties of the public utilities commission are continued as laws of the State.

(b) Insofar as the Act of March 28, 1916 (39 Stat. 38, c. 53) constitutes a territorial law enacted by Congress of the United States which might terminate on August 21, 1961, pursuant to the proviso of section 15 of the Act of March 28, 1959 (73 Stat. 11), the provisions of this Act shall be deemed to amend the Act of March 28, 1916.

(c) The public utilities commission is hereby authorized and directed to assume all of the functions, powers and duties pertaining to it under the constitution and laws of the State in respect to its increased jurisdiction.

SECTION 2. The following franchises which were granted by the Territory of Hawaii with the approval of the Congress of the United States and are now in existence, which may expire on August 21, 1961:

Electric Light and Power, Hana (Hana Ice and Electric)
Electric Light and Power, Hana (A. F. Tavares)
Electric Light and Power, Honolulu
Hilo Electric Light Co., Ltd.
Electric Light and Power, Hamakua
Electric Light and Power, North Kona & South Kona
Electric Light and Power, Districts of Waimea and Koloa, Island and County of Kauai
Electric Light and Power, Waimea and Kekaha
Electric Light and Power, Hanalei
Electric Light and Power, Lihue and Koloa
Electric Light and Power, District of Kawaihau
Electric Light and Power, Lahaina

- 8 -

Electric Light and Power, Wailuku
Gas and Electric Light and Power, Wailuku and Makawao
Electric Light and Power, Molokai
Gas, Honolulu
Gas, South Hilo
Honolulu Rapid Transit and Land Company

shall continue in effect; provided, that each and every such franchise shall be amended as follows:

(a) That all references to the Territory of Hawaii are hereby amended to read State of Hawaii;

(b) That the legislature of the State of Hawaii, and it alone, may at any time hereafter alter, amend or repeal any such franchise, and the approval of congress shall not be required for alteration, amendment or repeal;

(c) That no such franchise shall grant or be construed to grant any exclusive right or privilege, and no franchise shall limit or be construed to limit the power of the legislature of the State of Hawaii to grant additional franchises for the operation of competitive or other public utilities;

(d) That no such franchise shall limit or be construed to limit the power of the public utilities commission of the State of Hawaii or any other officer or agency of the State of Hawaii under chapter 104 of the Revised Laws of Hawaii 1955, or any amendments thereto, or under any laws of the State of Hawaii.

SECTION 3. All rights granted in each and every franchise aforementioned to acquire property shall be further amended to read as follows:

"The said company shall have the right to acquire, hold or take over, either by purchase or lease, property, both real, personal or mixed, as may be necessary for the proper conduct of its business, but said company shall not have power or right to acquire the franchise or property of any other public utility company, except with the approval of the public utilities commission."

SECTION 4. All rights granted in each and every franchise aforementioned to install equipment in, on, above, along, or under public rights of way shall be further amended to read as follows:

- 9 -

"Effective July 1, 1962 the company shall have the right to place, construct, erect, or otherwise build poles, wires, pipes, and other appurtenances in, on, above, along, or under public rights of way, provided that the proposed installation meets standards prescribed by the public utilities commission governing such installations." (See Act 88, SLH 1974)

SECTION 5. The franchise held by the Hawaiian Electric Company, Limited, shall be further amended by changing the language of section 10 thereof to read as follows:

"Section 10. Annual payments to City and County of Honolulu. The said company shall within one month after the expiration of each calendar year, file with the public utilities commission a statement showing the gross receipts from the sale of electric light and power furnished by the company on the Island of Oahu and shall at the same time pay to the treasurer of the City and County of Honolulu two and one-half per centum of the gross receipts of the company from all electric light or power furnished to consumers on the Island of Oahu during the preceding calendar year."

SECTION 6. Any corporation covered by this Act and having the power of eminent domain under section 8-4, Revised Laws of Hawaii 1955, and any corporation having the power of eminent domain under section 8-38, Revised Laws of Hawaii 1955, may continue to exercise such power, provided, that prior to the exercise of the power,

(a) The corporation submits to the public utilities commission its intention to exercise the power, with a description of the property to be condemned;

(b) The public utilities commission finds that the proposed condemnation is in the public interest, that the proposed condemnation is necessary, and that the corporation will use the property, for its operations as a public utility.

- 10 -

SECTION 7. Nothing in this Act shall be construed as granting to any of the public utilities a franchise in any of its certificated or regulated areas. Any person who prior to the enactment of this Act was certified or regulated by the public utilities commission shall continue to be so certificated or regulated in all respects as though this Act had not been passed.

SECTION 8. Nothing in this Act shall be construed as an admission on the part of the State that the holder of the franchise is presently engaged in the type of business provided for in said franchise.

SECTION 9. This Act shall take effect upon its approval.

(Approved July 5, 1961) S.B. 647.

- 11 -

(

pended from the
defray the cost of
or and the perma-
hance of the insti-

e operation of the
such other fees as
endered to partic-
nd. The institute
encies, public and
discretion of the
te.

priated from the
olving fund estab-

fect upon its ap-

S.B. NO. 1364

d ging and
Statutes.

s, is amended to

gulations. The di-
for the enforce-
and effect of law
sures and weights
include:
onable standards

edures to be fol-
of approval and
measures in the

requirements of

emen and service

g and measuring

COPY

ACT 88

(6) specifications, tolerances, and other technical requirements with respect to the packaging, handling, storing, advertising, labeling, dispensing, and selling of petroleum products which the director deems necessary for the protection of the consumer,

(7) rules to assure that amounts of commodities or services sold are determined in accordance with good commercial practice and are so determined and represented as to be accurate and informative to all parties at interest, and

(8) standard methods of ingredient, nutritional, cholesterol, fat, fatty acids, dietary, vitamins and minerals, spices and flavors, and imitation foods labeling consistent with federal requirements.

These regulations shall include specifications, tolerances and other technical requirements designed to eliminate from use those weights and measures:

(a) that are not accurate,

(b) that are of such construction that they are faulty, that is, that are not reasonably permanent in their adjustment or will not repeat their indications correctly, or

(c) that facilitates the perpetration of fraud.

The specifications, tolerances, and other technical requirements for commercial weighing and measuring devices as recommended and published by the National Bureau of Standards, together with regulations issued by the director under authority of this chapter, shall be the specifications, tolerances, and other technical requirements for weights and measures of the state.

The director may pursuant to chapter 91 adopt, in whole or in part, any amendment or supplement to the National Bureau of Standards publication or any subsequent similar publication by such bureau. For the purpose of this chapter, a weight or measure is "correct" when it conforms to all applicable sections of this chapter or to such regulations promulgated pursuant thereto; all other weights and measures are "incorrect"."

SECTION 2. Statutory material to be repealed is bracketed. New material is underscored. In printing this Act, the revisor of statutes need not include the brackets, the bracketed material, or the underscoring.*

SECTION 3. This Act shall take effect upon its approval.

(Approved May 31, 1974.)

ACT 89 S.B. NO. 1498-74

A Bill for an Act Relating to Public Utilities.

Be It Enacted by the Legislature of the State of Hawaii:

SECTION 1. Section 4, Act 134, Session Laws of Hawaii 1961, is amended to read:

*Edited accordingly

157

ACT 89

"SECTION 4. All rights granted in each and every franchise aforementioned to *install equipment in, on, above, along,* or under public rights of way shall be further amended to read as follows:

'Effective July 1, 1962 the company shall have the right to place, construct, erect, or otherwise build poles, wires, pipes, and other appurtenances in, on, above, along, or under public rights of way, provided that the proposed installation meets standards prescribed by the public utilities commission governing such installations.'"

SECTION 2. Statutory material to be repealed is bracketed. New material is underscored. In printing this Act, the revisor of statutes need not include the brackets, the bracketed material, or the underscoring.*

SECTION 3. This Act shall take effect upon its approval.

(Approved May 31, 1974.)

ACT 89 S.B. NO. 1565-74

A Bill for an Act Relating to Motor Vehicles.

Be It Enacted by the Legislature of the State of Hawaii:

SECTION 1. Section 437-28, Hawaii Revised Statutes, is amended by amending subsection (b) to read as follows:

"(b) Grounds for suspension, revocation, or denial of issuance or renewal of a license. The board may, after notice and hearing as provided in chapter 91, and subject to appeal to the circuit court of the circuit in which the board has jurisdiction under the procedure and rules prescribed from time to time by the laws of the State or the applicable rules of the courts pertaining to appeals to circuit courts, suspend, revoke, or deny the renewal of any license, or prior to such notice and hearing deny the issuance of any license, if it finds that the applicant or holder, or any officer, director, general manager, trustee, partner, or stockholder owning more than a ten percent interest of such applicant or holder:

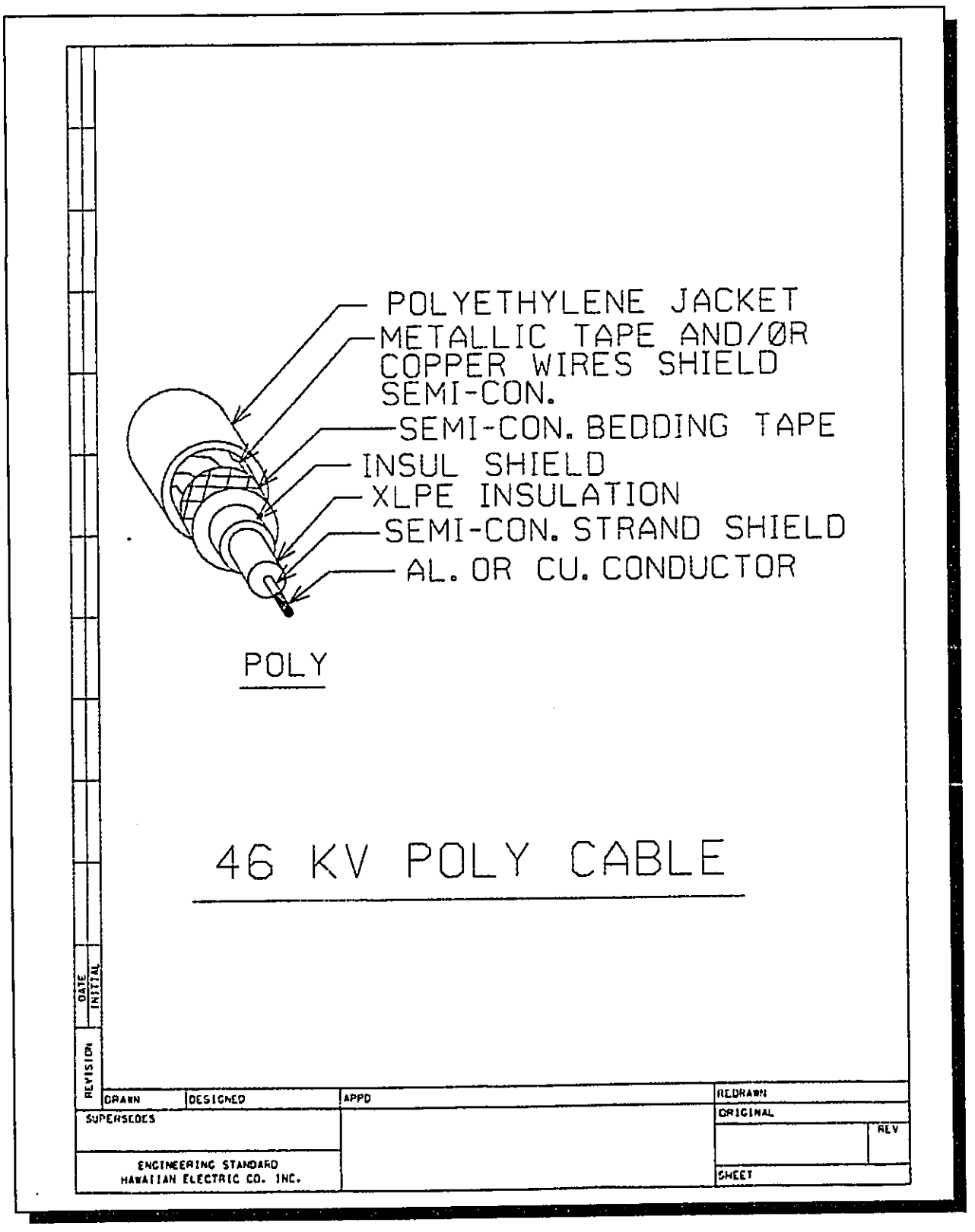
(1) Has intentionally made a false statement of a material fact in his application for a license or in any other statement required by this chapter or has obtained or attempted to obtain a license by fraud or misrepresentation; or

(2) Has failed to comply, observe, or adhere to any provision of this chapter or any other law relating to the sale, taxing, or licensing of motor vehicles or any rule, regulation, or order made pursuant to this chapter; or

(3) Has committed a fraudulent act in selling, purchasing, or otherwise dealing in motor vehicles or has misrepresented the terms and conditions of a sale, purchase, or contract for sale or purchase of a motor vehicle or any interest therein including an option to purchase such motor vehicle; or

*Edited accordingly.

