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Environmental Assessment for the Relocation of Units and Construction Projects at the Kalaeloa Hawaii Army National Guard Facility Oahu, Hawaii

Building 117

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May 2010

The Hawaii Army National Guard

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ENVIRONMENTAL ASSESSMENT FOR THE RELOCATION OF UNITS AND CONSTRUCTION PROJECTS AT THE KALAELOA HAWAII ARMY NATIONAL GUARD FACILITY OAHU, HAWAII

THE HAWAII ARMY NATIONAL GUARD
ENVIRONMENTAL OFFICE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

MAY 2010

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**DRAFT ENVIRONMENTAL ASSESSMENT
FOR THE RELOCATION OF UNITS AND CONSTRUCTION PROJECTS
AT THE KALAELOA HAWAII ARMY NATIONAL GUARD FACILITY, OAHU, HAWAII**

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List of Acronyms and Abbreviations

°F	degrees Fahrenheit
AA	Alert Area
AAF	Army Air Field
AASF	Army Aviation Support Facility
ACM	Asbestos Containing Material
ACMI	Air Combat Maneuvering Instrumentation
ADT	Average Daily Traffic
agl	above ground level
amsl	above mean sea level
ANG	Air National Guard
APE	Area of Potential Effects
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AT/FP	Anti-terrorism/Force Protection
ASB	Aviation Support Battalion
ASE	Air Support Equipment
ASOS	Air Support Operations Squadron
AST	Above-ground Storage Tank
AVN	Aviation
BCE	Base Civil Engineering
BMPs	Best Management Practices
BPNAS	Barbers Point Naval Air Station
BRAC	Base Realignment and Closure
BSB	Brigade Support Battalion
BSTB	Brigade Special Troops Battalion
CAA	Clean Air Act
CAS	Centralized Accumulation Site
CCSD	Conventional Construction Standoff Distances
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CH_4	methane
CIP	Campbell Industrial Park
CO_2	carbon dioxide
CO_{2e}	CO_2 equivalent
CSMS	Combined Support Maintenance Shop
CWA	Clean Water Act
CWB	Hawaii Department of Health Clean Water Branch
cy	cubic yard
CZMA	Coastal Zone Management Act
CZMP	Hawaii Coastal Zone Management Program
dB	Decibels
dBA	A-weighted Sound Level
DLNR	Hawaii Department of Land and Natural Resources
DNL	day-night average sound level
DoD	Hawaii Department of Defense
DOH	Hawaii Department of Health
DoN	Department of the Navy
DOPAA	Description of Proposed Action and Alternatives
DOT	Hawaii Department of Transportation
DPW	Department of Public Works
EA	Environmental Assessment
EDMS	Emissions and Dispersion Modeling System
EDR	Environmental Data Report
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FONSI	Finding of No Signification Impact
ft	feet/foot
ft²	square foot/square feet
FY	Fiscal Year
GHGs	Greenhouse Gases
GOV	Government-Owned Vehicle
GSE/TSE	Ground/Tactical Support Equipment
GWP	Global Warming Potential
H_2S	hydrogen sulfide
HAAQS	Hawaii Ambient Air Quality Standards
HAR	Hawaii Administrative Rules
HCDA	Hawaii Community Development Authority
HECO	Hawaiian Electric Company, Inc.
HHC	Headquarters Headquarters Command
HIARNG	Hawaii Army National Guard
HNL	Honolulu International Airport
HRS	Hawaii Revised Statutes
HVAC	Heating, Ventilation, and Air Conditioning
IBCT	29th Infantry Brigade Combat Team
IFR	Instrument Flight Rules
IRP	Installation Restoration Program
JFHQ	Joint Forces Headquarters
JP-8	Jet Petroleum
L_{dn}	Day-Night Average Sound Level
LATN	Low Altitude Tactical Navigation Areas
LBP	Lead-Based Paint
lbs.	pounds
LEED	Leadership in Energy and Environmental Design
lf	linear feet/linear foot
LOS	Level of Service
MCBH	Marine Corps Base Hawaii
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
mg/L	million gallons per liter
MOBILE6	Vehicle Emission Modeling Software
MOV	Military Owned Vehicle
MSD	Minimum Standoff Distances
MSL	Mean Sea Level
MVP	Motor Vehicle Parking

N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NM	nautical miles
NPDES	National Pollution Discharge Elimination System
OHSPRP	Oil and Hazardous Substance Spill Prevention and Response Plan
ORTP	Oahu Regional Transportation Plan
PCB	polychlorinated biphenyl
PCPI	Per Capita Personal Income
PHNWR	Pearl Harbor National Wildlife Refuge
PM_x	Particulate matter of size X
POL	Petroleum Oil and Lubricant
POV	Personal-Owned Vehicles
PWC	Public Works Center
RA	Restricted Areas
RC	Readiness Center
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	Region of Influence
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMAs	Special Management Areas
SUA	Special Use Airspace
TAG	The Adjutant General
TCLP	Toxicity Characteristic Leaching Procedure
TRACON	Terminal Radar Approach Control
UIC	Underground Injection Control
U.S.	United States of America
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USAR	United States Army Reserve
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WRCC	Western Regional Climate Center
WWTP	Waste Water Treatment Plant
YCP	Youth Challenge Program

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Project Summary

***Project Name*:**	Environmental Assessment, Relocation of Units and Construction Projects at the Kalaeloa Hawaii Army National Guard Facility, Oahu, Hawaii
***Proposed Action*:**	Move various Hawaii Army National Guard (HIARNG) units to Kalaeloa including the Oahu-based aviation units, Joint Forces Headquarters, and miscellaneous other smaller units. Construct or renovate buildings for these units and units already at Kalaeloa.
Applicant:	Hawaii Department of Defense
Tax Map Key:	1-9-1-13:045
Property Owner:	U.S. Army
Lessee:	State of Hawaii
Approving Agency:	Hawaii Department of Defense
State Land Use:	State Urban District
Zoning District:	F-1, Military and Federal Preservation
Community/ Development Plan:	HCDA 2006 Kalaeloa Master Plan
Special Designations:	Special District (SD) within the HCDA Kalaeloa Master Plan

Summary: HIARNG is proposing to relocate and consolidate its operations to Kalaeloa, Oahu, Hawaii. This Environmental Assessment (EA) evaluates and summarizes the potential impacts of proposed construction of new buildings and the renovation of existing buildings, as well as the relocation of aircraft, vehicles, equipment and personnel.

The proposed relocation site is on a portion of the former Barbers Point Naval Air Station. The former Air Station is now a designated community development area managed by the Hawaii Community Development Authority (HCDA). The proposed action includes movement of all HIARNG Aviation Units from Wheeler Army Airfield to Kalaeloa, consolidation of HIARNG Joint Forces Headquarters from Fort Ruger to Kalaeloa, consolidation of Combined Support Maintenance Shop (CSMS) to Kalaeloa, construction of an Army Aviation Support Facility, Brigade Readiness Center (RC), JFHQ-HIARNG RC, Army Aviation RC, and various other support structures within the 150-acre Kalaeloa site. Currently, various former Navy buildings exist on the Kalaeloa site and are used by the HIARNG. However, renovations and new structures are required before HIARNG can completely consolidate operations there.

In 1998 Feasibility and Conceptual Studies were prepared to evaluate a consolidation of HIARNG units at Kalaeloa. In 2003 an EA was prepared by HIARNG for the movement of the 29th Infantry Brigade Headquarters (now 29th IBCT), 29th Support Battalion (now 29th Brigade Support Battalion), 29th Military Intelligence Company (now the 29th Brigade Special Troops Battalion), 297th Firefighting Team, 12th Personnel Services Detachment (inactivating), Organizational Maintenance Shop #1 (now Field Maintenance Shop #1), Combined Support Maintenance Shop #1 (CSMS), United States Property and Fiscal Office, Medical Command (formerly Troop Command's Medical Detachment 4, and the State Area Command units (now JFHQ-HIARNG). Many of these units were subsequently moved following approval of that EA, but not all. The Proposed Action being considered in this EA includes moving the remainder of these units. Operations at Kalaeloa presently include, and will consolidate, most of HIARNG Oahu-based units into one location. The primary additional activity will be aircraft maintenance and operations.

Presently there are 530 full-time personnel that work at Kalaeloa on weekdays. In addition, 654 inactive duty reserve personnel conduct weekend training at Kalaeloa. The Proposed Action will station 108 full-time and 285 inactive duty reserve personnel presently operating at Wheeler Army Airfield to Kalaeloa. Additionally, 266 full-time (including 34 from CSMS) and 229 inactive duty reserve personnel that are stationed at Fort Ruger will relocate to Kalaeloa. The Proposed Action includes the relocation of 20 aircraft (19 helicopters and 1 fixed-wing aircraft) and approximately 58 vehicles used for operations and training purposes. The consolidation will improve operational efficiency, effectiveness and readiness of the National Guard.

The Proposed Action includes phases Phase 1B through Phase 4 of construction to correspond with availability of funding. The HIARNG, in coordination with the National Guard Bureau (NGB), is committed to preparing updated NEPA analysis if any of the facilities analyzed in this EA are not constructed within five years of finalization of this document or if the proposed locations of the facilities change.

Analysis of the Proposed Action found that no significant impacts would occur to land use, air quality, noise, geology and soils, biological resources, socioeconomics and environmental justice, hazardous materials and waste, airspace, utilities and public services, and aesthetics. With implementation of best management practices and adherence to standard operation procedures, no significant impact would occur to water or cultural resources.

Significant traffic impacts are possible, however regional transportation conditions in the Ewa area are undergoing rapid changes and these will continue into the foreseeable future. Roadway improvements in the Kalaeloa area are being coordinated between the Hawaii Department of Transportation (DOT) and the HCDA. HIARNG will work in collaboration with these agencies and will consider conducting new traffic counts at a future date closer to the relocation based on discussions with HCDA and DOT. In addition, HIARNG proposes a number of mitigation measures for its staff to utilize including flexible work hours and work days to help alleviate potential adverse impacts on traffic that are under HIARNG's control.