158


POLYETHYLENE JACKET
METALLIC TAPE AND/ØR
COPPER WIRES SHIELD
SEMI-CON.
SEMI-CON. BEDDING TAPE
INSUL SHIELD
XLPE INSULATION
SEMI-CON. STRAND SHIELD
AL. OR CU. CONDUCTOR
POLY
46 KV POLY CABLE
DATE
INITIAL
REVISION
DRAWN
DESIGNED
APPD
REDRAWN
ORIGINAL
SUPERSEDES
REV
ENGINEERING STANDARD
HAWAIIAN ELECTRIC CO. INC.
SHEET

6.2.2 Comments Received After Close of 30-day Comment Period

Commenters providing their input after the close of the 30-day comment period are listed below. Comment and response letters follow.

Name	Organization
Ms. Patricia Hamamoto, Superintendent	State of Hawaii, Department of Education
Mr. Timothy E. Steinberger, Director	City and County of Honolulu, Department of Design and Construction
Ms. Dierdre Mamiya, Administrator	State of Hawaii, Department of Land and Natural Resources, Land Division
Mr. Larry Leopardi, Director and Chief Engineer	City and County of Honolulu, Department of Facility Maintenance
Mr. Russell Takata, Program Manager	State of Hawaii, Department of Health, Noise, Radiation and Indoor Air Quality Branch
Mr. Denis Lau, P.E., Chief	State of Hawaii, Department of Health, Clean Water Branch
Mr. George Miyamoto, Acting Director	City and County of Honolulu, Department of Transportation Services
Mr. Wilfred K. Nagamine, Manager Clean Air Branch	State of Hawaii, Department of Health
Mr. Clyde Nāmu'o, Administrator	State of Hawaii, Office of Hawaiian Affairs

[redacted]
LINDA LINGLE
GOVERNOR

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

PATRICIA HAMAMOTO
SUPERINTENDENT

FILED
OCT 12 10 13 AM '04
PUBLIC UTILITIES
COMMISSION

OFFICE OF THE SUPERINTENDENT

October 6, 2004

Mr. Carlito Caliboso, Chairman
State of Hawaii Public Utilities Commission
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

SUBJECT: Draft Environmental Assessment for Hawaiian Electric Company's East Oahu Transmission Project, Honolulu

The Department of Education (DOE) is concerned that the Hawaiian Electric Company (HECO) project to reconfigure transmission lines will impact three schools in the Honolulu District by displacing school facilities and limiting access. The Draft Environmental Assessment (DEA) for the project identifies impacts but indicates that personal contact had only been made with one of the principals of the affected schools.

The DOE requests that your plans and their impacts on each of the three schools be discussed with each of their respective principals at this early stage in planning. Among the issues that would need to be discussed is use of school facilities such as parking lots and playgrounds. Although the DEA mentions that efforts will be made to schedule construction activity during school vacation periods, those periods are becoming increasingly shorter and can vary from year to year depending on the schedule for summer school, etc.

The DOE would like to be assured that if the directional drilling operation takes place on or near school lands that the drilling, slurry extraction, and on-site settling and containment pits do not affect school building foundations or pose a flooding threat.

Finally, the DOE would request that pedestrian and car access plans are worked out with the principals of the three affected schools to insure that temporary traffic patterns do not jeopardize students walking or bicycling to school. In turn, the principals could be of assistance in informing their constituencies about temporary changes in traffic and access.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

Mr. Carlito Caliboso
Page 2
October 6, 2004

The DOE appreciates this opportunity to review your plans but requests that more detailed planning be conducted with the principals of Lunalilo Elementary, McKinley High, and Washington Middle schools.

If you have any questions, please call Rae Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Heidi Meeker of the Facilities and Support Services Branch at 733-4862.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:jmb

c: Rae Loui, OBS
Dr. Raelene Chock, CAS, McKinley/Roosevelt Complex Area
Estelle Wong, CAS, Kaimuki/Kalani Complex Area
Michael Harano, Principal, Washington Middle School
Dean Nakamoto, Principal, Lunalilo Elementary School
Milton Shishido, Principal, McKinley High School
Lesley A. Matsumoto, Belt Collins

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-239

Ms. Patricia Hamamoto
Superintendent
State of Hawai'i Department of Education
PO Box 2360
Honolulu, HI 96804

Dear Ms. Hamamoto:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the State of Hawai'i Department of Education on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Department of Education's comments were not received by the Public Utilities Commission until October 11, 2004, HECO has prepared this response to the Department of Education's comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *The Department of Education (DOE) is concerned that the Hawaiian Electric Company (HECO) project to reconfigure transmission lines will impact three schools in the Honolulu District by displacing school facilities and limiting access. The Draft Environmental Assessment (DEA) for the project identifies impacts but indicated that personal contact had only been made with one of the principals of the affected schools.*

Lunalilo Elementary School, Washington Middle School, and McKinley High School are adjacent to the proposed project area. Lunalilo Elementary School, located on the 'Ewa side of Pumehana Street between Citron and Fern Streets, is adjacent to the proposed Phase 1 project area. Washington Middle School, located on the makai side of King Street at the Punahou Street intersection, and McKinley High School, located on the makai side of King Street at the Pensacola Street intersection, are adjacent to the proposed Phase 2 project area.

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Ms. Patricia Hamamoto
January 7, 2005
2004.33.0800 / 04EP-239
Page 2

Lunalilo Elementary School

For Lunalilo Elementary School, no school facilities would be displaced because all work would be confined to Pumehana Street. On Pumehana Street, on-street parking would likely be prohibited one block at a time for the duration of trenching activities. However, vehicular and pedestrian access to the school would be maintained throughout the construction period. Public access to work areas would be restricted to ensure pedestrian safety during construction. A special duty police officer will be on-site whenever construction activities are occurring.

Washington Middle School

Impacts to Washington Middle School from Phase 2 activities would differ depending on whether the conventional trenching option or horizontal directional drilling (HDD) option is used. For the trenching option, no school facilities would be displaced and vehicular and pedestrian access would be maintained to the teacher's parking lot off of King Street during construction hours because all work would be confined to a single lane on King Street.

For the HDD option, the teacher's parking lot off of King Street would have to be temporarily relocated during construction. The school's parking lot and field would be used to lay out ductline and possibly directional drilling equipment. The Boys and Girls Club of Hawai'i uses the playing fields at Washington Middle School from the end of the school day until sunset, and all day during school vacations. During construction with the HDD option, access to the school would be limited to the Punahou Street side of the school.

The estimated duration of impacts to Washington Middle School from the HDD option would be approximately two to four months, including set-up time. The longest period without scheduled classes at Washington Middle School is a three-week winter break. Scheduling a portion of the work during the school break would lessen the impact of work on the school. A special duty police officer will be on-site whenever construction activities are occurring.

McKinley High School

Impacts to McKinley High School would also differ depending on the construction option chosen. For the trenching option, no school facilities would be displaced and vehicular and pedestrian access would be maintained to the school because all work would be confined to a single lane on King Street.

For the HDD option, land near the corner of King and Pensacola Streets would be needed for staging of materials. Slurry extracted from the drill hole would be returned to an on-site settling and containment pit. Wet cuttings would then be separated from

Ms. Patricia Hamamoto
January 7, 2005
2004.33.0800 / 04EP-239
Page 3

the slurry for disposal and the remaining slurry would be recycled into the drilling rig. According to the school's principal, the proposed activities would have little impact, provided the construction work area is fenced off. The nearest school building, the Science Building, is set back from King Street. It has air conditioning, so classroom windows would not open directly on the site of the drilling activity, although other buildings, further makai and towards downtown Honolulu, do depend on natural ventilation. The equipment staging area would be fenced off during the drilling phase to prevent access to the staging area. Vehicular and pedestrian access to the school would be maintained during construction. A special duty police officer will be on-site whenever construction activities are occurring.

Summary

Conventional trenching construction would not displace school facilities and would not impact access to the three schools as noted above. This is the construction option that is being proposed for the project.

The HDD option was considered for Phase 2 of the project which would impact Washington Middle School and McKinley High School. This option would temporarily displace school facilities and impact access at Washington Middle School only. However, as noted on page 3-34 of the Draft EA, HDD does not offer significant advantages over conventional trenching for this project. Furthermore, the uncertainty in securing needed permits and approvals for this option does not support further consideration of this option. Therefore, conventional trenching is being proposed for the project.

Regarding your comment that the Draft EA only indicates personal contact with one of the principals of the affected schools, HECO wishes to clarify that it contacted all the principals at the affected schools. Although Section 4.5.3 ("Schools") in the Draft EA only noted comments from the McKinley High School principal, as noted in Table 6-1, page 6-3 of the Draft EA, meetings were also held with principals of Washington Middle School and Lunalilo Elementary on May 4, 2004 and May 21, 2004 respectively.

2 *The DOE requests that your plans and their impacts on each of the three schools be discussed with each of their respective principals at this early stage in planning. Among the issues that would need to be discussed is use of school facilities such as parking lots and playgrounds. Although the DEA mentions that efforts will be made to schedule construction activity during school vacation periods, those periods are becoming increasingly shorter and can vary from year to year depending on the schedule for summer school, etc.*

Ms. Patricia Hamamoto
January 7, 2005
2004.33.0800 / 04EP-239
Page 4

HECO provided the Draft EA to the principals of Lunalilo Elementary School, Washington Middle School, and McKinley High School for review and comment. We will continue meeting with the principals of these schools to keep them informed of the project planning and to coordinate various aspects of the project that could potentially impact their schools. In particular, we will give special attention to the use of school facilities. However, as mentioned previously in this response letter, we are proposing conventional trenching construction, which will not require the use of school facilities and will not impact access to the schools.

It is noted that the timing and durations of school vacation periods may change, which may not allow the proposed project to be constructed during these periods. Nevertheless, every reasonable effort will be made to have the construction near these schools occur during the school vacation periods.

3 *The DOE would like to be assured that if the directional drilling operation takes place on or near school lands that the drilling, slurry extraction, and on-site settling and containment pits do not affect school building foundations or pose a flooding threat.*

Your question covers four topics: (a) the drilling, (b) slurry extraction, (c) local settlement, and (d) containment pits. Other concerns are flooding and degradation to local foundations.

(a) The drilling operation occurs at grade. The machine and product casing are located at grade. The drill string enters the ground at an entrance pit, the dimensions of which are typically 10 feet by 10 feet by four feet deep. Ground water in areas where HDD was evaluated occurs below four feet and is not an issue for the drilling operation. The receiving pit is typically small with the depth designed to be above the existing water level. Therefore the drilling operation does not influence existing foundations in any way. If the design has the product casing traversing beneath buildings or structural facilities, which is not being contemplated for this project, the design would incorporate special slurry viscosity and operating pressures to assure no ground settlement beneath any structure. Slurry viscosity and operating pressures are monitored from the on-site control room of the drill rig by the contractor and owner's inspector. Flooding is not an issue since all operations occur at grade or above the existing ground water level.

(b) The slurry extraction, or slurry management, is handled by using a self-contained slurry (mud) system. The mud is mixed and viscosity tested above grade in the mud trailer. The mud is then pumped to the drill cutting head through the drill string. The viscosity is designed to prevent local frac-out

Ms. Patricia Hamamoto
January 7, 2005
2004.33.0800 / 04EP-239
Page 5

(escape of slurry through fractures and resulting loss of operating pressure) into the local subsurface surrounding the drill head. The mud is then forced back up the drill hole into the entry pit. In the entry pit is a rock/mud pump which is capable of handling more than the calculated mud return flow. This equipment pumps the mud back to the mud trailer where the rock and sands are removed. The second stage of mud recycling involves retesting the filtered mud for viscosity, adjusting viscosity as needed, and then pumping the mud back down the drill string to the cutting head. This operation is repeated indefinitely until drilling is complete. Therefore the entry area for slurry management is not an issue with respect to foundations or flooding as all the work occurs above grade and the ground water level. The exit pit, the terminus of the HDD drilling project, is shallow and small in area. The contractor would have on site trucks with appropriate equipment to remove the slurry as it enters the exit pit. The amount of slurry is small and is hauled to a previously approved area for disposal. Again, there are no issues with settlement or flooding.

(c) The only containment pits used will be the entry and exit pits. These pits, as described above, are of minimal depth and area and have no effect on ground settlement nor any potential to cause flooding.

(d) Local settlement generally occurs when dewatering is required, such as for a jack and bore installation. HDD technology does not utilize dewatering as all work takes place above grade. The drill head and string are performing using a designed slurry under a specific pressure that controls the possibility of frac-out and over excavation.

HDD has little possibility to encounter local settlement and /or flooding when proper design/geotechnical and construction methods are utilized. This application will take place above grade and above the existing ground water level; therefore, settlement and/or flooding is not expected to be encountered. The local foundation issue seems remote due to the nature of the operation and the expected distance from the foundations.

As noted earlier in this letter, HDD does not offer significant advantages over conventional trenching for this project. Furthermore, the uncertainty in securing needed permits and approvals for this option does not support further consideration of this option. Therefore, conventional trenching is being proposed for the project.

4 *Finally, the DOE would request that pedestrian and car access plans are worked out with the principals of the three affected schools to insure that temporary traffic patterns do not jeopardize students walking or bicycling to school. In turn, the principals could be of assistance in informing their constituencies about temporary changes in traffic and access.*

Ms. Patricia Hamamoto
January 7, 2005
2004.33.0800 / 04EP-239
Page 6

For both phases, HECO will seek input from schools official regarding traffic control and the staging all work areas. All schools will be continually updated during construction.

On Phase 1, HECO will attempt to schedule all excavation work on Pumehana Street, adjacent to Lunalilo Elementary School, during summer vacation.

On Phase 2, HECO desires to do work at night along King Street, including the sections fronting Washington Intermediate and McKinley High Schools.

5 *The DOE appreciates this opportunity to review your plans but requests that more detailed planning be conducted with the principals of Lunalilo Elementary, McKinley High, and Washington Middle schools.*

School officials will be provided with detailed plans as early as possible in the design and planning phases. Further, HECO will seek their input regarding traffic control plans and to construction to be completed near the schools.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 523-4564 , FAX: (808) 523-4567
WEB SITE ADDRESS: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

TIMOTHY E. STEINBERGER, P.E.
DIRECTOR

CDP 04-0163

October 8, 2004

FILED
OCT 12 10 13 AM '04
PUBLIC UTILITIES COMMISSION

State of Hawaii Public Utilities Commission
465 South King Street, First Floor
Honolulu, Hawaii 96813

Attention: Mr. Carlito Caliboso

Ladies and Gentlemen:

Subject: Draft Environmental Assessment (DEA)
East O'ahu Transmission Project 46KV Phased Project

We have reviewed the DEA and have the following comments:

As-built drawings of existing sewer lines should be checked to avoid any conflicts with the proposed transmission lines. Construction plans should be sent to the Wastewater Branch of the Site Development Division of the Department of Planning and Permitting for review and comment.

If there are any questions, please contact Mr. Jay Hamai of Wastewater Division at 527-5003.

Very truly yours,

Eugene C. Chu

for TIMOTHY E. STEINBERGER, P.E.
Director

GS:dk

cc: Belt Collins Hawaii, Ltd. (Lesley A. Matsumoto)

Belt Collins

January 7, 2005
2004.33.0800 / 04EP-240

Mr. Timothy Steinberger
Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 11th Floor
Honolulu, HI 93813

Dear Mr. Steinberger:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received a comment from the City and County of Honolulu Department of Design and Construction on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Department of Design and Construction's comment was not received by the Public Utilities Commission until October 12, 2004, HECO has prepared this response to the Department of Design and Construction's comment.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

As-built drawings of existing sewer lines should be checked to avoid any conflicts with the proposed transmission lines. Construction plans should be sent to the Wastewater Branch of the Site Development Division of the Department of Planning and Permitting for review and comment.

During the detailed design for the Proposed Action, HECO will review as-built drawings of existing sewer lines in the project area that are reasonably available to minimize any potential conflicts. Subsequently, HECO will submit construction plans to the Wastewater Branch of the Site Development Division of the Department of Planning and Permitting for review and comment prior to commencement of construction.

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Timothy Steinberger
January 7, 2005
2004.33.0800 / 04EP-240
Page 2

Your comment is appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

RECEIVED
2004 OCT 20 2:23
BELT COLLINS HAWAII

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 19, 2004

LD-NAV

HECO46KV.RCM

Belt Collins Hawaii Ltd.
Lesley A. Matsumoto
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Ms. Matsumoto:

SUBJECT: Draft Environmental Assessment for the East Oahu Transmission Project - 46KV

Thank you for the opportunity to review and comment on the subject matter.

The Department of Land and Natural Resources' Land Division transmitted or made available a copy of the document pertaining to the subject matter to the following Department of Land and Natural Resources' Divisions for their review and comment:

- Division of Forestry and Wildlife
- Commission on Water Resource Management
- Engineering Division Planning
- Office of Conservation and Coastal Lands
- Land-Oahu District Land Office
- Land-Planning and Development

Enclosed please find a copy of the Engineering Division comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at (808) 587-0384. Thank you.

Very truly yours,

DIERDRIE S. MAMIYA
Administrator

C: ODLO

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION
2004 SEP 13 A 10: 51

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

September 8, 2004
LD/NAV
Ref.: HEC047KV.CMT

Suspense Date: 9/15/04

MEMORANDUM:

TO: ✓ *XXX Division of Forestry and Wildlife
*XXX Land-Oahu District Land Office
XXX Engineering Division
XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
*XXX Land-Planning and Development

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA) for East Oahu Transmission Project - 46KV Phased Project

Please review the DEA pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

***Note: One copy of the document is available in the Land Division Office, Room 220.**

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

Signed: PAUL J. CONRY, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE

Date: SEP - 9 2004

Name: _____ Division: _____

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION

2004 SEP 14 P 3:57

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

September 8, 2004
LD/NAV
Ref.: HECO47KV.CMT

Suspense Date: 9/15/04

MEMORANDUM:

TO: *XXX Division of Forestry and Wildlife
*XXX Land-Oahu District Land Office
✓XXX Engineering Division
XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
*XXX Land-Planning and Development

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA) for East Oahu Transmission Project - 46KV Phased Project

Please review the DEA pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

***Note: One copy of the document is available in the Land Division Office, Room 220.**

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

Signed: [signature]
Date: 9/14/04

Name: ERIC T. HIRANO, CHIEF ENGINEER
Division: Engineering

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LA/NAV

Ref.: HECO47KV.CMT

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) **Please take note that the project sites according to the Flood Insurance Rate Map (FIRM), are located in Zones X, A and AO. National Flood Insurance Program (NFIP) does *not* regulate development within Zone X, however, they do regulate development within Zones A and AO as indicated in bold letters below.**

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

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

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

(X) **Mr. Robert Sumimoto at (808) 523-4254 or Mr. Mario Siu Li at (808) 523-4247 of the City and County of Honolulu, Department of Planning and Permitting.**

( ) Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.

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

( ) Mr. Mario Antonio at (808) 241-6620 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

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

( ) Additional Comments:_____

( ) Other: _____

Should you have any questions, please call Mr. Andrew Monden of the Planning Branch at 587-0229.

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 9/14/04

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION
2004 SEP 16 P 3:50

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

September 8, 2004
LD/NAV
Ref.: HECO47KV.CMT

Suspense Date: 9/15/04

MEMORANDUM:

TO: *XXX Division of Forestry and Wildlife
*XXX Land-Oahu District Land Office
XXX Engineering Division
XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
*XXX Land-Planning and Development

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA) for East Oahu Transmission Project - 46KV Phased Project

Please review the DEA pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

***Note: One copy of the document is available in the Land Division Office, Room 220.**

✓ We have ~~no comments~~. ( ) Comments attached.

Signed: [signature] Date: 9-16-04

Name: Robert M. Ing Division: Land

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
04 SEP 8 AM : 32

RECEIVED
LAND DIVISION
2004 SEP 10 P 4: 21

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

September 8, 2004
LD/NAV
Ref.: HECO47KV.CMT

Suspense Date: 9/15/04

MEMORANDUM:

TO: *XXX Division of Forestry and Wildlife
*XXX Land-Oahu District Land Office
XXX Engineering Division
✓XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
*XXX Land-Planning and Development

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA) for East Oahu Transmission Project - 46KV Phased Project

Please review the DEA pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

***Note: One copy of the document is available in the Land Division Office, Room 220.**

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

Signed: W. Roy Hardy Date: 9/9/04

Name: Roy Hardy Division: CWRM

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-241

Ms. Dierdre S. Mamiya
Administrator
State of Hawai'i
Department of Land and Natural Resources
PO Box 621
Honolulu, HI 96819

Dear Ms. Mamiya:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the State of Hawai'i Department of Land and Natural Resources on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Department of Land and Natural Resources' comments were not received by the Public Utilities Commission until October 18, 2004, HECO has prepared this response to the Department of Land and Natural Resources' comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *The Department of Land and Natural Resources' Land Division transmitted or made available a copy of the document pertaining to the subject matter to the following Department of Land and Natural Resources' Divisions for their review and comment:*

- *Division of Forestry and Wildlife*
- *Commission on Water Resource Management*
- *Engineering Division Planning*
- *Office of Conservation and Coastal Lands*
- *Land-Oahu District Land Office*
- *Land-Planning and Development*

Enclosed please find a copy of the Engineering Division comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

Thank you for noting that our Proposed Action would occur in Zones X, A, and AO, according to the Flood Insurance Rate Map (FIRM), and that the National Flood Insurance Program (NFIP) regulated development within Zones A and AO. This information will be added to the Final EA in sections 4.7.1.2 and 4.7.2.1. Accordingly, project areas within these areas, Special Flood Hazard Area, will comply with Title 44 of the Code of Federal

Ms. Dierdre S. Mamiya
January 7, 2005
2004.33.0800 / 04EP-241
Page 2

Regulations, and City and County of Honolulu requirements. Compliance with applicable requirements will be ensured through the City and County of Honolulu's review of HECO's construction drawings for this project.

2 *Engineering Division:*
Please take note that the project sites according to the Flood Insurance Rate Map (FIRM), are located in Zones X, A and AO. National Flood Insurance Program (NFIP) does not regulate development within Zone X, however, they do regulate development within Zones A and AO as indicated in bold letters below.

Please see response to Comment 1.

3 *Engineering Division:*
Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken.

Please see response to Comment 1.

4 *Engineering Division:*
Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards.

Please see response to Comment 1.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 215, KAPOLEI, HAWAII 96707
TELEPHONE : (808) 692-5054 FAX: (808) 692-5857

JEREMY HARRIS
MAYOR

LARRY J. LEOPARDI, P.E.
DIRECTOR AND CHIEF ENGINEER

JOSEPH MAGALDI
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 04-905

October 14, 2004

State of Hawaii Utilities Commission (Accepting Authority)
465 South King Street, First Floor
Honolulu, Hawaii 96813

Attention: Mr. Carlito Caliboso, Chairman

Gentlemen:

Subject: **East Oahu Transmission Project 46KV Phased Project**
Draft Environmental Assessment (DEA)

The Department of Facility Maintenance reviewed the August 2004 DEA for the subject project and we have no comments to add to the documents at this time.

Should you have any questions, please call Charles Pignataro of our Division of Road Maintenance, at 484-7697.

Very truly yours,

LARRY LEOPARDI, P.E.
Director and Chief Engineer

cc: Belt Collins Hawaii Ltd. (with DEA attachment)

BeltCollins

January 7, 2007
2004.33.0800 / 04EP-242

Mr. Larry Leopardi
Director and Chief Engineer
City and County of Honolulu
Department of Facility Maintenance
1000 Uluohia Street, Suite 215
Kapolei, HI 96707

Dear Mr. Leopardi:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received a letter from the City and County of Honolulu Department of Facility Maintenance (DFM) on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although DFM's letter was not received by the Public Utilities Commission until October 15, 2004, HECO acknowledges that DFM has no comments to add to the document at this time.

Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
2004 OCT 20 2:23
BELT COLLINS HAWAII

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

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

October 19, 2004

TO: Mr. Carlito Caliboso, Chairman
State of Hawaii Public Utilities Commission (Accepting Authority)

FROM: Russell S. Takata, Program Manager
Department of Health
Noise, Radiation & Indoor Air Quality Branch

SUBJECT: **Comments to the East O'ahu Transmission Project 46KV Phased Project**

Our comments should be printed as follows:

"Project activities shall comply with the Administrative Rules of the Department of Health:

- Chapter 11-46 Community Noise Control.

There are currently no statutes or administrative rules governing extremely-low-frequency (ELF) electromagnetic fields (EMF).

Should there be any questions, please contact Russell S. Takata, Environmental Health Program Manager, Noise, Radiation and Indoor Air Quality Branch, at 586-4701."

cc: Belt Collins Hawaii Ltd.
Lesley A. Matsumoto

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-243

Mr. Russell S. Takata
Program Manager, Noise Radiation and Indoor Air Quality Branch
State of Hawai'i
Department of Health
Noise, Radiation and Indoor Air Quality Branch
PO Box 3378
Honolulu, HI 96801

Dear Mr. Takata:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (ETOP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the State of Hawaii, Department of Health, Noise, Radiation and Indoor Air Quality Branch (NRIAQB) on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Department of Health NRIAQB's comments were not received by the Public Utilities Commission until October 20, 2004, HECO has prepared this response to the Department of Health NRIAQB's comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *Project activities shall comply with the Administrative Rules of the Department of Health:*

- *Chapter 11-46 Community Noise Control.*

As referenced in Section 4.5.1 of the Draft EA, HECO understands that project activities must comply with Hawaii Administrative Rules (HAR) Title 11, Chapter 46.

2 *There are currently no statutes or administrative rules governing extremely-low-frequency (ELF) electromagnetic fields (EMF).*

Although there are no Hawai'i statutes or administrative rules governing extremely-low-frequency (ELF) electromagnetic fields, HECO has followed the Hawai'i Department of Health Policy Relating to Electric and Magnetic Fields from Power-

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Russell S. Takata
January 7, 2005
2004.33.0800 / 04EP-243
Page 2

Frequency Sources. That policy recommends "Prudent Avoidance" meaning that reasonable, practical, simple and relatively inexpensive actions should be considered to reduce exposure to EMF.