SECTION 1
PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The Hawaii Army National Guard (HIARNG) is proposing to relocate and consolidate its operations to Kalaeloa, Oahu, Hawaii. This Environmental Assessment (EA) evaluates and summarizes the potential impacts of proposed construction of new buildings and the renovation of existing buildings, as well as the relocation of aircraft, vehicles, equipment and personnel. The proposed relocation site is on a portion of the former Barbers Point Naval Air Station (see Figure 1.2-1). The former Air Station is now a designated community development area managed by the Hawaii Community Development Authority (HCDA). The proposed action includes movement of all HIARNG Aviation Units from Wheeler Army Airfield to Kalaeloa, consolidation of HIARNG Joint Forces Headquarters from Fort Ruger to Kalaeloa, consolidation of Combined Support Maintenance Shop (CSMS) to Kalaeloa, construction of an Army Aviation Support Facility, Brigade Readiness Center (RC), JFHQ-HIARNG RC, Army Aviation RC, and various other support structures within the 150-acre Kalaeloa site. Currently, various former Navy buildings exist on the Kalaeloa site and are used by the HIARNG. However, renovations and new structures are required before HIARNG can completely consolidate operations there.

The Proposed Action includes the relocation of 20 aircraft (19 helicopters and 1 fixed-wing aircraft) and approximately 58 vehicles. Presently there are 530 full-time personnel that work at Kalaeloa on weekdays. In addition, 654 inactive duty reserve personnel conduct weekend training exercises at Kalaeloa. The Proposed Action will station 108 full-time and 285 inactive duty reserve personnel presently operating at Wheeler Army Airfield to Kalaeloa. Additionally, 266 full-time (including 34 from CSMS) and 229 inactive duty reserve personnel that are stationed at Fort Ruger will relocate to Kalaeloa.

The proposed action includes four phases of construction, Phase 1B through Phase 4, to correspond with availability of funding. Phase 1A was previously assessed and is completed, thus its actions are not assessed in this document. The HIARNG, in coordination with the National Guard Bureau (NGB), is committed to preparing updated NEPA analysis if any of the facilities analyzed in this EA are not constructed within five years of finalization of this document or if the proposed locations of the facilities change. The HIARNG would also prepare additional NEPA analysis if additional infrastructure is identified to support the facilities analyzed in the EA. When appropriate, NEPA documentation would be "tiered-off" of this EA, as long as projects are in direct support of the facilities in this EA. Should a future, supplemental NEPA analysis be appropriate, HIARNG will coordinate with NGB-ARE regarding future NEPA documentation requirements and the appropriate level of NEPA analysis.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to consolidate HIARNG facilities and operations by moving those currently at Wheeler AAF and Fort Ruger to the Kalaeloa site, which will create one single HIARNG location. HIARNG is one of three branches of the State of Hawaii Department of Defense (DoD). The HIARNG has three major commands: the JFHQ-HIARNG (formerly called Headquarters State Area Command), the 29th Infantry Brigade Combat Team (IBCT) (formerly called 29th Separate Infantry Brigade), and the 103rd Troop Command.

Printing Date: May 18, 2010, M:\projects\GIS\6601_Kalaeloa_EA\figures\EA\Figure 1.2-1 Location.mxd

Figure 1.2-1
Location of HIARNG Kalaeloa
Kalaeloa, Oahu, Hawaii
May 2010

Operations include deployments of aircraft and troops, vehicle and equipment storage and maintenance, training exercises, defense support to civil authorities operations, and logistical support activities.

The facilities at Fort Ruger and Wheeler AAF are insufficient to support spatial requirements of the HIARNG units located there. In 1998, feasibility and conceptual studies were prepared to evaluate a consolidation of these units at Kalaeloa (EarthTech 1998a, 1998b). Some of the units have already been moved and were evaluated in a previous EA (HIARNG 2003a).

The proposed action considered in this EA includes: moving remaining Headquarters units at Fort Ruger to Kalaeloa and construction of a new RC there to accommodate all JFHQ units, moving aviation units currently at Wheeler AAF including construction of an AASF and RC at Kalaeloa, consolidating Combined Support Maintenance Shop (CSMS) from Diamond Head to Kalaeloa, and construction of a new RC for the brigade already present at Kalaeloa. The specific units to be moved are described in greater detail in Section 2 of this EA.

There is insufficient space to expand at the existing AASF hangar and Army Aviation Armory facilities at Wheeler. US Army Garrison Hawaii will not commit additional land at Wheeler AAF for the construction of a new AASF there.

Benefits of relocation of units to a single facility at Kalaeloa include:

- Maximizing the efficiency of HIARNG operations;
- Facilitation of mobilization and deployment of HIARNG units throughout the State;
- Reduced number of military vehicles operating in and around the Diamond Head neighborhood;
- Alleviation of problems at current facilities that have insufficient space;
- Return of Diamond Head facilities to the State's Diamond Head Monument;
- Increased expansion ability and improved sustainability;
- Proximity to rapidly developing Kapolei area will enhance recruitment efforts; and
- Providing maximum anti-terrorism/force protection (AT/FP) setbacks to comply with current standards.

An increase in RC space for JFHQ-HIARNG will boost morale, enhance readiness, and adhere to the State Adjutant General's plan to replace older facilities in order to lower operation costs to sustainable levels and increase readiness, consistent with NGR 415-10 Army National Guard Facilities Construction and NGB PAM 415-12, Army National Guard Facilities Allowances dated 30 Apr 07.

The JFHQ-HIARNG unit is currently split between Fort Ruger in portions of buildings 306/306A and 300/300A, and Kalaeloa in Buildings 1784, 1785, and 1788. The buildings at Fort Ruger total approximately 53,450 ft^2 and those at Kalaeloa total approximately 29,880 ft^2. The buildings at Fort Ruger are shared with other units. For example, building 306 currently houses the Adjutant General's (TAG) special staff, the DoD (Hawaii) state offices, parts of the JFHQ Hawaii National Guard staffed with both Army and Air personnel, and the Hawaii Air National Guard Headquarters. The current combined space occupied by the JFHQ-HIARNG units at Fort Ruger and Kalaeloa is 83,330 ft^2, which is substantially lower than the authorized 102,024 ft^2. The current Fort Ruger facilities cannot be expanded easily because of the proximity to the Diamond Head State Monument and a predominately residential area, and split operations between Fort Ruger and Kalaeloa are not efficient because it is often necessary to travel from one location to the other to conduct operations.

At Wheeler AAF, the existing AASF is approximately 44,000 ft² in area, and consists of operations, allied shops and a maintenance hangar. The space required for AASF is approximately 217,000 ft² based on DD1390 planning documents, a shortfall of 173,000 ft² from present. Wheeler Army planning officials have stated that there is no real property available for expansion for the HIARNG Aviation operation, and the US Army Garrison Hawaii Master Plan has no additional space reserved for HIARNG.

The Wheeler AAF facility previously performed both the U.S. Army and HIARNG UH-60 maintenance missions. The unit no longer supports the U.S. Army Pacific for the maintenance of UH-60s and was required to surrender space, which affects HIARNG's ability to train the 777th personnel to repair UH-60 aircraft on Oahu, and leaves less than 50% of the space required.

The Wheeler AAF hangar presently provides sufficient space for a limited number of aircraft (eight maximum) with their rotors removed. The proposed Kalaeloa facility would be able to support twelve CH-47 Chinooks and five UH-60 Blackhawks, as well as the C-26 fixed-wing aircraft. The C-26 aircraft currently occupies a small hangar (Building 825) on Wheeler AAF that is subject to severe flooding. Parking space deficiencies identified in the DD1390, and verified in the planning charrette (Jacobs 2008), would also be corrected. The aircraft parked outside are vulnerable to damage from weather and foreign object debris. Delay in this project would put valuable aircraft and soldiers at higher risk of aviation accidents potentially resulting in the loss of lives and aircraft.

The HIARNG Armory at Wheeler AAF (Building 832), which was designed to accommodate a single company, is currently being shared by the 777th Aviation Support Battalion, units of the 1-171st Aviation, and Detachment 1 Company B 1-207th Aviation. The requirements for these units result in a shortfall of over 69,000 ft^2 of RC space at Wheeler AAF. Buildable areas for expansion at Wheeler AAF are virtually non-existent due to runway clearance restrictions. Without this project, the units' readiness will continue to be adversely affected by insufficient storage and training space.

There are various other building space shortages at Kalaeloa. Adequate RC space for the 29th IBCT, 29th Brigade Support Battalion, and the 29th Brigade Special Troops Battalion must be constructed. The specific requirements for each project component in the proposed action are discussed along with the description of each project in Section 2.1. In addition to inadequate space, the old Navy facilities at Kalaeloa are not energy efficient and do not meet current seismic, building, or accessibility codes, and cannot be upgraded to meet force protection requirements.

Force protection requirements include standoff distances created to mitigate explosive effects on buildings by keeping explosives as far as possible from them (UFC 4-010-01 2007). Standoff distances are required for all new and existing DoD buildings. Conventional Construction Standoff Distances (CCSDs) allow for conventional construction methods to be used for buildings. When CCSDs cannot be met, Minimum Standoff Distances (MSD) must be met, and additional protective measures, such as building hardening, are required (UFC 4-010-01. Standoff distances less than the MSD are not allowed for new construction. CCSDs and MSDs are listed in Table 1.2-1. Construction and renovations at Kalaeloa would allow HIARNG to meet force protection requirements.

Table 1.2-1. Standoff Distances for New and Existing Buildings

Location	*Building Category*	*Conventional Construction Standoff Distance*	*Minimum Standoff Distance*
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter	Billeting and High Occupancy Family Housing	45 meters (m) (148 feet [ft])	25 m (82 ft)
	Primary Gathering Building	45 m (148 ft)	25 m (82 ft)
	Inhabited Building	25 m (82 ft)	10 m (33 ft)
Parking and Roadways within a Controlled Perimeter	Billeting and High Occupancy Family Housing	25 m (82 ft)	10 m (33 ft)
	Primary Gathering Building	25 m (82 ft)	10 m (33 ft)
	Inhabited Building	10 m (33 ft)	10 m (33 ft)

1.3 BACKGROUND

1.3.1 Location

Kalaeloa includes the former BPNAS, located on the Ewa plain, approximately 16 miles west of downtown Honolulu and just south of Kapolei. The proposed site for HIARNG facilities is a 150-acre parcel currently housing hangars and barracks in the central and northern area of Kalaeloa. The proposed site is adjacent to the existing Kalaeloa Airport facilities that are operated by the Department of Transportation – Airports Division.