HECO has implemented Prudent Avoidance in planning the EOTP as described in Section 4.13.4 of the Draft EA. Reduction of EMF levels can be achieved for multiple circuit power lines with similar loads by optimizing the cable placement and phasing arrangement within the cable ducts. Enertech Consultants of Santa Clara, Inc. ("Enertech") studied a variety of cable placements and phasing arrangements for the 46kV circuit cable sections to determine the optimum phase configuration for EMF reduction. Enertech's calculated results for multiple circuit 46kV cables show that use of optimum phase placement in the cable ducts can reduce EMF levels by a maximum amount of 87 percent when all circuits have identical loads. HECO has applied Prudent Avoidance in its engineering design for ductlines with multiple circuits by optimizing the cable placement and phasing arrangement within the cable ducts.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to
EMD/CWB

10069PKP.04

October 22, 2004

FILED
2004 OCT 25 A 10:42
PUBLIC UTILITIES COMMISSION

Mr. Carlito Caliboso
Chairman
Public Utilities Commission
State of Hawaii
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

Subject: East Oahu Transmission Project 46 KV Phased Project
Draft Environmental Assessment

The Department of Health (DOH), Clean Water Branch (CWB), has reviewed the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at (808) 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..."

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:

   a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).

   b. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.**

   c. Discharges of treated effluent from leaking underground storage tank remedial activities.

   d. Discharges of once through cooling water less than one (1) million gallons per day.

   e. Discharges of hydrotesting water.

Mr. Carlito Caliboso
October 22, 2004
Page 2

f. Discharges of construction dewatering effluent.

g. Discharges of treated effluent from petroleum bulk stations and terminals.

h. Discharges of treated effluent from well drilling activities.

i. Discharges of treated effluent from recycled water distribution systems.

j. Discharges of storm water from a small municipal separate storm sewer system.

k. Discharges of circulation water from decorative ponds or tanks.

The CWB requires that a Notice of Intent (NOI) to be covered by an NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at:
http://www.hawaii.gov/health/environmental/water/cleanwater/index.html

3. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible (i.e. NPDES general permits do not cover discharges into Class 1 or Class AA State waters). An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at:
http://www.hawaii.gov/health/environmental/water/cleanwater/index.html

4. Hawaii Administrative Rules, Section 11-55-38, also requires the applicant to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD.

If you have any questions, please contact Ms. Kris Poentis of the Engineering Section, CWB, at 586-4309.

Sincerely,

for DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:bt

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-244

Mr. Denis Lau
Chief, Clean Water Branch
State of Hawai'i
Department of Health
PO Box 3378
Honolulu, HI 96801

Dear Mr. Lau:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (ETOP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the State of Hawaii, Department of Health, Clean Water Branch (CWB) on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Department of Health CWB's comments were not received by the Public Utilities Commission until October 25, 2004, HECO has prepared this response to the Department of Health CWB's comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *The Army Corps of Engineers should be contacted at (808) 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution control Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..."*

Thank you for the information regarding the Section 401 Water Quality Certification triggers. HECO will contact the Army Corps of Engineers as you recommend.

Belt Collins Hawaii Ltd
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Denis Lau
January 7, 2005
2004.33.0800 / 04EP-244
Page 2

2 *A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:*

a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix).

b. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required ***before the commencement of the construction activities.***

c. Discharges of treated effluent from leaking underground storage tank remedial activities.

d. Discharges of once through cooling water less than one (1) million gallons per day.

e. Discharges of hydrotesting water.

f. Discharges of construction dewatering effluent.

g. Discharges of treated effluent from petroleum bulk stations and terminals.

h. Discharges of treated effluent from well drilling activities.

i. Discharges of treated effluent from recycled water distribution systems.

j. Discharges of storm water from a small municipal separate storm sewer system.

k. Discharges of circulation water from decorative ponds or tanks.

The CWB requires that a Notice of Intent (NOI) to be covered by an NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/index.html.

Thank you for providing the detailed information regarding potential NPDES triggers. HECO intends to obtain any applicable permits and approvals for the project as part of the Proposed Action.

3 *The applicant my be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible (i.e. NPDES general permits do not cover discharges into Class 1 or*

Mr. Denis Lau
January 7, 2005
2004.33.0800 / 04EP-244
Page 3

Class AA State waters). An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at:
http://www.hawaii.gov/health/environmental/water/cleanwater/index.html.

Class 1 and Class AA State waters are not present in the vicinity of the project area.

4 *Hawai'i Administrative Rules, Section 11-55-38, also requires the applicant to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD.*

If an NOI or NPDES permit is required, HECO will submit a copy of the application to the State Historic Preservation Division as required by Hawai'i Administrative Rules 11-55-38.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4529 • FAX (808) 523-4730 • INTERNET www.co.honolulu.hi.us

RECEIVED
2004 NOV -5 PM 2:10
BELT COLLINS HAWAII

JEREMY HARRIS
MAYOR

GEORGE "GEORGE" MIYAMOTO
DIRECTOR

ROBERT I. FISHMAN
DEPUTY DIRECTOR

TP8/04-74984R

October 28, 2004

Mr. Carlito Caliboso, Chairman
Public Utilities Commission
State of Hawaii
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

Subject: East Oahu Transmission Project
46 kV Phased Project

In response to the August 30, 2004 letter from Belt Collins Hawaii Ltd., we have reviewed the draft environmental assessment (EA) for the subject project. The following comments are the result of this review:

1. The project should include effective public notification measures, i.e., message boards, media, door-to-door, etc., depending on the alternatives selected, that would adequately inform residents, businesses, and the general public affected by the construction work of the traffic impacts/delays and possible need to alter travel routes/times.

2. The description of level of service on Page 4-22 of Volume 1 is an outdated definition. The Traffic Impact Study in Volume 2 appears to use the current 2000 HCM definitions.

3. The traffic assessment for the Phase 1 project on Makaloa Street used traffic volumes inflated from 2004. The traffic volumes should account for the additional traffic generated by the WalMart/Sam's Club complex.

4. The discussion regarding traffic impacts should also specify where traffic signal detector loops will be cut, how long they will remain out of service, and whether substitute equipment could be used temporarily.

5. Page 8-8 of the Traffic Impact Study in Volume 2 mentions traffic signal timing as a possible method to mitigate traffic congestion on the mauka-makai streets to

Mr. Carlito Caliboso
Page 2
October 28, 2004

King Street. Traffic signal timing adjustment should be implemented at all affected signalized intersections within the project limits, if it will mitigate traffic congestion during construction.

6. The draft EA implies that both Phases 1 and 2 will be done consecutively from one end to the other. If possible, construction should be done in two or more sections simultaneously to reduce the overall project schedule.

7. Chapter 5, Other Considerations, in Volume 1 and the Traffic Impact Study in Volume 2 should include a figure that shows the BRT alignment in relation to the East Oahu Transmission Project alignment.

8. On Page 5-13, Table 5-2, Summary of Government Permits and Approvals, should be corrected to reflect that the Department of Transportation Services is the agency responsible for Street Usage Permits.

9. The following corrections should be made to the Volume 2 Traffic Impact Study:

   a. On Page 2-9, the first sentence in Section 2.3.2 should be corrected to state that Route 3 provides transit service along Date Street.
   b. On Page 3-6, the first sentence in Section 3.5.1 should state that no changes are expected along Winam Avenue, not Pumehana Street.
   c. On Page 4-17, the last sentence in Section 4.5.2 should start with the correct word, "During".
   d. On Page 7-1, the first sentence in Section 7.1.1 should correctly read, "...narrow section of Winam Avenue by...."
   e. On Page 8-21, the second sentence should read, "...King Street from the Washington Middle School...."

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

GEORGE "KEOKI" MIYAMOTO
Acting Director

cc: Ms. Lesley A. Matsumoto
Belt Collins Hawaii Ltd.

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-240

Mr. George Miyamoto
Acting Director
City and County of Honolulu
Department of Transportation Services
650 South King Street, 3rd Floor
Honolulu, HI 93813

Dear Mr. Miyamoto:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the City and County of Honolulu Department of Transportation Services on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Department of Transportation Services' comments were not received by the Public Utilities Commission until November 5, 2004, HECO has prepared this response to the Department of Transportation Services' comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *The project should include effective public notification measures, i.e., message boards, media, door-to-door, etc., depending on the alternatives selected, that would adequately inform residents, businesses, and the general public affected by the construction work of the traffic impacts/delays and possible need to alter travel routes/times.*

HECO has been conducting a public notification campaign directed towards the residents, businesses, and general public affected by the 46kV Phased Project. Most recently, the following were performed:

- On June 10, 2004, HECO made a presentation at the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board meeting regarding the project, in particular, the Winam Avenue segment of the project.
- Since August 2004, HECO has been going door-to-door to inform residents and businesses in the project area.

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. George Miyamoto
January 7, 2005
2004.33.0800 / 04EP-240
Page 2

HECO will continue to keep residents and businesses in the project area informed as the project progresses. During construction, the following will be implemented.

- A "24/7" project "hot line" with a dedicated telephone number (not the HECO Trouble Line), will be in place for the duration of the project. Publication of this number will be communicated widely and frequently. The primary purpose of this hot line is to immediately handle and respond to all complaints, questions, and concerns.

- The construction manager will attend monthly Neighborhood Board meetings to present construction activity updates and submit a written progress report, which often becomes part of the published meeting minutes. The construction manager will attend the entire meeting so that he is available for additional questions and comments from the community.

- The construction manager will also initiate and maintain an ongoing dialogue with one or several of the Neighborhood Board members. This dialogue will be in addition to Neighborhood Board meeting briefings.

2 *The description of level of service on Page 4-22 of Volume 1 is an outdated definition. The Traffic Impact Study in Volume 2 appears to use the current 2000 HCM definitions.*

Thank you for identifying this correction. For the Final EA, the subject paragraph will be edited as follows:

Intersection volume-to-capacity ratios (V/C) and levels of service (LOS) are indicators of how an intersection or a roadway is functioning. The V/C compares the existing or projected vehicular volumes on a roadway to the roadway's capacity, thus indicating the relative adequacy of the roadway to accommodate the traffic volumes. The LOS describes roadway traffic conditions in terms of travel delays or travel speeds, with the service quality expressed on a letter basis from A to F, which signify excellent to unacceptable conditions, respectively. Descriptions of LOS A through LOS F for signalized and unsignalized intersections are provided in Table A-1 of Appendix B, *Traffic Impact Study*.

3 *The traffic assessment for the Phase 1 project on Makaloa Street used traffic volumes inflated from 2004. The traffic volumes should account for the additional traffic generated by the WalMart/Sam's Club complex.*

The traffic estimates provided in the *East O'ahu Transmission Project Traffic Impact Study* (Wilbur Smith Associates August 2004) included the traffic generated by the

Mr. George Miyamoto
January 7, 2005
2004.33.0800 / 04EP-240
Page 3

Wal-Mart development, as obtained from the *Traffic Impact Report* prepared for that project, to the traffic estimates developed for Makaloa Street and Kapi'olani Boulevard using the historic growth rates.

4 *The discussion regarding traffic impacts should also specify where traffic signal detector loops will be cut, how long they will remain out of service, and whether substitute equipment could be used temporarily.*

Trenching along Makaloa Street, Kapiolani Boulevard, Date Street, and King Street may involve cutting of detector loops. These loops could remain out of service for approximately three to four weeks at each location. HECO staff and its construction contractor will be meeting with the City DTS to coordinate the scheduling of the detector losses and any actions needed to offset these losses.

5 *Page 8-8 of the Traffic Impact Study in Volume 2 mentions traffic signal timing as a possible method to mitigate traffic congestion on the mauka-makai streets to King Street. Traffic signal timing adjustments should be implemented at all affected signalized intersections within the project limits, if it will mitigate traffic congestion during construction.*

Any recommendations to modify signal timing will be made part of the Traffic Control Plan, which will be submitted to the City for approval prior to the start of construction.

6 *The draft EA implies that both Phases 1 and 2 will be done consecutively from one end to the other. If possible, construction should be done in two or more sections simultaneously to reduce the overall project schedule.*

As noted in Section 3.1.1.3, p. 3-20 in the Draft EA, construction for Phase 1 is planned to begin in 2006 and estimated to take 12 months to complete. Within Phase 1, there are four different areas that require the installation of underground lines within City roadways. These areas include Makaloa Street, Pumehana Street, Date Street, and Winam Avenue as shown in Figure 3-2 of the Draft EA. HECO intends to have one construction crew dedicated to Makaloa Street and another crew dedicated to the remaining streets. The two crews will work simultaneously in their respective areas. This assumption was factored into the overall construction schedule estimate. However, a two month contingency was also factored into the schedule as noted in Figure 3-4 of the Draft EA. Therefore, there is a possibility that the overall project could be reduced.

As noted in Section 3.1.2.3, p. 3-35 in the Draft EA, construction for Phase 2 would be coordinated with the City to avoid conflicts with other projects. Therefore, HECO

Mr. George Miyamoto
January 7, 2005
2004.33.0800 / 04EP-240
Page 4

does not intend to construct Phase 2 simultaneously with Phase 1 due to the schedule uncertainty. The total duration for Phase 2 is estimated at 17 months. HECO estimates that the earliest Phase 2 would begin construction is late 2007. Phase 2 involves the installation of underground lines on a portion of Cooke Street, King Street between Cooke Street and McCully Street, and a portion of McCully Street as shown in Figure 3-5 of the Draft EA. HECO intends to have one construction crew dedicated to Cooke Street and King Street from Cooke Street to Kaheka Street. Another crew would be dedicated to King Street from Kaheka Street to McCully Street and McCully Street. The two crews will work simultaneously in their respective areas. This assumption was factored into the overall construction schedule estimate. However, a two-month contingency was also factored into the schedule as noted in Figure 3-7 of the Draft EA. Therefore, there is a possibility that the overall project could be reduced.

7 *Chapter 5, Other Considerations, in Volume 1 and the Traffic Impact Study in Volume 2 should include a figure that shows the BRT alignment in relation to the East Oahu Transmission Project alignment.*

In the Final EA, the *Traffic Impact Study* will include a new figure, Figure 1-3, that illustrates the proposed BRT routes potentially affecting the EOTP. This figure will be referenced in the paragraph discussing the City and County's BRT project (pg. 5-4 of the Draft EA) in the Final EA.

8 *On Page 5-13, Table 5-2, Summary of Government Permits and Approvals, should be corrected to reflect that the Department of Transportation Services is the agency responsible for Street Usage Permits.*

Thank you for identifying this error. In the Final EA, Table 5-2 will be changed to reflect this correction.

9 *The following corrections should be made to the Volume 2 Traffic Impact Study:*

a. *On Page 2-9, the first sentence in Section 2.3.2 should be corrected to state that Route 3 provides transit service along Date Street.*

b. *On Page 3-6, the first sentence in Section 3.5.1 should state that no changes are expected along Winam Avenue, not Pumehana Street.*

c. *On Page 4-17, the last sentence in Section 4.5.2 should start with the correct word, "During".*

Mr. George Miyamoto
January 7, 2005
2004.33.0800 / 04EP-240
Page 5

d. *On Page 7-1, the first sentence in Section 7.1.1 should correctly read, "... narrow section of Winam Avenue by..."*

e. *On Page 8-21, the second sentence should read, "...King Street from the Washington Middle School..."*

Thank you for identifying these errors. These corrections will be made in the Final EA.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Daniela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
2004 NOV -3 PM 2:36
BELT COLLINS HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

November 3, 2004

04-986A CAB

Mr. Carlito Caliboso, Chairman
Public Utilities Commission
State of Hawaii
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Mr. Caliboso:

SUBJECT: Draft Environmental Assessment for the Proposed East Oahu Transmission Project

This letter is to transmit the following comments on the subject document:

Control of Fugitive Dust:

There is a significant potential for fugitive dust emissions during all phases of construction. Proposed construction activities will occur in proximity to existing residences, public areas and major thoroughfares, thereby exacerbating potential dust problems. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of development and construction activities is warranted.

Construction activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following:

a) Plan the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;
b) Provide an adequate water source at the site prior to start-up of construction activities;

Mr. Carlito Caliboso
November 3, 2004
Page 2

c) Landscape and provide rapid covering of bare areas, including slopes, starting from the initial grading phase;
d) Minimize dust from shoulders and access roads;
e) Provide adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
f) Control dust from debris being hauled away from the project site.

If you have any questions, please contact Mr. Barry Ching of my staff at 586-4200.

Sincerely,

WILFRED K. NAGAMINE
Manager, Clean Air Branch

BC:jhm

c: Belt Collins Hawaii, Ltd.

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-270

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
State of Hawai'i
Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Dear Mr. Nagamine:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the State of Hawaii Department of Health Clean Air Branch on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS) Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although the Clean Air Branch's comments were not received by the Public Utilities Commission until November 8, 2004, HECO has prepared this response to the Clean Air Branch's comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1 *There is a significant potential for fugitive dust emissions during all phases of construction. Proposed construction activities will occur in proximity to existing residences, public areas and major thoroughfares, thereby exacerbating potential dust problems. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of development and construction activities is warranted.*

Dust should not become an issue because the work would be performed and staged from paved surfaces and the following work practices would be used.

- No soils would remain on site after excavation and/or prior to backfill.
- Excavated material would be deposited directly into dump trucks and hauled off site immediately for proper disposal.
- The project would utilize a cemented flowable backfill, which would be transported and placed with ready-mix trucks.
- As a matter of good housekeeping, the contractor would be required to wash down the area at the end of each shift.

2 *Construction activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust.*

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Wilfred K. Nagamine
January 7, 2005
2004.33.0800 / 04EP-270
Page 2

As mentioned in Section 4.8.2.1 of the Draft EA, fugitive dust will be minimized as required by HAR 11-60.1-33.

3 *The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following:*

a. *Plan the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;*

b. *Provide an adequate water source at the site prior to start-up of construction activities;*

c. *Landscape and provide rapid covering of bare areas, including slopes, starting from the initial grading phase;*

d. *Minimize dust from shoulders and access roads;*

e. *Provide adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and*

f. *Control dust from debris being hauled away from the project site.*

HECO will be implementing dust control measures as required by HAR 11-60.1-33. Appropriate dust control measures will be identified in construction documents that will be submitted to the City and County of Honolulu Department of Planning and Permitting for approval.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF KAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD04/1548

November 4, 2004

Mr. Carlito Caliboso, Chairman
State of Hawaii Public Utilities Commission
465 South King Street, First Floor
Honolulu, Hawaii 96813

Re: East O'ahu Transmission Project, 46kV Phased Project, Draft Environmental Assessment, Hawaiian Electric, August 2004

Dear Chairman Caliboso:

The Office of Hawaiian Affairs (OHA) is in receipt of your September 8, 2004, request for review and comments on a draft environmental impact assessment of the aforementioned project area, which is a proposal by Hawaiian Electric Company, Inc. to reconfigure and connect existing 46 kilovolt circuits from the Pūkele Substation with existing and new 46 kilovolt at the Archer and Kamoku substations. OHA apologizes for the delayed response and offers the following comments and concerns in the area of historic and cultural sites.

Historic and Cultural Sites

Given the proposed route of the project and the depth of trenching activities related to the proposed work, OHA recommends that an archaeological monitor be present during ground disturbing work along the corridor.

This is due to the fact that three relatively large unmarked cemeteries have recently been discovered in urban Honolulu at the Ke'eaumoku Walmart, Ko'olani Condominium, and Queen Street Extension projects. The likelihood of other unmarked cemeteries in the urban corridor is high, especially those associated with the smallpox epidemic of 1853.

Mr. Carlito Caliboso
November 4, 2004
Page 2

Furthermore, isolated burial sites may exist along the proposed route associated with previous *habitation in the area*. An archaeological monitor would help to ensure proper mitigation of any inadvertent discoveries of human skeletal remains and mitigate adverse impacts.

In the event human remains are identified during ground disturbing activities, all work in the immediate area shall cease and the county police department and the State Historic Preservation Division shall be notified.

If you have any questions or concerns, please contact Kai Markell, Policy Advocate, at 594-1945 or kaim@oha.org. Once again, thank you for your patience during our review and assessment of this important matter.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

c. Ms. Lesley A. Matsumoto, Belt Collins

BeltCollins

January 7, 2005
2004.33.0800 / 04EP-252

Mr. Clyde W. Nāmu'o
State of Hawai'i
Office of Hawaiian Affairs
711 Kapi'olani Boulevard, Suite 500
Honolulu, HI 96813

Dear Mr. Nāmu'o:

Hawaiian Electric Company, Inc. (HECO)
East O'ahu Transmission Project (EOTP)
Draft Environmental Assessment — Response to Comments

HECO has received comments from the Office of Hawaiian Affairs (OHA) on the Draft Environmental Assessment for the EOTP. Hawai'i Revised Statutes (HRS). HRS Chapter 343 only requires HECO to respond to comments received or postmarked during the 30-day review period ending October 8, 2004. Although OHA's comments were not received by the Public Utilities Commission until November 10, 2004, HECO has prepared this response to OHA's comments.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

1. *Given the proposed route of the project and the depth of trenching activities related to the proposed work, OHA recommends that an archaeological monitor be present during ground disturbing work along the corridor. This is due to the fact that three relatively large unmarked cemeteries have recently been discovered in urban Honolulu at the Ke'eaumoku Wal-Mart, Ko'olani Condominium, and Queen Street Extension projects. The likelihood of other unmarked cemeteries in the urban corridor is high, especially those associated the smallpox epidemic of 1853.*

   The purpose of the Archaeological Assessment for this project was to determine the potential of encountering archaeological sites or deposits during the course of construction. This potential was assessed by conducting research into the land use history of the area and the results of previous archaeological investigations in the area. The Archaeological Assessment therefore examined the traditional and historic background of the project area, previous archaeological investigations and on-going archaeological investigations including the Ke'eaumoku Wal-Mart, the Ko'olani on Waimanu Street, and the Queen Street Extension Project (see section 6.3 of the Archaeological Assessment) as noted in your comment letter. Based on this Archaeological Assessment, HECO will prepare a plan for archaeological monitoring

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 • Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 • F/808 538 7819 • honolulu@beltcollins.com • www.beltcollins.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Clyde W. Nāmu'o
January 7, 2005
2004.33.0800 / 04EP-252
Page 2

of the work on King Street fronting the Catholic Cemetery during Phase 2 of the EOTP.

2. *Furthermore, isolated burial sites may exist along the proposed route associated with previous habitation in the area. An archaeological monitor would help to ensure proper mitigation of any inadvertent discoveries of human skeletal remains and mitigate adverse impacts.*

   The Archaeological Assessment acknowledges on page 22 that "there is also the possibility of isolated human burials throughout the project area." Any inadvertent burials found will be treated appropriately and in accordance with governmental requirements. An archaeological monitoring plan is being prepared.

3. *In the event human remains are identified during ground disturbing activities, all work in the immediate area shall cease and the county police department and the State Historic Preservation Division shall be notified.*

   In the event human remains are identified during ground disturbing activities, HECO will comply with HRS Chapter 6E which requires that all disturbing activity in the immediate area that could damage the remains must cease, as well as reporting of the discovery to the Historic Preservation Division and the county police.

Your comments are appreciated. Thank you for your interest in this project.

Sincerely,

BELT COLLINS HAWAII LTD.

Lesley A. Matsumoto
Project Manager

cc: Public Utilities Commission
Office of Environmental Quality Control
Division of Consumer Advocacy
Henry Q Curtis, Life of the Land
Scott K. Saiki
Karen H. Iwamoto, Palolo Community Council
Mr. Traver Carroll, Ho'olaulima O Palolo
Corey Y.S. Park, Esq./Pamela W. Bunn, Esq., Mālama o Mānoa
Daisy M. Murai, Kapahulu Neighbors

Chapter 7

References

CHAPTER 7
REFERENCES

Anderson L.E.W., G.A Boorman, J.E. Morris, L.B. Sasser, P.C. Mann, S.L. Grumbein, J.R. Hailey, A. McNally, R.C. Sills, J.K. Haseman. 1999. Effects of 13-week magnetic field exposure on DMBA-initiated mammary gland carcinomas in female Sprague-Dawley rats. *Journal of Carcinogenesis.* 20:1615-1620.

Babbitt, J.T.; A.I. Kharazi,; J.M.G. Taylor, C.N. Rafferty, R. Kovatch, D.B. Bonds; S.G. Mirell; E. Frumkin; F. Dietrich; D. Zhuang; T.J.M. Hahn. 1998. *Leukemia/Lymphoma in Mice Exposed to 60-Hz Magnetic Fields; Results of the Chronic Exposure Study.* Electric Power Research Institute Report TR-110338. Palo Alto, California.

Boorman G.A., D.L. McCormick, J.C. Findlay, J.R. Hailey, J.R. Gauger, T.R. Johnson, R.M. Kovatch, R.C. Sills, J.K. Haseman. 1999a. Chronic toxicity/oncogencity evaluation of 60 Hz (power frequency) magnetic fields in F344/n rats. *Toxicologic Pathology.* 27:267-278.

Boorman G.A., L.E. Anderson, J.E. Morris, L.B. Sasser, P.C. Mann, S.L. Grumbein, J.R. Hailey, A. McNally, R.C. Sills, J.K. Haseman. 1999b. Effects of 26-week magnetic field exposure in a DMBA initiation-promotion mammary glands model in Sprague-Dawley rats. *Journal of Carcinogenesis.* 20:899-904.

Building Industry Association. *Military Housing Privatization Initiative in Hawaii.* http://biahawaii.inets.com/docs/webdocs/RTC/BIA0306171.pdf. Accessed June 16, 2004.

CH2M HILL. June 1995. Final *Kamoku-Pukele 138-kV Transmission Line Alternatives Study.* Prepared for Hawaiian Electric Company, Inc.

City and County of Honolulu. Revised Ordinances of Honolulu. Chapter 24 Development Plans, and Chapter 41. http://www.co.honolulu.hi.us/refs/roh.

City and County of Honolulu, Board of Water Supply. Half Size Plans. Numbers 31 (12/20/1989), 38 (12/5/1989), 39 (8/3/1987), 44 (12/4/1989), and 45 (9/26/1990).

City and County of Honolulu, Board of Water Supply. http://hbws.org/ea_wat_resource/ ea01_ct01_mainpage.htm. Accessed May 21, 2004.

City and County of Honolulu, Department of Planning and Permitting. 2004. Honolulu Land Information System (HOLIS). http://gis.hicentral.com. Accessed May and June 2004.