1.3.2 Mission

The HIARNG is one of three divisions of the State of Hawaii DoD. It is composed of three commands and support staff offices including the JFHQ-HIARNG, 29th IBCT, and the 103rd Troop Command.

The federal mission of the HIARNG is to serve as an integral component of the total Army by providing fully-manned, operationally-ready, and well-equipped units that can respond to any national contingency ranging from war and peacekeeping missions to nation-building operations. The mission of the HIARNG is to provide a highly-effective, professional, and organized force capable of supporting and assisting civilian authorities in response to natural disasters, human-caused crises, or the unique needs of the state and its communities, as civil response capabilities are exhausted.

1.4 SUMMARY OF ENVIRONMENTAL STUDY REQUIREMENTS

1.4.1 Federal and State Requirements

The National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq*.) requires Federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. The Council on Environmental Quality (CEQ) has been established under NEPA to implement and oversee federal processes. The CEQ has issued the *Regulations for Implementing Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] § 1500-1508). This EA complies with NEPA CEQ regulations.

To assess impacts on the environment and comply with NEPA and other relevant state and county environmental laws and regulations, the decision-making process for the proposed action includes the development of an EA addressing environmental issues associated with the proposed construction projects. The CEQ regulations specify that an EA:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI);
- Aid in an agency's compliance with NEPA when no EIS is necessary; and
- Facilitate the preparation of an EIS when one is necessary.

This EA also meets the State of Hawaii requirements in Chapter 343 of Hawaii Revised Statutes (HRS) and Chapter 200 of Hawaii Administrative Rules (HAR) from the Department of Health describing the contents of a State EIS (HAR 11-200-17). It meets the requirements outlined in 32 CFR Part 651, *Environmental Analysis of Army Actions*. This EA was prepared in accordance with Army Regulation 200-1 and guidance from the National Guard Bureau (NGB) NEPA Handbook (NGB 2006): *Guidance on Preparing Environmental Documentation for the Army National Guard in Compliance with National Environmental Act of 1969*.

NEPA and CEQ regulations require intergovernmental notifications prior to making any detailed statement of potential environmental impacts. Through the process of interagency and intergovernmental coordination for environmental planning, HIARNG notifies relevant federal, state, and local agencies and allow them time to evaluate the potential environmental impacts associated with the proposed action. Comments from agencies will be addressed and subsequently incorporated into the environmental assessment.

1.4.2 Public and Government Agency Involvement

As part of the EA process, a 30-day public notice period begins with an announcement of availability in the Hawaii Office of Environmental Quality Control *Environmental Notice* and publication of a notice in the *Honolulu Advertiser* and *Honolulu Star Bulletin*. Copies of the Draft EA are made available at public facilities near the affected area, including local libraries and online at http://oeqc.doh.hawaii.gov. Interested parties are given 30 days to provide HIARNG with comments on the Draft. HIARNG's contractor, TEC Inc., is responsible for compiling responses to public comments. Comments and responses from the public will be included in an Appendix and in a Draft FONSI, if that is the decision made.

Notice of availability of the combined Final EA and Draft FONSI is distributed by HIARNG in the same manner as the Draft EA. No action may be taken until the public 30-day review period is complete. Upon completion of the 30-day review period, and if it is a FONSI decision, the FONSI will be executed by HIARNG and the National Guard Bureau (NGB).

Additional information on public and government agency involvement is described in Section 5.

SECTION 2
PROPOSED ACTION AND ALTERNATIVES

The proposed action at Kalaeloa would enhance unit training, operations, and provide adequately-sized and configured facilities to support the mission of HIARNG. A list of projects was previously developed to address the needs of the HIARNG for facilities and infrastructure. Proposed actions are described in detail in this section; specific elements of the proposed action are described below in Section 2.1, while Section 2.2 summarizes alternatives to the proposed action, including the No-Action Alternative. The expected year of implementation is provided.

2.1 PROPOSED ACTION

2.1.1 Summary of Relocation and Previous Evaluations

HIARNG proposes to consolidate forces currently located at Fort Ruger and Wheeler AAF to the 150-acre parcel located at 91-1227 Enterprise Avenue in Kalaeloa, Hawaii. The units to be moved include all HIARNG Aviation units currently at Wheeler AAF, and the remaining JFHQ sections not already at Kalaeloa. The CSMS will also consolidate its operations at Kalaeloa. The specific units and numbers of individuals and vehicles or aircraft associated with each are described in Section 2.1.2 and Tables 2.1-2 and 2.1-4.

The proposed relocation of HIARNG units to Kalaeloa would consolidate various full-time and inactive duty reserve personnel to Kalaeloa. Full-time personnel, including civilians, are on-site during regular business hours, Monday through Friday. Reserve personnel are on-site between 38 and 63 days each calendar year for training purposes, including at least one weekend per month, and two consecutive weeks of training annually. The number of on-site days for a given unit varies according to training requirements; units deploying are required to be on-site for more training days. The aviation units would move 19 aircraft (18 helicopters and 1 fixed-wing aircraft) to Kalaeloa. A total of 58 additional wheeled vehicles and/or associated trailers would be moved to Kalaeloa.

The current HIARNG Kalaeloa facility was part of BPNAS that was officially closed in July 1999 as a result of the BRAC Act. Former BPNAS parcels are currently being redeveloped by Federal, state, and county agencies, as well as military and private organizations. BPNAS occupied 3,833 acres, of which 2,137 were declared surplus available for reuse and redevelopment (DoD 1999). The Record of Decision (ROD) for that Environmental Impact Statement (EIS) is provided in Appendix A.

The proposed action includes four phases of construction, Phase 1B through Phase 4, to coordinate with funding. Phase 1A has already been completed and its actions are not assessed in this document.

The HIARNG, in coordination with NGB, is committed to preparing updated NEPA analysis if any of the facilities analyzed in this EA are not constructed within five years of finalization of this document or if the proposed locations of the facilities change. The HIARNG would also prepare additional NEPA analysis if additional infrastructure is identified to support the facilities analyzed in the EA. When appropriate, NEPA documentation would be "tiered-off" of this EA, as long as projects are in direct support of the facilities in this EA. However, should a future, supplemental NEPA analysis be

appropriate, HIARNG will coordinate with NGB-ARE regarding future NEPA documentation requirements and the appropriate level of NEPA analysis.

The four phases (Phase 1A, 1B, 2, 3, and 4) include both renovation to existing facilities and new construction projects on the Kalaeloa parcel. The proposed action requires extensive construction, renovation, and demolition. Phase 1A and a portion of Phase 1B were completed prior to the preparation of the present EA, and were evaluated in a previous EA (HIARNG 2003a). The FONSI for that action is provided in Appendix A. These phases addressed the movement of an estimated 1,500 personnel in the following units:

- 29th Infantry Brigade Headquarters (now 29th IBCT);
- 29th Support Battalion (now 29th Brigade Support Battalion);
- 29th Military Intelligence Company (now the 29th Brigade Special Troops Battalion);
- 297th Firefighting Team;
- 12th Personnel Services Detachment (inactivating);
- Organizational Maintenance Shop #1 (now Field Maintenance Shop #1);
- Combined Support Maintenance Shop (CSMS) #1;
- United States Property and Fiscal Office;
- Medical Command (formerly Troop Command's Medical Detachment 4); and
- State Area Command units (now JFHQ-HIARNG).

Phase 1B is the relocation of CSMS #1 from Fort Ruger to Kalaeloa. This unit, although evaluated in the previous EA (HIARNG 2003), is being evaluated in this EA because they have not yet moved. Since the completion of the 2003 EA small changes have been made to the renovation plans for the western portion of Building 117 and Building 663 and these are also evaluated in this EA. Additionally, a new construction project (maintenance bays) is now planned for Phase 1B to accommodate this move. CSMS is authorized to have as many as 73 personnel, but currently has only 34 staff, all of whom would be relocated to Kalaeloa. The proposed CSMS personnel move, changes to Buildings 117 and 663, and the additional construction are the elements included under Phase 1B in the present EA.

Proposed construction, renovation, and demolition project phases are detailed in Table 2.1-1 and shown in Figure 2.1-1. The space and facility requirements were determined in accordance with NGR 415-10 Army National Guard Facilities Construction and NGB PAM 415-12, Army National Guard Facilities Allowances dated 30 Apr 07. Building shapes and specific placements in Figure 2.1-1 are conceptual and subject to modification during design, but placements of buildings relative to other buildings are accurate. The proposed action includes the renovation of twelve structures, demolition of two buildings, and the construction of seven new structures, plus parking for military- and privately-owned vehicles. While start dates of each planned action are listed, the schedules are subject to the availability of funding and are estimates of when construction might begin. The phases are described in greater detail in the next section and are not anticipated to occur concurrently given funding limitations, however some overlap may occur.

Table 2.1-1. Project Descriptions at HIARNG Site, Kalaeloa, Oahu, Hawaii

Description	*Action*	*Size (ft²)*	*Planned Action Start Date (pending funding)*
Phase 1B (Project #150077)			
Building 117 (western portion)	Renovation (plan changes since 2003 only)	90,000	2011
Building 117 Maintenance Bays	Construction	38,000	2011
Building 666	Demolition	3,648	2011
Building 663	Renovation (plan changes since 2003 only)	1,386	2011
Phase 2			
Brigade Readiness Center (Project #150043)	Construction	206,833	2011
Army Aviation Support Facility (Project #150023)	Construction	217,241	2012
Bird Bath and Fuel Storage	Construction	20,000 (estimate)	2013
JFHQ-HIARNG RC (Project #150301)	Construction	102,024	2012
Building 1903	Demolition	3,200	2014
Army Aviation RC, Building 282	Renovation	114,359	To be determined
RC Maintenance Bays Wash-rack	Construction	10,000 (estimate)	To be determined
Mail Distrib. Center (Building 175)	Renovation	3,110	2011
Civil Support Team	Construction	15,000	To be determined
Phase 3			
Motor Vehicle Covered Parking	Construction and Paving	165,000	To be determined
Gateway Improvements	Construction	< 10,000	To be determined
Phase 4			
Buildings 19, 46, 1784, 1785, 1786, 1787, 1788	Renovation	115,000	2010, 2011 thru 2015

2.1.2 Description of Specific Actions

2.1.2.1 Phase 1B

The proposed action includes construction and renovation to support the CSMS and movement of 34 CSMS personnel. It includes changes to the previous renovation plans for Building 117 that have been made since the original plans were evaluated in the HIARNG EA (2003), demolition of Building 666 and renovation of Building 663 (both are adjacent to Building 117) as an office for the CSMS, and the construction of new vehicle maintenance, paint, and body repair bays (Figure 2.1-1). A vehicle wash-rack would also be included in the new bays. Since Building 117 is eligible for listing on the National Register

of Historic Places, there would be coordination with the State Historic Preservation Officer (SHPO) regarding documentation of the proposed changes.