City and County of Honolulu, Department of Planning and Permitting. July 1999. *Primary Urban Center Development Plan.*

Corbisier, C. July/August 2003. *Living with Noise in Public Roads,* Vol. 67, No. 1. http://www.tfhrc.gov/pubrds/03july/06.htm. Accessed June 22, 2004.

EDM International, Inc. December 2003. *Evaluation of the Applicability and Practicability of Live Working (LW) Methods for Hawaiian Electric Company, Inc.'s (HECO) 138 kV Transmission System.*

Enertech Consultants of Santa Clara, Inc. December 22, 2004. *Hawaiian Electric Company Addendum to Magnetic Field Evaluation East Oahu Transmission Project.*

Enertech Consultants of Santa Clara, Inc. July 22, 2004. *Hawaiian Electric Company East Oahu Transmission Project Magnetic Field Evaluation.*

Enertech Consultants of Santa Clara, Inc. 1985. "AC Field Exposure Study: Human Exposure to 60 Hz Electric Fields." EPRI Report EA-3993.

Ernest K. Hirata & Associates, Inc. August 30, 2002. *Soils Investigation Rehabilitation of Streets Kapiolani Boulevard from Ward Avenue to Kalakaua Avenue Honolulu, Hawaii.* Prepared for Engineers Surveyors Hawaii, Inc.

Federal Emergency Management Agency (FEMA). November 20, 2000. *Flood Insurance Rate Map.* Map numbers 15003C0365 and 15003C0370.

Federal Highway Administration. No date. *Effective Noise Control During Nighttime Construction.* http://opsfhwa.gov/wz/workshops/accessible/Schexnayder_paper.htm.

Fewell Geotechnical Engineering, Ltd. May 19, 2004. *Draft Boring Logs Directional Drilling Feasibility Study King Street, Between Ward Avenue and Punahou Street East Oahu Transmission Line Honolulu, Oahu, Hawaii.*

Forssen, U.M., M. Feychting, L.E. Rutqvist, B. Floderus, A. Ahlbom. 2000. Occupational and residential magnetic field exposure and breast cancer in females. *Epidemiology.* 11:24-29.

Gammon, M.D., J.B. Schoenberg, J.A. Britton, J.L. Kelsey, J.L. Stanford, K.E. Malone, R.J. Coates, D.J. Brogan, N. Potischman, C.A. Swanson, L.A. Brinton. 1998. Electric blanket use and breast cancer risk among younger women. *American Journal of Epidemiology.* 148:556-563.

Gauger, J.R. 1985. "Household Applicance Magnetic Field Survey." IEEE Transactions on Power Apparatus and Systems. Vol. PAS-104, No. 9, pp. 2346-44.

Hawai'i Community Development Authority (HCDA). August 1999. *Mauka Area Plan Kakaako Community Development District Honolulu, Hawaii.* Unofficial Compilation. http://www.hcdaweb.org/images/maukaareaplan_a383.pdf. Accessed June 10, 2004.

Hawaiian Electric Company, Inc. December 2003. *East Oahu Transmission Project: Options to the Koolau/Pukele Transmission Overload Problem.*

Hawaii Electric Company, Inc. September 2000. *Revised Final Environmental Impact Statement, Kamoku Pukele 138-kV Transmission Line Project.*

Hawaiian Electric Company, Inc. March 2000. Review of the Distributed Generation Alternatives to the Kamoku-Pukele Line. Honolulu, Hawaii.

Hawaiian Electric Company, Inc. September 24, 1993. Decision & Order No. 12627, docket No. 7602.

Hawaiian Electric Company, Inc. August 1992. *East Oahu 138 kV Requirements Study Updated.*

Hawaiian Electric Company, Inc. July 1991. *East Oahu 138 kV Requirements.*

Hawaiian Electric Company, Inc. No Date. *Transmission Planning Criteria.* Section IV.3

International Agency for Research on Cancer (IARC). IARC Monographs on the evaluation of carcinogenic risks to humans. Volume 80: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields. IARC Press, Lyon, France, 2002.

International Commission on Non-Ionizing Radiation Protection April 1998. "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz)." Health Physics. Vol 74, No. 4, pp. 494-522.

Juvik, Sonia P. and James O. Juvik. 1998. *Atlas of Hawaii.* Third edition. University of Hawaii Press, Honolulu, Hawaii.

Kabat, G.C., E.S. O'Leary, E.R. Schoenfeld, J.M. Greene, R. Grimson, K. Henderson, W.T. Kaune, M.D. Gammon, J.A. Britton, S.L. Teitelbaum, A.I. Neugut, M.C. Leske. 2003. Electric blanket use and breast cancer on Long Island. *Epidemiology.* 14:514-520.

Kleinerman. R.A., W.T. Kaune, E.E. Hatch, S. Wacholder, M.S. Linet, L.L. Robison, S. Niwa, R.E. Tarone. 2000. Are children living near high-voltage power lines at increased risk of acute lymphoblastic leukemia? *American Journal of Epidemiology.* 151:512-515.

Linet, M.S., E.H. Hatch, R.A. Kleinerman, L.L. Robison, W.T. Kaune, D.R. Friedman, R.K. Severson, C.M. Haines, C.T. Hartsock, S. Niwa, S. Wacholder, R.E. Tarone. 1997. Residential exposure to magnetic fields and acute lymphoblastic leukemia in children. *New England Journal of Medicine.* 337:1-7.

London, S.J., J.M. Pogoda, K.L.Hwang, B. Langholz, K.R. Monroe, L.N. Kolonel, W.T. Kaune, J.M. Peters, B.E. Henderson. 2003. Residential magnetic field exposure and breast cancer risk: A nested case-control study from a multiethnic cohort in Los Angeles County, California. *American Journal of Epidemiology.* 158:969-980.

Macdonald, Gordon A., Agatin T. Abbott, and Frank L. Peterson. 1983. *Volcanoes in the Sea.* Second edition. University of Hawaii Press, Honolulu, Hawaii.

Mandeville, R., E. Franco, S. Sidrac-Ghali, L. Paris-Nadon, N. Rocheleau, G. Mercier, M. Desy, C. Dexaux, L. Gaboury. 2000. Evaluation of the potential promoting effects of 60-Hz magnetic fields on N-Ethyl-N-Nitrosourcea induced neurogenic tumors in female F344 rats. *Bioelectromagnetics.* 21:84-93.

McCormick, D.L., G.A. Boorman, J.C. Findlay, J.R. Hailey, T.R. Johnson, J.R. Gauger, J.M. Pletcher, R.C. Sill, J.K. Haseman. 1999. Chronic toxicity/oncogenicity evaluation of 60 Hz (power frequency) magnetic fields in B6C3F mice. *Toxicologic Pathology.* 27:279-285.

Mink, John F. and L. Stephen Lau. 1990. *Aquifer Identification and Classification of O'ahu: Groundwater Protection Strategy for Hawai'i, Technical Report No. 179.*

Morris, J.E., L.B. Sasser, D.L. Miller, G.E. Dagle, C.N. Rafferty, K.L. Ebi, L.E. Anderson. 1999. Clinical progression of transplanted large granular lymphocytic leukemia in Fischer 344 rats exposed to 60 Hz magnetic fields. *Bioelectromagnetics.* 20:48-56.

National Institute of Environmental Health Sciences (NIEHS). 2002. *EMF Electric and Magnetic Fields Associated with the use of Electric Power: Questions and Answers.* Research Triangle Park, North Carolina: National Institute of Environmental Health Sciences of the U.S. National Institutes of Health.

National Institute of Environmental Health Sciences. 1999. Health Effects from Exposure to Power Line Frequency Electric and Magnetic Fields. NIH Publication No. 99-4493. Research Triangle Park, North Carolina: National Institute of Environmental Health Sciences of the U.S. National Institutes of Health.

National Institute of Environmental Health Sciences. 1998. *Assessment of Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields: Working Group Report.* NIH Publication No. 98-3981. Research Triangle Park; North Carolina: National Institute of Environmental Health Sciences of the U.S. National Institutes of Health.

National Research Council (NRC). 1999. *Research on Power Frequency Fields Completed Under the Energy Policy Act of 1992.* Washington, D.C. National Academy Press.

Neutra, R.R., V. Delpizzo, G.M. Lee. 2002. *An evaluation of the possible risks from electric and magnetic fields (EMFs) from power lines, internal wiring, electrical occupations and appliances.* Final Report. California Department of Health Services (CDHS). California EMF Program, Oakland, California.

Occupational Safety and Health Administration. Occupational Safety and Health Standards-Code of Federal Regulations Chapter 29 Part 1910.

Pacific Legacy, Inc. August 2004. *Archaeological Assessment for the Hawaiian Electric Company Inc. East O'ahu Transmission Project–46kV Phased Project.* Prepared for Belt Collins Hawaii.

Pacific Legacy, Inc. August 2004. *Cultural Impact Assessment for the Hawaiian Electric Company, Inc. East O'ahu Transmission Project 46kV Phased Project.* Prepared for Belt Collins Hawaii.

Power Engineers. May 28, 2004. Draft Report. HLY 019-280 (STU) HECO (5/12/04)br 105240.

Power Engineers. August 2004. *The Hawaiian Electric Company, Inc., East O'ahu Transmission Project Phase 2–46kV Lines, Horizontal Drilling Feasibility Study.* Provided in Appendix A.

Schoenfeld, E.R., E.S. O'Leary, K. Henderson, R. Grimson, G.C. Kabat, S. Ahnn, W.T. Kaune, M.D. Gammon, M.C. Leske. 2003. Electromagnetic fields and breast cancer on Long Island: a case-control study. American Journal of Epidemiology. 158:47-58.

State of Hawai'i, Department of Business, Economic Development and Tourism. March 2004. *Quarterly Statistical and Economic Report.* Honolulu, HI.

State of Hawai'i, Department of Business, Economic Development and Tourism. October 2003. *2002 The State of Hawaii Data Book A Statistical Abstract*

State of Hawai'i, Department of Business, Economic Development and Tourism. *State of Hawaii Data Book 2001.* www.hawaii.gov/dbedt/db01/sec01.html.

State of Hawai'i, Department of Business, Economic Development and Tourism, Office of Planning. 2004. Hawai'i Statewide GIS Program. http://www.state.hi.us/dbedt/gis/. Accessed June 2004.

State of Hawai'i, Department of Business, Economic Development and Tourism, Office of Planning. July 23, 1998 Comment letter regarding the *Kamoku-Pukele 138-kV Transmission Line Project Draft Environmental Impact Statement.*

State of Hawai'i, Department of Business, Economic Development and Tourism. *1997 Benchmark Report.*

State of Hawai'i, Department of Commerce and Consumer Affairs, Division of Consumer Advocacy. May 3, 1993. *Consumer Advocate's Amended Statement of Position.*

State of Hawai'i, Department of Education. http://doe.k12.hi.us/about/intro_calendar.htm. Accessed May 7, 2004.

State of Hawai'i, Department of Health. February 27, 2004. *2004 List of Impaired Waters in Hawaii, Public Comment Draft.*

State of Hawai'i, Department of Health. May 2003. *Minimizing Construction and Demolition Waste.* Third edition.

State of Hawai'i, Department of Health. January 19, 1994. "DOH Policy Relating to Electric and Magnetic Fields from Power-Frequency Sources." Memorandum.

State of Hawai'i, Department of Health. September 22, 1992. Hawaii Administrative Rules. Title 11, Chapter 23.

State of Hawai'i, Department of Health, Environmental Management Division, Solid and Hazardous Waste Branch, Underground Storage Tank Division. March 2000. *Technical Guidance Manual for Underground Storage Tank Closure and Release Response.*

State of Hawai'i, Department of Health, Office of Solid Waste Management. July 2000. *Hawai'i 2000 Plan for Integrated Solid Waste Management*

State of Hawai'i, Department of Land and Natural Resources, Commission on Water Resource Management. No date. Well locations marked on USGS. 1983. Map O-13 (Honolulu Quadrangle).

State of Hawaii, Department of Labor and Industrial Relations. *2002 Employment and Payrolls in Hawaii.*

State of Hawai'i, Public Utilities Commission. April 7, 1994. Decision and Order No. 13201.

3Point. September 2003. *East Oahu Transmission Project: A Report on Public Input Collected in June and July 2003.*

United Kingdom Childhood Cancer Study (UKCCS) Investigators. Exposure to power frequency electric fields and the risk of childhood cancer in the UK. 2002. *British Journal of Cancer.* 87:1257-1266, 2002.

United Kingdom Childhood Cancer Study (UKCCS) Investigators. Childhood cancer and residential proximity to power lines. 2000. *British Journal of Cancer.* 83:1573-80, 2000.

United Kingdom Childhood Cancer Study (UKCCS) Investigators. Exposure to power frequency magnetic fields and the risk of childhood cancer. 1999. *The Lancet.* 353:1925-1931.

U.S. Census. 2000.

U.S. Department of Agriculture, Soil Conservation Service. 1972. *Soil Survey of Islands of Kauai, Oahu, Molokai, and Lanai, State of Hawai'i.*

U.S. Department of Energy's Office of Emergency Management. <date>. *Hawaiian Islands Hazard Mitigation Report.*

U.S. Department of Transportation and City and County of Honolulu, Department of Transportation Services. July 2003. *Primary Corridor Transportation Project Final EIS.*

U.S. Department of Transportation, Federal Highway Administration. No date. *Effective Noise Control During Nighttime Construction,* Table 2. http://ops.fhwa.dot.gov/wz/workshops/accessible/Schexnayder_paper.htm. Accessed June 22, 2004.

U.S. Department of Transportation, Federal Highway Administration. No date. *Highway Traffic Noise.* Website: http://www.fhwa.dot.gov/environment/htnoise.htm. Accessed June 22, 2004.

United States Environmental Protection Agency (EPA). December 1993. *Questions and Answers about Electric and Magnetic Fields (EMF).* Washington, D.C. Government Printing Office (GPO); Booklet No. 402-R-92-009.

U.S. Environmental Protection Agency. No date. National ambient air quality standards.

U.S. Environmental Protection Agency. *Protective Noise Levels.* Condensed version of EPA levels document. http://www.avlelec.com/epa_noise.html.

U.S. Geological Survey. 2001. *USGS Water Resources Date, Hawaii and Other Pacific Area, Water Year 2000.* Volume 1, Hawai'i. Water Date Report HI-00-1.

U.S. Geological Survey. 1998. Honolulu Quadrangle map.

West Virginia Department of Highways. No date. http://www.wvcorridorh.com/engineer/noise.html. Accessed June 22, 2004.

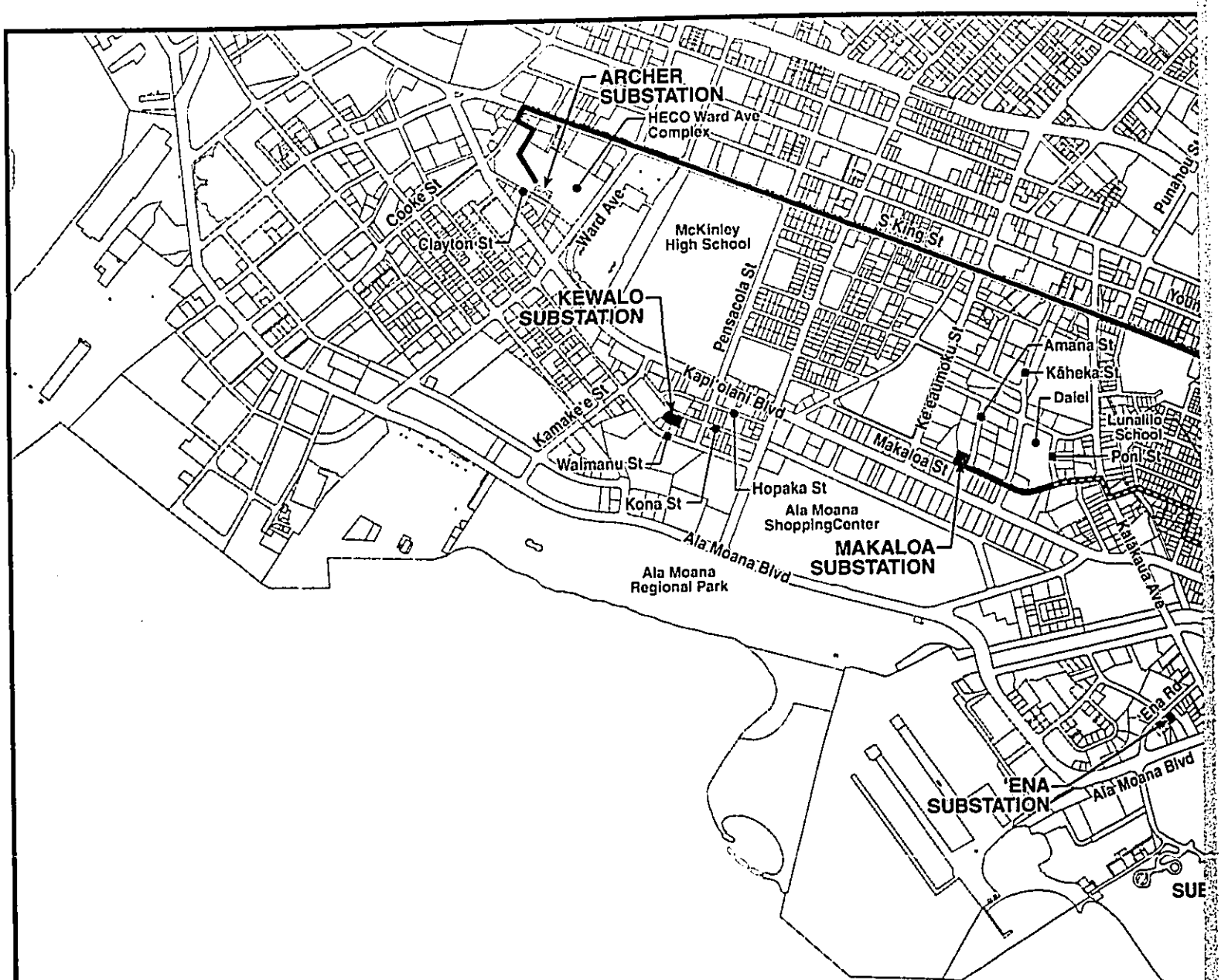
Wilbur Smith Associates. December 2004. *Traffic Impact Study East O'ahu Transmission Project Final.*

World Health Organization. No date. *Guidelines for Community Noise.* http://www.who.int/docstore/peh/noise/Comnoise-3.pdf. Accessed June 22, 2004.

World Health Organization. No date. *Occupational and Community Noise.* http://www.who.int/mediacentre/factsheets/fs258/en/. Access June 22, 2004.

ALREADY
REDUCED
AND
PLACED
IN FILE

RECEIVED AS FOLLOWS



LEGEND

- Proposed Phase 1 Underground 46kV Circuits in New Ductline
- Proposed Phase 1 Underground 46kV Circuits in Existing Ductline
- Substations Affected by Proposed Phase 1 Modifications
- Proposed Phase 2 Underground 46kV Circuits in New Ductline
- Substation Affected by Proposed Phase 2 Modifications

Note: Figure does not show proposed 12kV circuit work on Kapi'olani Boulevard (see Actitivies 1A-6 and 1A-7 in Figure 3-2) and existing ductline between Makaloa Substation and Poni Street proposed for new 46kV circuit (see Activities 1A-9 and 1A-10 in Figure 3-2).

NORTH

0 750 1500

SCALE IN FEET

RECEIVED AS FOLLOWS

2004.33.0800/010-1 11.02.04 10

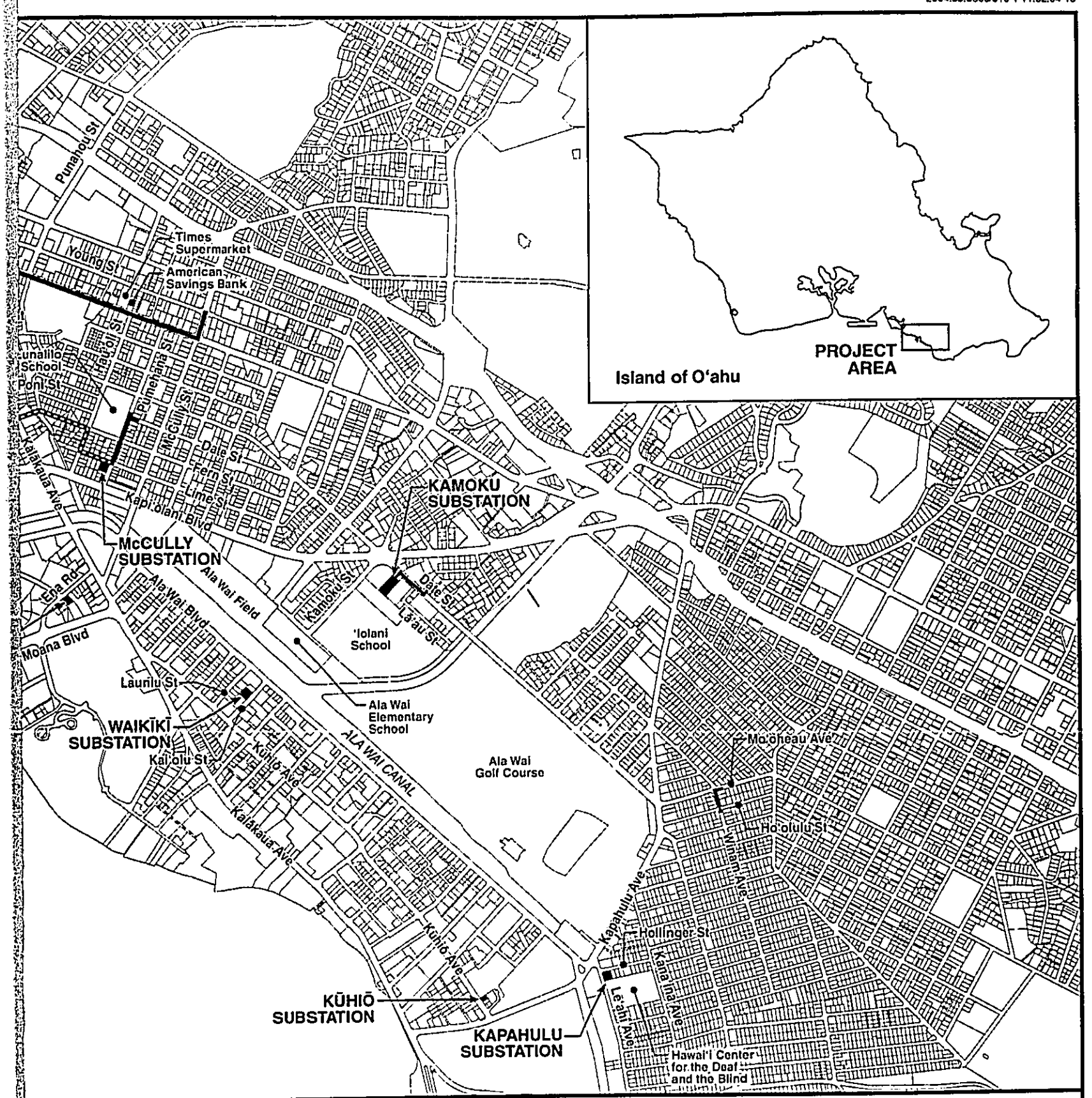
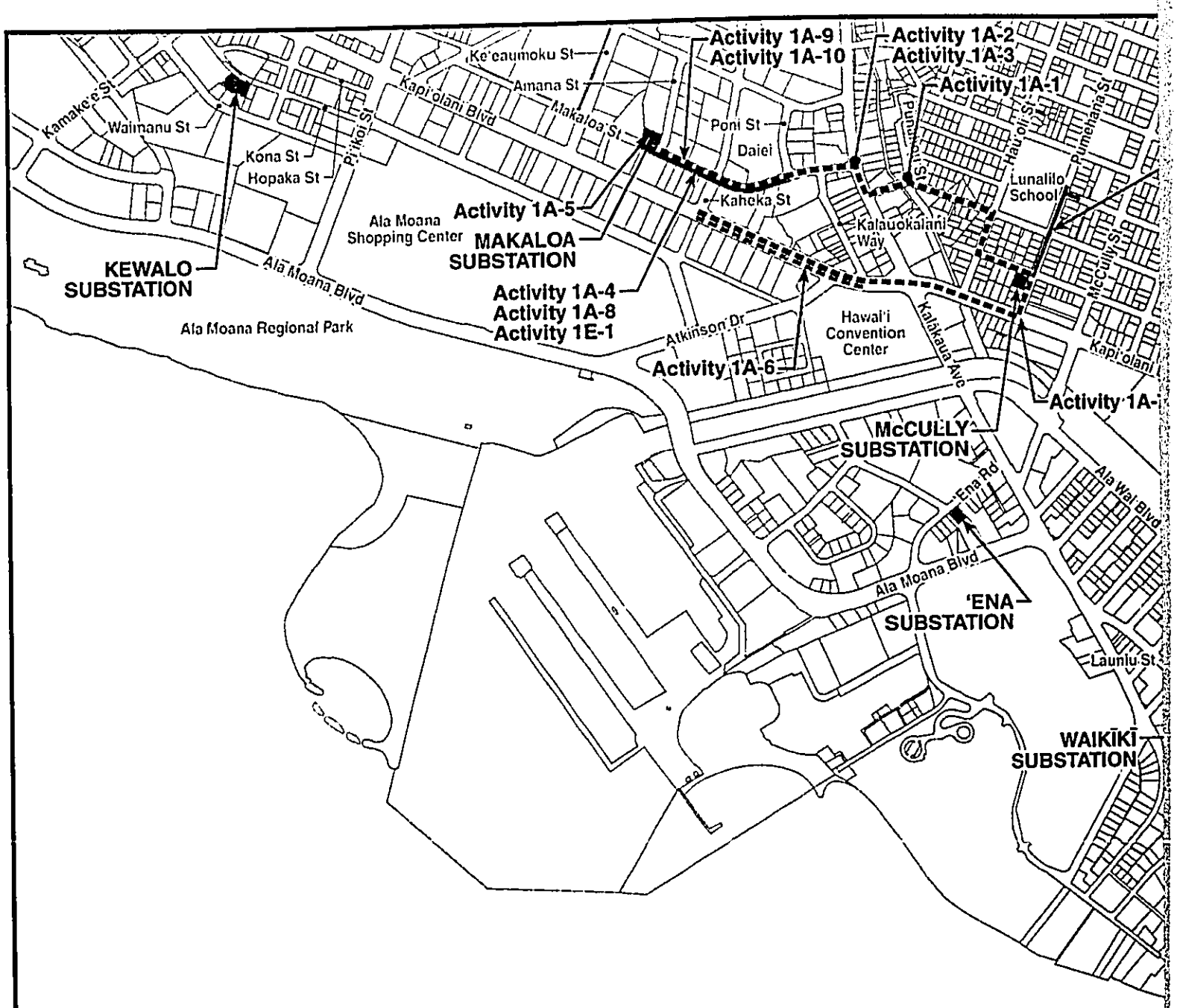


Figure 1-1
PROPOSED ACTION—
46kV DUCTLINES AND AFFECTED SUBSTATIONS
Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

RECEIVED AS FOLLOWS



LEGEND

Substations Affected by Proposed Phase 1 Modifications

Notes: Dashed lines indicate existing ductline.
Refer to Table 3-1 for activity descriptions.