2.1.2.2 Phase 2

Phase 2 initiates relocation of the remaining JFHQ-HIARNG elements and aviation units of the HIARNG. Phase 2 includes the construction of the new JFHQ-HIARNG RC, the Brigade RC, and the AASF. New construction would strive to meet Leadership in Energy and Environmental Design (LEED) silver standards for energy savings and water savings and other green building design features. Various personnel, vehicles, and aircraft associated with these units would also move to Kalaeloa (Table 2.1-2). The civilian portion of full-time personnel would not report in times of emergency. Reserve personnel report one weekend per month, and many, although not all, report in times of emergency.

Brigade RC

The 29th IBCT currently operates from Building 1898; the 29th Brigade Support Battalion and 29th Brigade Special Troops Battalion currently operate from Building 282 at Kalaeloa. The current buildings are insufficient in critical space and are not configured to adequately accommodate unit requirements. The full requirement includes administrative, classroom, library, learning center, assembly hall, arms vault, kitchen, maintenance training bays and supply space. The Brigade RC project would support an full-time personnel and National Guard soldiers. No new full-time or part-time soldiers in the Brigade would need to move to Kalaeloa because they are already stationed there.

The proposed size of the Brigade RC building is 206,833 ft² and it would be located near the secondary gate (Figure 2.1-1). It would be built with a standing seam roof, concrete floors, and mechanical and electrical equipment with emergency power generator backup.

Supporting facilities would include military vehicle parking, access roads and POV parking, security fencing, motor pool lighting, vehicle-wash system and pump house, loading ramp, flammable materials storage building, controlled waste-handling facility and sidewalks. Extension of electric, sewer, water and communication utilities on Kalaeloa to the building site would be necessary. Physical security measures would be incorporated.

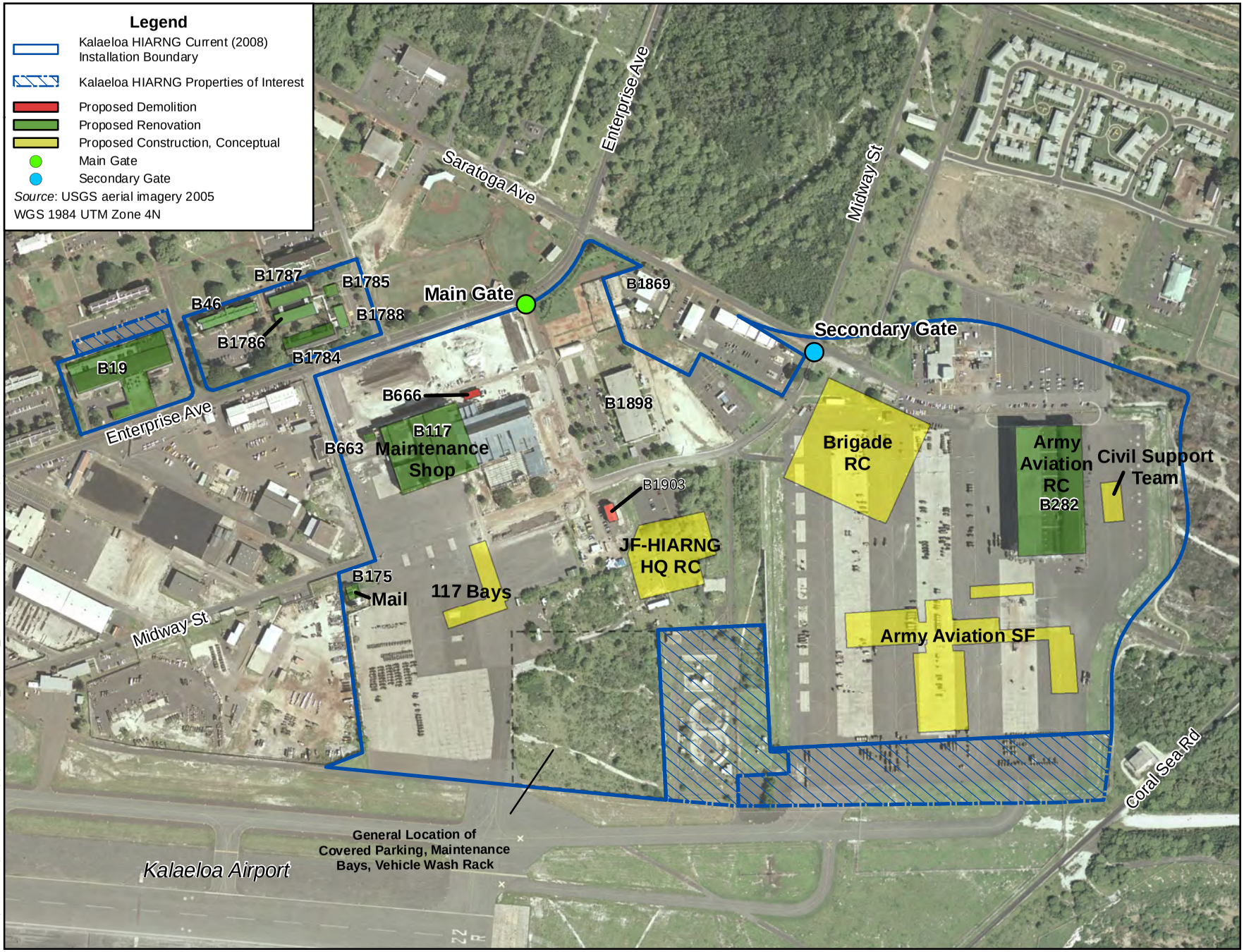

Figure 2.1-1
Proposed Action Buildings and Properties of Interest
Kalaeloa, Oahu, Hawaii
May 2010

Table 2.1-2. Relocation of Personnel, Vehicles, and Aircraft to Kalaeloa

Unit	*Full-Time Personnel Monday – Friday, includes civilians*	*Inactive Duty Reserve Personnel One weekend per month*	*Authorized Military Aircraft, Vehicles, Equipment*
Phase 2– HIARNG Aviation Units			
Company B, 1-171st Aviation	108	285	19 helicopters 1 fixed wing aircraft 4 military vehicles 12 fuel trucks 11 trailers
Detachment 1 Company D, 1-171st Aviation			
Detachment 1 Company E, 1-171st Aviation			
Detachment 1 Company C, 1-207th			
Company B (Detachments 1,2,3) 777th Aviation Support Battalion			
Operations Support Airlift Command – Detachment 55			
Headquarters Company 1-171st			
Aviation General Support Company			
297th Fire Fighting Engineers			3 vehicles
Civilian Aviation Team			
Phase 2 – HIARNG HQ and Miscellaneous Units			
G6 Command, Control, Communications, Information Technology	266	229	0
Recruiting and Retention Command			0
Facilities Management Office (FMO) (to include Environmental Office)			0
Mail Distribution Center			0
CERFP Chemical, biological, radiological, nuclear, explosive – Enhanced Response Force Package			22 Gov. vehicles 30 trailers
196th Training Support Battalion (USA)			17 (estimate)
196th Infantry Training Brigade (USA)			0
Joint Incident Site Communications Capability (JISCC)			0
Combined Support Maintenance Shop (CSMS)			2
Grand Totals	374	514	20 aircraft 58 vehicles

AASF #1 and Related Facilities

The proposed AASF #1 would serve the peacetime missions of the assigned units. The proposed 217,241 ft² AASF and supporting facilities (Figure 2.2-1) would adequately provide the units housed in this facility with hangar, operations, allied shops, aircraft storage, administrative space, simulation space, supply and tool rooms, classroom, locker, restrooms and maintenance space. All HIARNG aviation personnel who are currently located at Wheeler AAF would move to Kalaeloa under the proposed action (Table 2.1-4). This includes full-time staff who work weekdays and inactive duty reserve personnel who train one weekend per month and two weeks a year. Reserve personnel would not all train on the same weekend.

The units of the 1-171st (formerly B-193rd) Aviation Company that would be transferred to the Kalaeloa site currently have 12 authorized helicopters. Detachment 1 Company C 1-207th Aviation currently has five helicopters that would be relocated from AASF #2 at Hilo, Hawaii. The current Detachment 55 currently has one fixed-wing aircraft. The following summarizes the aircraft proposed for relocation to Kalaeloa:

- 12 Chinook helicopters (model CH-47D);
- 5 Blackhawk helicopters (models UH-60L and UH-60M); currently assigned to AASF #2 in Hilo, Hawaii;
- 2 OH-58 or UH72A helicopters; currently assigned to AASF #2 in Hilo, Hawaii; and
- 1 fixed-wing aircraft (model C-26E).

Although this is the total number of aircraft authorized, it is not typical for all of them to be on Oahu at the same time because there is not adequate space at Wheeler AAF to accommodate them. Currently the 5 Blackhawk helicopters and 2 OH58s are assigned to AASF #2 in Hilo, Hawaii but sometimes fly to Oahu for training with AASF #1. A total of eleven (11) bays are authorized and are included in the proposed design of the AASF. These include: one C-26 maintenance bay, one UH-72 maintenance bay, three UH-60 maintenance bays, and six CH-47 maintenance bays. Based on recent and historical information, estimates of flight activity are summarized in Table 2.1-3.