NORTH

0 500 1000
SCALE IN FEET

RECEIVED AS FOLLOWS

2004.33.0800/015-1 k11.02.04 10

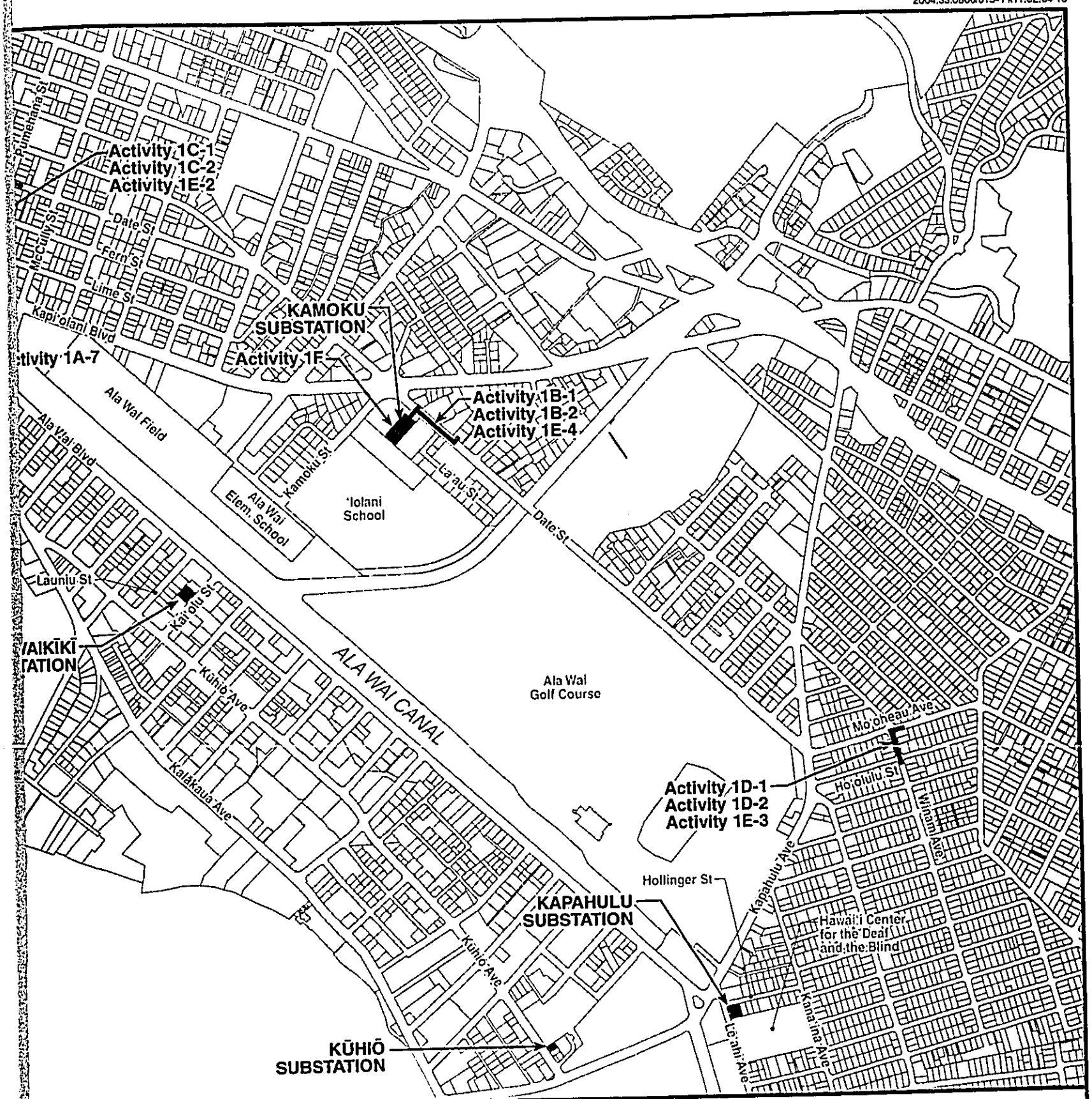
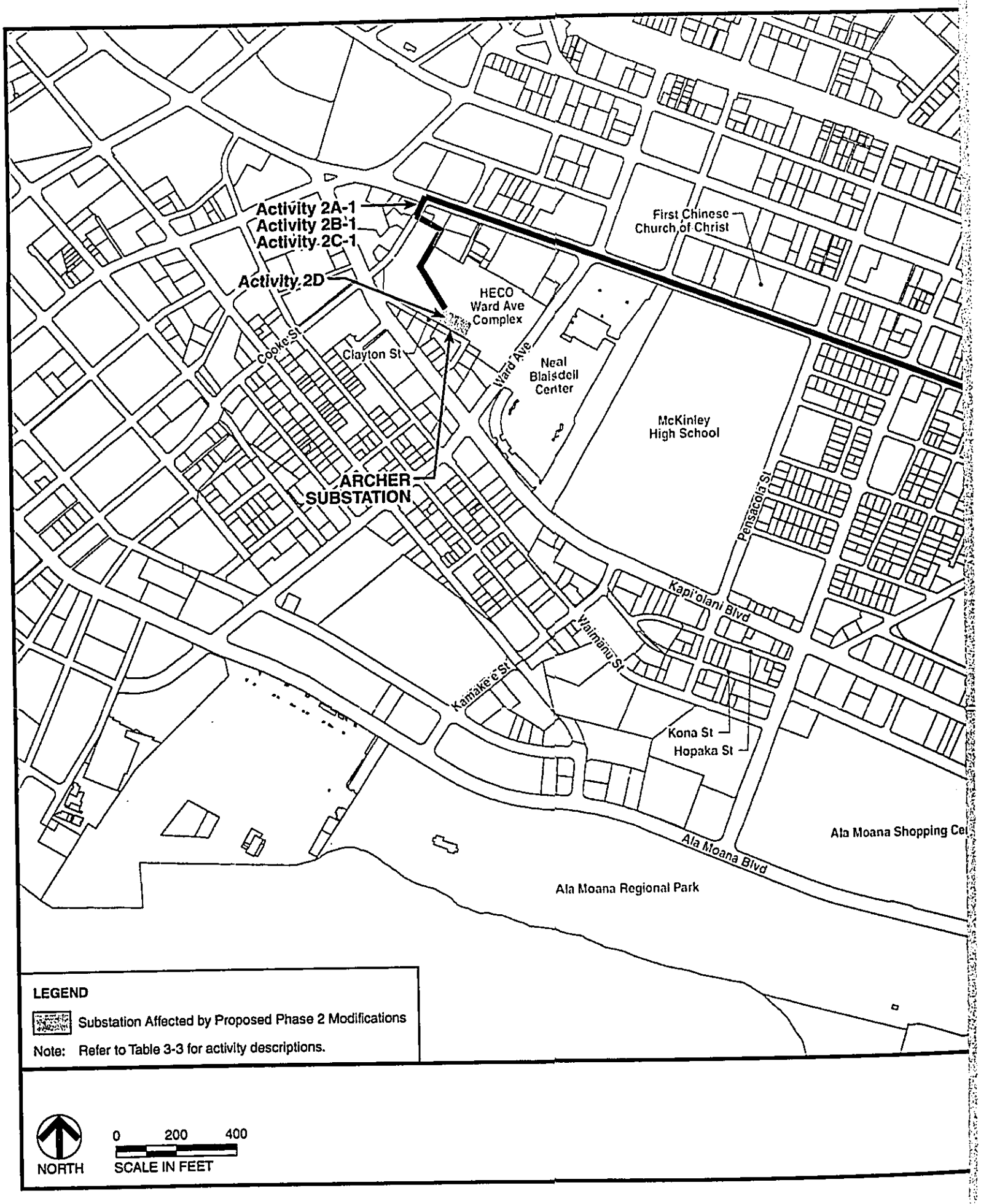


Figure 3-2
PROPOSED CONSTRUCTION ACTIVITIES—PHASE 1

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

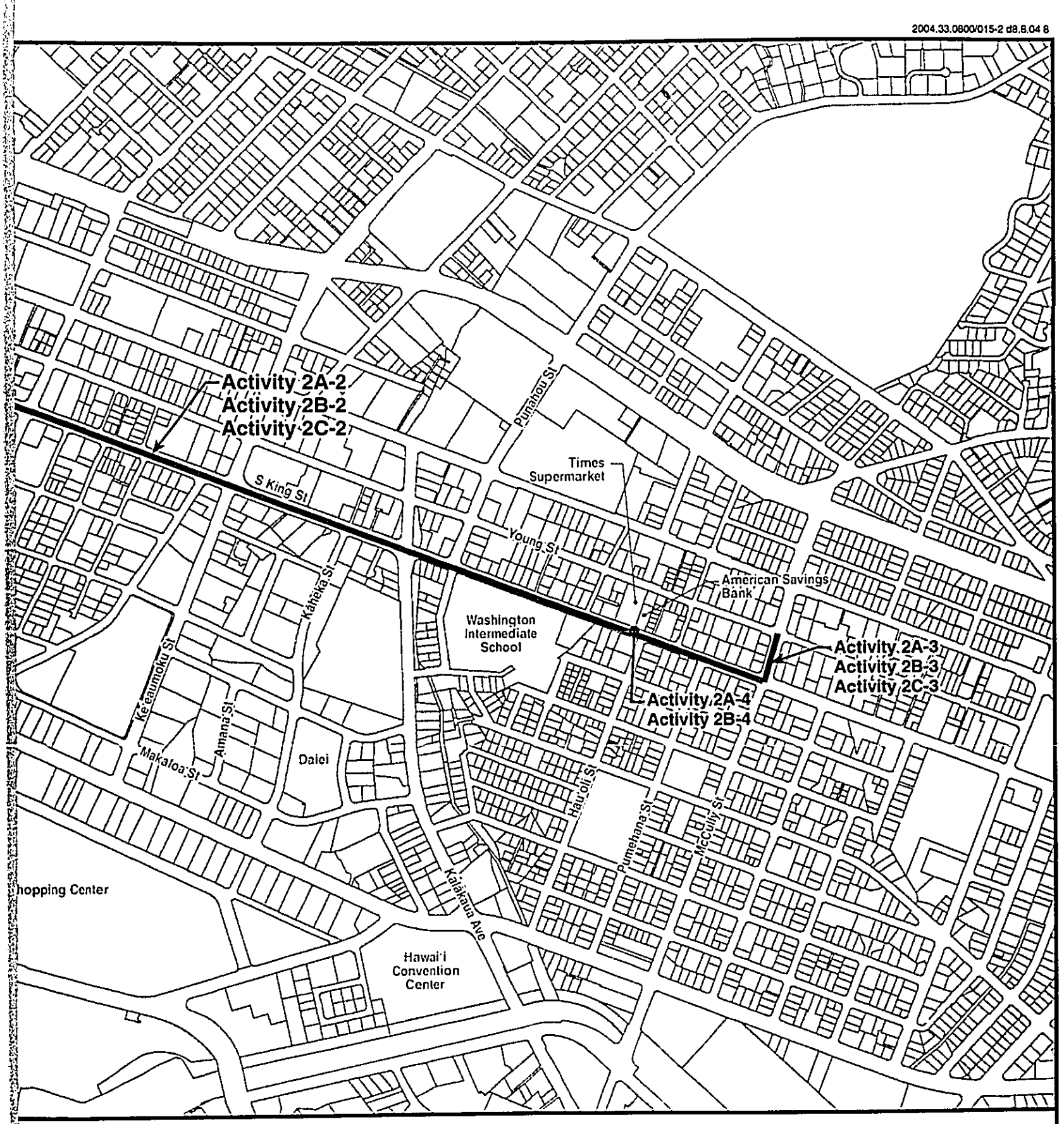


Figure 3-5
PROPOSED CONSTRUCTION ACTIVITIES—PHASE 2

Environmental Assessment for the 46kV Phased Project
East O'ahu Transmission Project
Hawaiian Electric Company, Inc.