Table 2.1-3. Estimated Aircraft Flight Activity for the Proposed Action at Kalaeloa

Aircraft	*Average Flight Activity*	*Flight Times*
Twelve CH-47 Chinooks	• Routine flights –10-15 flight days per month (11 months per year) with an estimated 2-3 aircraft flying • Drill weekend (1 per month) flights –an estimated 2-3 aircraft flying for 5 periods from Friday to Sunday. • Drill month (usually June, or July) – 10 flight days with an estimated 4-5 aircraft flying during each of 3 periods.	• Routine flights at 0900, 1300, 1700, usually Tues-Thurs plus unscheduled maintenance test flights. • Drill weekend flights at 0700, 1300, 1700. • Drill month – various.
Five UH-60 Blackhawks	• Routine flights - flight frequency estimated at 12 flight days per month (11 months per year) with an estimated 1-2 aircraft flying. • Drill weekend (1 per month) flights –an	• Routine flights at 0900, 1300, 1700, usually Tues-Thurs plus unscheduled maintenance test

Aircraft	*Average Flight Activity*	*Flight Times*
	estimated 1-2 aircraft flying for 5 periods from Friday to Sunday. • Drill month (usually June, or July) – 10 flight days with an estimated 1-2 aircraft flying during each of 3 periods (note that during drill month additional units may come to Oahu from AASF #2 or AASF #1 units may travel to Hilo.	flights. • Drill weekend flights at 0700, 1300, 1700. • Drill month – various.
Two Light Utility Helo (OH-58 or UH-72)	• Used for counter-drug operations with flight numbers highly variable - an estimated average of 10-12 flight days per month for 2 aircraft.	Various
One C-26 Fixed Wing	• Single aircraft with highly variable mission-oriented use; operation estimated at 44 weeks per year with 5-35 flights per week.	Various

Note: Each flight can consist of multiple airfield operations (e.g., a touch and go).

Kalaeloa is located under the final approach path for Honolulu International Airport Runway 8L and is Class B Airspace. Aircraft visual flight rules are used for arrival and departure; approach and departure altitudes would be 800 feet.

Associated with the AASF would be construction of a helicopter wash facility ("bird bath"). Aircraft JP-8 fuel would be obtained offsite and stored in 2,500 – 5,000 gallon mobile tank trucks at the HIARNG Kalaeloa facility or in an above-ground storage tank meeting regulatory standards. Fuel trucks would be parked in a facility which would provide appropriate containment and/or diversionary structures or equipment to prevent a discharge to the environment. Fuel needs are estimated at 25,000 – 35,000 gallons per month.

JFHQ-HIARNG RC

The JFHQ-HIARNG unit is currently located in buildings 306/306A and 300/300A at Fort Ruger, and in buildings 1784, 1785, and 1788 at Kalaeloa. Existing building sizes are summarized in Section 1.2. The JFHQ-HIARNG unit is authorized for 102,024 ft² of space. The current split operations are inefficient and adequate facilities do not exist at either location. Presently, there are both full-time personnel (FTE) and National Guard soldiers at the Kalaeloa facility. However, HIARNG personnel and units are also located at Fort Ruger in Diamond Head and would move to Kalaeloa under the proposed action. Including other miscellaneous units this includes 266 full-time staff and 229 inactive duty reserve personnel who would undertake weekend training at Kalaeloa (Table 2.1-4). Not all reserve personnel would train on the same weekend.

Table 2.1-4. Number of Personnel Authorized to be Located at Kalaeloa, Hawaii

	Full-Time Employee's (FTE) Monday - Friday including civilians	*National Guard Reserve Personnel (RP) One weekend per month for training*	*Total Personnel*
Fort Ruger - Diamond Head	266	229	495
Wheeler AFB -AASF	108	285	403
Total Personnel Relocating	374	514	898
Presently at Kalaeloa	530	654	1484
Total After Relocation	904	1468	2382
Percentage Relocating	**41%**	**35%**	**37%**

The proposed JFHQ-HIARNG RC building of 102,024 ft² would consist primarily of staff offices that are only administrative in function, as well as a typical assembly hall, equipment supply and storage, classrooms and other training space. This facility would also house the Recruiting and Retention Command. The proposed location is shown in Figure 2.1-1.

The new JFHQ-HIARNG HQ exterior building materials would consist of masonry and insulated metal panel wall systems with energy efficient, low-energy insulated window glazing systems. The primary roof system would be a combination of flat roof and pitched standing seam metal roof assemblies. The supporting program for the facility would include POV parking, military vehicle parking, maintenance training bay, a controlled waste handling facility, flammable material storage, and security fencing/landscaping where required. Extension of all required electric, water, and telecom utilities on the station to the new building location would be required for the new construction in order to bring the existing utilities up to current building code standards. The primary physical security measures would include required standoff distances from vehicular roads, existing facilities, and parking areas. It would not require separate fencing around the facility, except for military vehicle parking. Cost-effective energy conservation features would be incorporated into design. Building 1903, totaling 3,200 ft² in area, is within the footprint of the proposed building and would be demolished.

Army Aviation RC and Building 282

An Army Aviation RC requires administrative, classroom, supply, maintenance training, kitchen, and assembly space. It would be used primarily for training but could also be used during the evenings for family support activities. Personnel that would use the RC have been previously described under the AASF. Building 282 is being considered for use as the Aviation RC. The proposed 117,004 ft² Army Aviation RC (Figure 2.1-1) would support the 297th Firefighters, the Medical Command, Company B, C and D-171st Aviation units, Company C 207th Aviation unit, the Aviation General Support Company, Company B 777th Aviation, HHC 171st Aviation unit, and Joint Incident Site Communications Capability (JISCC). Building 282 was built in 1958 and served as a fueling and maintenance hangar. A Historic Building Survey (E2M 2009) found Building 282 to represent an outstanding example of the type, period, and method of construction that is particular to the Navy during the Cold War. However, this building does not currently meet the operational and space requirements for RCs or the AASF and requires continual maintenance.

Building 282 currently serves as a temporary Brigade RC, Special Troops Battalion RC, and Brigade Support Battalion RC. The building would undergo minor renovations until a permanent structure is built, but would eventually be used for the Aviation RC if it can be renovated to meet the operational needs of the Aviation RC. The minor renovations required for the building to serve as the Aviation RC are evaluated in this EA. However, if Building 282 can't be sufficiently renovated for these needs, a new structure may be necessary. Pending structural and feasibility studies at a later date, a decision would be made whether it can be fully renovated to meet the operational needs of the Aviation RC. Future decisions based on structural and feasibility studies for re-use would be evaluated with appropriate NEPA and State environmental impact documentation and there would be appropriate coordination with the SHPO.

Combined Support Maintenance Shop (CSMS)

A previous EA addressed (HIARNG 2003) the movement of various HIARNG units, including moving the Combined Support Maintenance Shop #1 (CSMS). The CSMS has not completed its move from Fort Ruger in the Diamond Head area to Kalaeloa. The Proposed Action in this EA includes the second phase of renovations to Building 117 to accommodate CSMS and provide additional maintenance bays for vehicles. The improvements would eliminate the need for some vehicles to travel from Kalaeloa to Fort Ruger for service, as is presently the case, and would improve overall operational efficiency of the CSMS unit. Although authorized to have 73 personnel on staff relocate to Kalaeloa, the CSMS unit presently has 34 staff, all of whom are anticipated to relocate to the consolidated facilities at Kalaeloa.

Miscellaneous Facilities and Personnel

Other new buildings to be constructed would include an addition to the Civil Support Team building behind Building 282, a new Controlled Humidity Preservation building in the southwestern portion of the site, and a Mail Distribution Center in renovated Building 175 in the southern portion of the site (Figure 2.1-1). Personnel associated with these miscellaneous units would primarily be relocating from Fort Ruger to Kalaeloa.

2.1.2.3 Phase 3

Phase 3 consists of approximately 165,000 ft² of covered military-owned vehicle parking in the southern portion of the facility (Figure 2.1-1). At the primary entrance to the Kalaeloa site there would be re-landscaping, removal of extraneous temporary structures, and the addition of security guard shack and force protection structures in an aesthetically pleasing formation to provide an attractive gateway to the facility.

2.1.2.4 Phase 4

Phase 4 includes the minimal renovation of buildings 19, 46, 1784, 1785, 1786, 1787, and 1788.

- Building 19 would retain its original purpose, serving as a mess hall, kitchen, gym and physical fitness center.
- Building 46 is being used temporarily to house the Medical Command and would revert to barracks when permanent RC unit space is constructed.
- Buildings 1784, 1785 and 1788 are being temporarily used to house JFHQ-HIARNG and would revert to barracks once a permanent RC is constructed.

- Buildings 1786 and 1787 are currently used to house participants in the Hawaii National Guard Youth Challenge Program, which would not change.

The buildings that would revert back to billeting once construction is complete would house neighbor island troops when they are on-site for training activities.

2.1.3 Other Properties of Interest

HIARNG is in the process of evaluating the potential to secure the use of several parcels adjacent to Kalaeloa (Figure 2.1-1) to increase available usable space, help to meet force protection requirements for locating buildings, and gain access to the airport runway. Use would be secured through a lease or written agreement. Use of the following three parcels is considered part of the action proposed in this EA.

- Former Navy Fuel Storage Facility – Currently owned by the Navy, this parcel located southwest of the AASF in the proposed action area is the planned site of the central aircraft wash-fuel facility, also called the bird bath. This site contains the following small buildings or structures including building numbers: pumping station, 169; sanitary disposal building, 1852; JP-5 truck fill stand, 1857; MoGas truck fill stand, 1858; diesel truck fill stand, 1859; fuel office, 1860; MoGas/AVGas pump shed, 1863; JP-5 pump shed, 1866; refueller fill stand, 1948; and pump house,1949. The use of this parcel by HIARNG for these activities is currently being negotiated with Hawaii Department of Transportation who has requested acquisition of the parcel from the Navy.
- Access to the Kalaeloa Airport Runway – This area includes paved and grass areas adjacent to the Kalaeloa Airport. It is currently owned by the Hawaii Department of Transportation (DOT) and is not used. HIARNG would use it for access to the airport runway. DOT will provide HIARNG with a Right-of-Entry, lease, easement, or other form of access to use and share DOT's access road to the Kalaeloa Airport Runway.
- Parking Lot Adjacent to Building 19 – The parking lot adjacent to Building 19 is currently owned by the Housing and Community Development Corporation of Hawaii (HCDCH); HIARNG has no parking space associated with their building.

Acquisition or lease of the following single parcel is not considered part of the proposed action; however, the proposed action would be compatible with this acquisition or lease. Any future action specific to this parcel would be evaluated in a separate NEPA action, as necessary.

- Building 1869 (Former Hobby Shop) Parcel - The Navy has recently transferred the Building 1869 parcel to Hunt Properties. This property approaches within 80 feet of HIARNG Building 1898. Acquiring this property would enhance force protection by providing stand-off from other facilities.

2.2 ALTERNATIVES TO THE PROPOSED ACTION

2.2.1 Planning and Alternatives Selection

NEPA requires that alternatives to a proposed action are considered as part of the environmental impact analysis process. Proposed alternatives must be viable options that are available to meet the objectives of the proposed action. The purpose of this proposed action is to consolidate HIARNG units and to provide sufficient space for operations, maximizing the efficiency of HIARNG operations.

As discussed in Section 1.2, this project has been in the planning stage for many years. A feasibility study and conceptual study were completed in 1998 (Earth Tech 1998a, 1998b). In 2007, project planning charrettes were conducted to establish project requirements and develop concepts and cost estimates for the JFHQ-HIARNG RC and the AASF #1 (Jacobs 2007, 2008). Three separate locations and building configurations were developed for review during the charrette. The results are reviewed in Section 2.2.2 of this EA. Building configurations were evaluated in the AASF charrette and the preferred layout is used for the proposed action and Alternative 1. Additional requirements, unit locations, and site layouts were evaluated internally subsequent to the charrettes and are explained in Section 2.2.2.

2.2.1.1 Project Site Alternatives Not Carried Forward

Alternative sites for the proposed action have been sought at length, but no viable alternative has been identified. A key requirement is the need for an operational airfield to support the HIARNG mission. Alternatives considered and basic facility constraints are summarized in Table 2.1-5 and are further described below.

Fort Ruger. The existing JFHQ facility, located at Fort Ruger, near Diamond Head Crater, currently has an Armory building, warehouses, storage facilities, a state maintenance motor pool facility and parking. The site measures 10.5 acres, and there is no room to expand in any direction. HIARNG is also required to vacate the inside of Diamond Head crater because the Governor has designated the area as a State Monument. It is the TAG's plan to keep the primary HIARNG and DoD Headquarters at the 3949 Diamond Head Road facility, expanding the State Civil Defense Emergency Operation Center once the HIARNG vacates. Many of HIARNG's operations are currently located at Kalaeloa and it would be much more efficient if the other Oahu HIARNG units were also located there, since there is sufficient space and access to the Kalaeloa airfield. The Fort Ruger site does not allow sufficient space for consolidated facilities that would meet all HIARNG requirements, nor does the surrounding neighborhood and infrastructure support the traffic, both vehicular and air, that would be required. Helicopter noise complaints would be likely if helicopter landings were proposed in the area.

Fort Shafter. The Funston Family Housing Area at Fort Shafter was considered as a potential site for a JFHQ RC, but was deemed to have inadequate space, constraints from historic areas, and high demolition costs. The site consists of 11 acres situated on top of a steep knoll just east of Honolulu International Airport. After force protection standoffs were accounted for, only 3.4 acres would remain for development by the HIARNG. In addition, the land can only be accessed via one road, due to the topography of the site, making it potentially difficult to access during emergency. The topography of the site also limits the potential for helicopter landing.

Wheeler Army Airfield. Wheeler AAF houses the current AASF #1 and Army Aviation RC. Expansion to meet HIARNG aviation requirements was evaluated at Wheeler AAF, however Wheeler Army officials have stated there is no land available for expansion for HIARNG, nor does the current Master Plan for Wheeler AAF include any expansion for HIARNG operations. In addition, there are flood problems at the HIARNG Wheeler AAF facilities that hinder aviation.

Kaneohe Marine Corps Base Hawaii. The Marine Corps Base Hawaii (MCBH) was considered and rejected as a viable alternative site for the aviation units because it is used by the Marine Corps and Navy, and there is not enough space available to support the combined HIARNG units.

Hickam Air Force Base. Hickam AFB does not have additional space for the HIARNG facilities, nor does it have the capacity for the increased traffic of additional units.

Bellows Air Force Station. 1,500-acre Bellows Air Force Base, heavily used in World War II, is currently a training area for the U.S. Marine Corps and a portion is used as a recreational area. Runways, required for the fixed wing aircraft, have deteriorated beyond use. There is no air traffic control facility at Bellows, a requirement for daily helicopter operations.

Keaukaha Military Reservation, Hilo. The Hilo facility is on a month-to-month rental basis, has very limited space, and has generated noise complaints at its current size. The majority of units reside on Oahu, making a move off-island to Hilo, Hawaii difficult for soldiers with families.

Dillingham Air Field. Dillingham Air Field does not have an air traffic control facility, which is a requirement for daily helicopter operations. Currently it can only be used during fair weather, because there is no instrument approach. There would be noise concerns for the local community.

Table 2.2-1. Screening of Alternative and Preferred Sites for HIARNG Relocation in Hawaii

Site	*Operational Airfield*	*Noise Issues*	*Traffic or Access Issues*	*Sufficient Space Available for Expansion*	*Considered Further in Analysis*
Kalaeloa (preferred site)	Yes	No	Yes	Yes 150 acres	Yes
Fort Ruger	No	Yes	Yes	No 10.5 acres	No
Fort Shafter	Limited	No	Yes	No 3.4 acres	No
Wheeler Army Airfield	Limited due to flooding	No	No	No 0 acres	No
Kaneohe Marine Corps Base Hawaii	Limited	No	No	No 0 acres	No
Hickam Air Force Base	Yes	No	Yes	No	No
Bellows Air Force Station	Limited	No	No	No	No
Keaukaha Military Reservation, Hilo	Limited	Yes	No	Limited	No
Dillingham Air Field	Limited	Yes	No	Limited	No

2.2.2 Alternative 1 – Consolidate Units in a Revised Configuration at Kalaeloa, Oahu

Based on the evaluation of potential sites for consolidation of the HIARNG, Kalaeloa proves the most practical and economically feasible, and is the only location that meets the purpose and need for the various projects. A viable alternative to the proposed action is a revised configuration of the facilities within the same 150-acre site at Kalaeloa as the proposed action. Alternative 1 would move the AASF to the southwest corner of the HIARNG parcel, closer to the runways (Figure 2.2-1). To relocate the AASF, other structures would have to be relocated as well. The Army Aviation RC would be co-located with the AASF to facilitate travel to and from aircraft. The JFHQ-HIARNG RC would shift north, taking the location of the Brigade RC in the proposed action. The Brigade RC would shift southeast. The motor

vehicle parking and associated maintenance bays would shift to the location of the AASF in the proposed action. Building shapes and specific placements in Figure 2.2-1 are conceptual and subject to modification during design but placements of buildings relative to other buildings are accurate.

Advantages of Alternative 1 include:

- Moves aircraft noise farther from nearest residential areas, which are located north of the parcel; and
- Reduces motor vehicle traffic within the HIARNG site, as primary motor vehicle parking would be closer to RCs.

Disadvantages of Alternative 1 include:

- The location of the JF HQ is not in the centrally-located preferred site; and
- Building 282 cannot be efficiently used under this alternative; it would remain but its use would be limited and upkeep and maintenance are required.

2.2.3 No-Action Alternative

NEPA guidelines require the analysis of a No-Action Alternative. The No-Action Alternative is the baseline against which potential impacts of the Proposed Action are measured. Under the No-Action Alternative, the proposed construction and renovation projects at Kalaeloa would not be implemented. The JFHQ-HIARNG locations would continue to be split between at an inadequate facility at Diamond Head, and the old Navy barracks at Kalaeloa, Oahu, Hawaii. Combined, these facilities provide 83,330 ft² as opposed to the 102,024 ft² authorized, resulting in an 18,694 ft² shortfall. A new Brigade RC would not be built resulting in inadequate facilities for training and deploying troops. The AASF #1 and Army Aviation RC would remain at WAAF, with inadequate space for training, flight operations, and proper maintenance of aircraft. Presently, the AASF#1 uses 44,000 ft² compared to 217,000 ft² necessary, a shortfall of 173,000 ft². Lack of appropriate space to house aircraft puts the airframes, equipment and aircrews at risk of loss due to weather and component failures. Numerous deficiencies at existing Kalaeloa buildings would result in high maintenance costs and reduced force readiness.

If the proposed action is not implemented, current inefficient operations of the HIARNG would continue due to the separate locations of the various units of HIARNG on Oahu. Inadequate space would continue to constrain operations, training and preparedness. Inadequate mission support at both Federal and state levels would result.

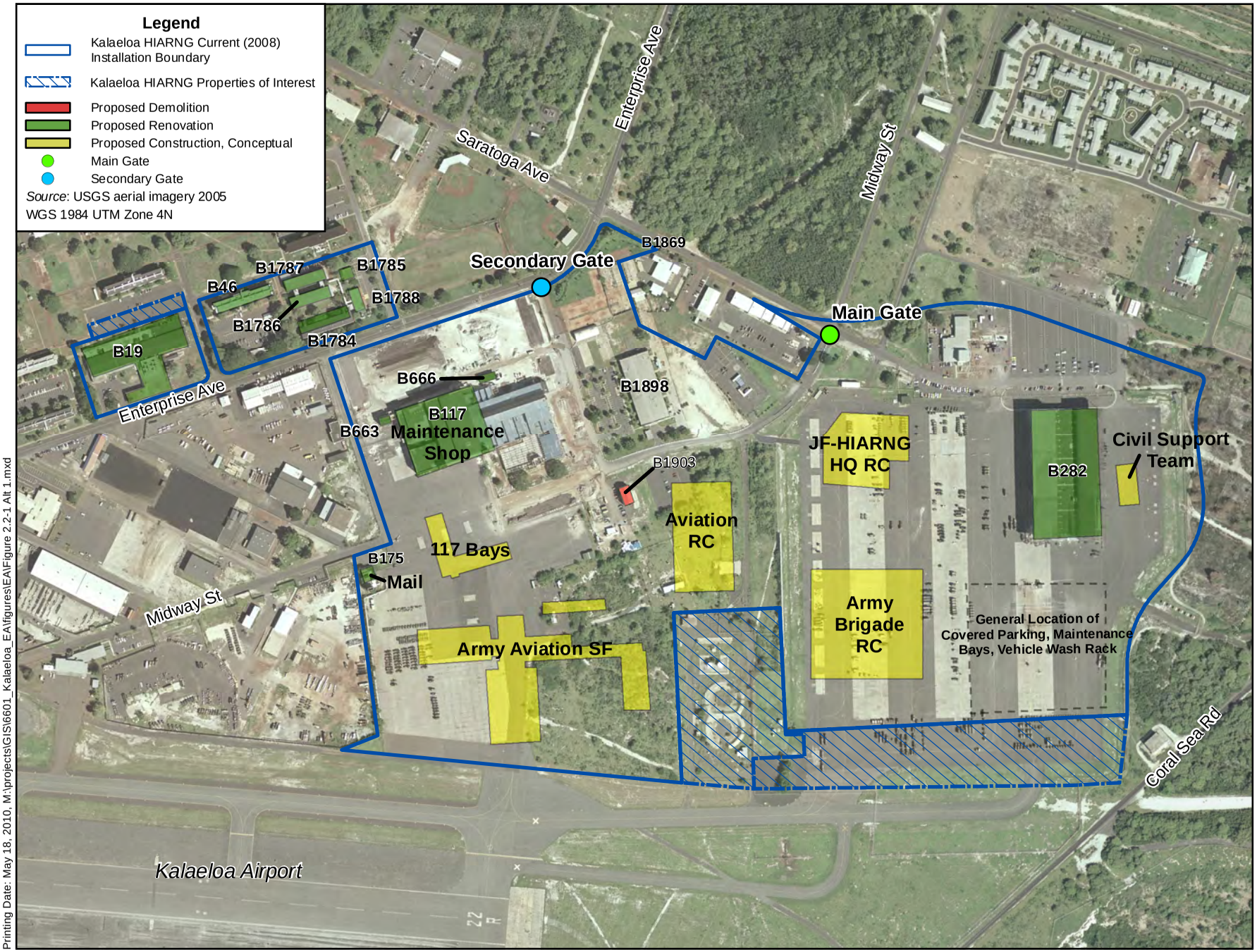

Figure 2.2-1
Alternative Action Buildings and Properties of Interest
Kalaeloa, Oahu, Hawaii
May 2010

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SECTION 3
AFFECTED ENVIRONMENT

This section describes relevant existing conditions for resources potentially affected by the Proposed Action and alternatives described in Section 2. Information presented in this section represents the environmental baseline against which the proposed action is compared in Section 4 to identify potential impacts. Descriptions of the affected environment are provided for the following resources: land use, air quality, noise, geology and soils, water resources, biological resources, cultural resources, socioeconomics and environmental justice, transportation, hazardous materials and wastes, airspace, utilities and public services, and aesthetics. The following subsections provide a definition of each resource, a description of the associated region of influence (ROI) in which potential impacts would occur, and existing conditions within the associated ROI for each resource.

3.1 LOCATION DESCRIPTION

HIARNG facilities constitute approximately 150 acres within the former Barber's Point Naval Air Station. The BPNAS is located at 16 miles west of Honolulu and south of Kaploei.

3.2 LAND USE

3.2.1 Definition of Resource

Land use comprises the natural conditions and/or human-modified activities occurring at a particular location. Human-modified land use categories include residential, commercial, industrial, transportation, communications and utilities, agricultural, institutional, recreational, and other developed use areas. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas. The ROI for land use includes the Kalaeloa 150-acre parcel and its immediate vicinity within approximately 1.5 miles.

3.2.2 Existing Conditions

3.2.2.1 Historic Land Use

BPNAS was acquired by the U.S. Navy in 1941 from Campbell Estate for the purpose of building a Marine Corps Airstrip. Prior to 1941, the land at Kalaeloa was primarily agricultural; sugar cane and sisal were cultivated prior to James Campbell's lease of the land to the Navy (US Navy 1992). The bombing of Pearl Harbor in December of 1941 led to the rapid completion of BPNAS, which was designed to support 4,000 troops, 450 officers and 1,200 civilian workers (US Navy 1992). For over fifty years, BPNAS used the property to support aviation operations, industrial activities, aircraft maintenance, training, fueling and waste handling. At one point it was believed that Barbers Point controlled more take-offs and landings in a 24-hour period than any other air field in the world, supporting 10,000 military members (Denfeld 1995 as sited in HIARNG 2008). A view of the BPNAS and vicinity in 1983 is shown in Figure 3.2-1.

In 1993, the BRAC Commission recommended the closure of BPNAS, and in July 1999, the base was closed down and renamed Kalaeloa. The Navy retained portions of the facility but they have been

gradually transferring it to other Federal, state, and county agencies (see Section 3.2.2.3 for additional information).

Figure 3.2-1. 1984 Aerial Photo of HIARNG Kalaeloa Facility

3.2.2.2 Regional Land Use

Upon closure of BPNAS in 1999, plans were developed to guide future development in the area. In 2002 the Hawaii state legislature transferred responsibility for Kalaeloa to the Hawaii Community Development Authority (HCDA). HCDA prepared a Master Plan for redevelopment of Kalaeloa that was approved by the HCDA Board and the Governor in 2006 (HCDA 2006). The Master Plan was developed to further guide land use and coordinate Federal, state, government, and private developers with the community (HCDA 2006). The Master Plan envisioned areas of mixed use including residential, an airport, light industrial, eco-industrial, military, institutions, open space, parks, and recreation. Areas surrounding Kalaeloa are mixed use industrial, commercial, residential and urban. Campbell Industrial Park (CIP), the island's largest industrial area, is located west of Kalaeloa. In this area is also Barbers Point Harbor. Immediately adjacent to the southwestern portion of the subject site is the Kalaeloa Airport runway (Figure 3.2-2). To the south of the subject site the United States Coast Guard Reservation encompasses 44 acres. To the north and east, residential developments are present just beyond areas that may have had infrastructure in the past but are currently overgrown with vegetation.

Housing in the Ewa area has been rapidly increasing since the closure of the Oahu Sugar Company in the early 1990's. Several former military housing developments are located within the former BPNAS boundary (HCDA 2006). Approximately 70,000 people currently reside just east of Kalaeloa, many of them along Fort Weaver Road (HCDA 2006) in the area historically used for sugar cane cultivation. Numerous housing developments with some portion within approximately one mile are located to the north and east of the HIARNG Kalaeloa facility including City of Kapolei and Villages of Kapolei to the North, and Ewa Villages, Ewa Gentry Makai, and Ocean Pointe to the east. Other developments in the vicinity include Ko Olina Resort and Marina and municipal and private golf courses.

The entire former BPNAS still remains zoned F-1, Federal and Military Preservation District. Areas outside the former BPNAS are zoned for a mixture of residential, commercial, and open space (Figure 3.2-3). The Ewa Development Plan was created in August 1997 by the City and County of Honolulu Planning Department. It has since been updated with the most current version a public review draft (DPP 2008). The Ewa Development Plan guides land use in the greater area surrounding Kalaeloa. The intent of the Ewa Development Plan is to provide for open space and regional and community parks and recreation, manage cultural resources, develop the City of Kapolei, and guide both residential and non-residential development.

3.2.2.3 Land Ownership

Since the BRAC new legislation has allowed the Navy to sell land at Kalaeloa (former BPNAS) to private owners in addition to transferring to other government agencies (HCDA 2006). As of 2006, 25% (929 ac) of the former Barber's Point was retained by the Navy, 44% (1,621 ac) was conveyed to government or private owners, and 31% (1,146 ac) remained pending conveyance (HCDA 2006). Land transferred also includes private housing and commercial leasing areas (see Appendix B for specific information on parcel ownership within Kalaeloa).

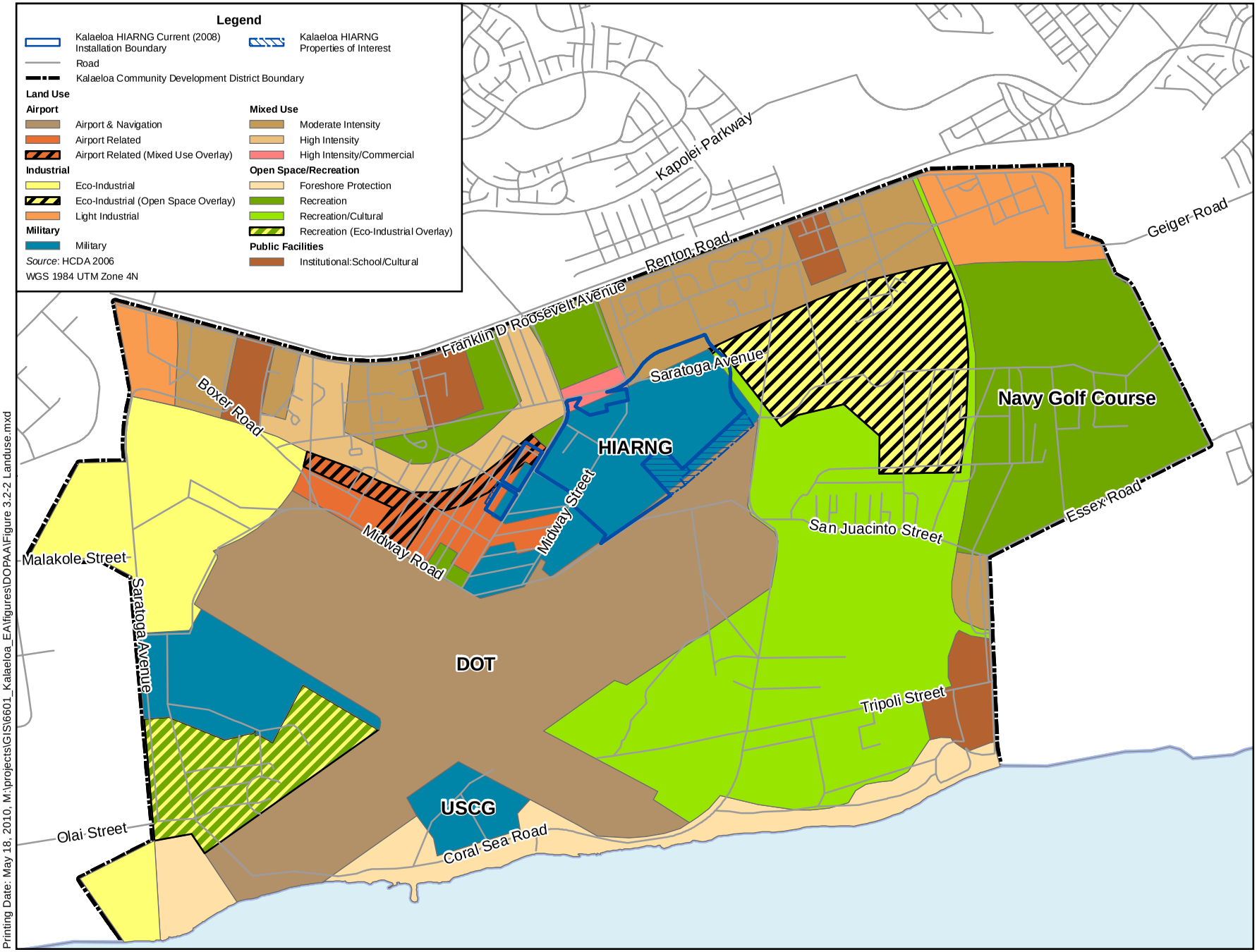
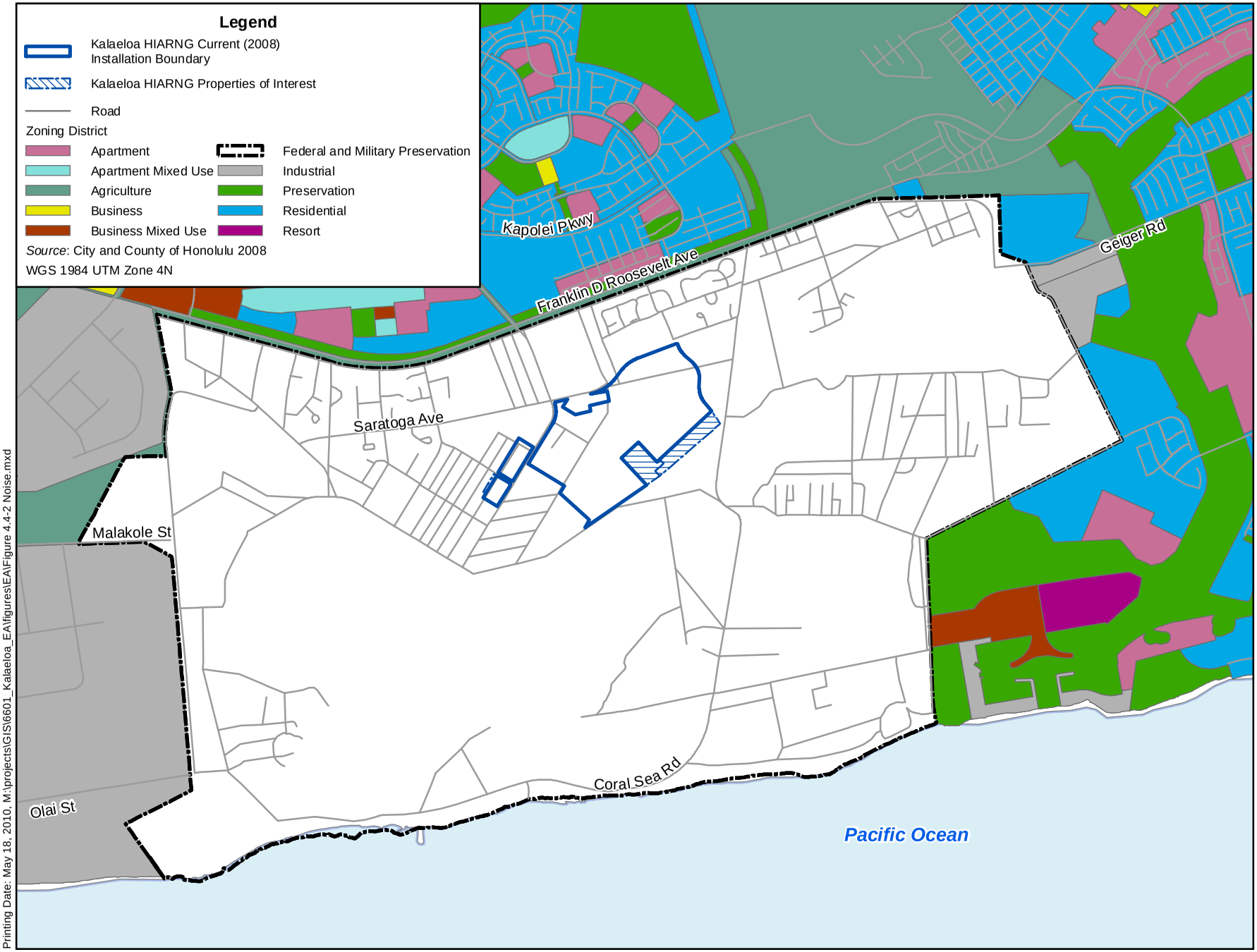


Figure 3.2-2
Kalaeloa Land Use
Kalaeloa, Oahu, Hawaii
May 2010



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Feet
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Figure 3.2-3
Ewa Zoning
Kalaeloa, Oahu, Hawaii
May 2010

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3.2.2.4 Coastal Zone Management

The Coastal Zone Management Act (CZMA) was enacted on October 27, 1972, to encourage coastal states to be proactive in managing natural resources for the public's benefit. The CZMA recognizes the importance of balancing the competing uses of cultural, natural and recreational resources within the coastal zone. Federal consistency (codified at 15 CFR 930) is the CZMA requirement that Federal actions that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources, or coastal effects) must be consistent with the enforceable policies of a coastal state's federally-approved Coastal Management Program.

Under the Hawaii Coastal Zone Management Program (CZMP) authorized by HRS Chapter 205A, all lands and state jurisdictional waterways are within the coastal zone in recognition of the inherent link between land and sea. The CZMP provides guiding principles for the design and implementation of allowable land and water uses and activities throughout the state. Areas in close proximity to the shoreline are designated as Special Management Areas (SMAs) and regulated locally. Any action within the SMA may require a permit with conditions that help avoid, minimize or mitigate adverse impacts to coastal resources. While the coastline along Kalaeloa is part of the SMA, HIARNG's Kalaeloa facility is not within theSMA boundary. Thus, an SMA permit is not required; however a CZM consistency determination will be required prior to the initiation of project construction and/or renovation activities.

3.3 AIR QUALITY

This section addresses baseline air quality conditions for the project area and includes a description of air quality terminology, regulatory requirements applicable to the proposed alternatives, and current air quality conditions.

3.3.1 Definition of Resource

Air quality is defined as the ambient air concentrations of specific criteria pollutants determined by the U.S. Environmental Protection Agency (USEPA) to be of concern to the health and welfare of the general public. These criteria pollutants include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), particulate matter less than 10 microns in diameter (PM_{10}), and lead. Both the Federal government and the Hawaii Department of Health have established ambient air quality standards (National Ambient Air Quality Standards [NAAQS] and Hawaii Ambient Air Quality Standards (HAAQS), respectively) for several criteria pollutants (Table 3.3-1). These standards identify the maximum allowable concentrations of criteria pollutants that are considered safe, with an additional adequate margin of safety to protect human health and welfare. The state standards for CO and NO_2 are more stringent than the NAAQS. The Hawaii Department of Health has also adopted an ambient air quality standard for hydrogen sulfide (H_2S).

Air quality within a region is a function of the type and amount of pollutants emitted, size and topography of the air basin, and prevailing meteorological conditions. Criteria pollutants affecting air quality in a given region can be characterized as being either stationary or mobile sources. Stationary sources of emissions are typified by emissions from smokestacks. Mobile sources of emissions include emissions from cars and aircraft.

Table 3.3-1. National and Hawaii State Ambient Air Quality Standards

Pollutant	*Averaging Time*	*Hawaii AAQS*	*National AAQS*	
			Primary	*Secondary*
Carbon Monoxide	8 hour	4.4 ppm (5 mg/m^3)	9 ppm (10 mg/m^3)	--
	1 hour	9 ppm (10 mg/m^3)	35 ppm (40 mg/m^3)	--
Lead	Rolling 3-Month Average	--	0.15 µg/m^3	Same as Primary
	Quarterly Average	1.5 µg/m^3	1.5 µg/m^3	Same as Primary
Nitrogen Dioxide	Annual (Arithmetic Mean)	0.04 ppm (75 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary
Particulate Matter (PM_{10})	Annual (Arithmetic Mean)	50 µg/m^3	--	--
	24-hour	150 µg/m^3	150 µg/m^3	Same as Primary
Particulate Matter ($PM_{2.5}$)	Annual (Arithmetic Mean)	--	15.0 µg/m^3	--
	24-hour	--	35 µg/m^3	--
Ozone	8-hour	0.08 ppm (157 µg/m^3)	0.075 ppm (147 µg/m^3)	Same as Primary
Sulfur Dioxide	Annual (Arithmetic Mean)	0.03 ppm (80 µg/m^3)	0.03 ppm (80 µg/m^3)	--
	24-hour	0.14 ppm (365 µg/m^3)	0.14 ppm (365 µg/m^3)	--
	3-hour	0.5 ppm (3,000 µg/m^3)	--	0.5 ppm (3,000 µg/m^3)
Hydrogen Sulfide	1-hour	0.025 ppm (35 µg/m^3)	--	--
Note: HAAQS = Hawaii Ambient Air Quality Standards; NAAQS = National Ambient Air Quality Standards				

Emissions are often characterized as being "primary" or "secondary" pollutants. Primary pollutants are those emitted directly into the atmosphere such as CO, SO_2, $PM_{2.5,}$ and PM_{10}. Secondary pollutants are those formed through chemical reactions in the atmosphere such as O_3 and NO_2. Volatile organic compounds (VOCs) (also referred to as hydrocarbons or reactive organic gases) are precursors to the production of ozone ($O_{3)}$. SO_2 and NO_2 are commonly referred to and reported as oxides of sulfur (SO_x) and oxides of nitrogen (NOx), respectively, as SO_2 and NO_2 constitute the majority of their respective oxides.

Areas that violate ambient air quality standards are designated as nonattainment areas. Nonattainment designations for O_3, CO, $PM_{2.5}$, and PM_{10} include subcategories indicating the severity of the air quality problem (e.g., the classifications range from moderate to serious for CO and PM_{10}, and from marginal to severe for O_3). Areas that comply with Federal air quality standards are designated as attainment areas. Areas that have been re-designated from nonattainment to attainment status are designated as maintenance areas. Areas that lack monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are considered to be in attainment for regulatory purposes.

3.3.1.1 Regulatory Setting

The Federal Clean Air Act (CAA) of 1970 and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The State of Hawaii Department of Health enforces air pollution regulations and sets guidelines to maintain the NAAQS and HAAQS within the State of Hawaii.

Section 176(c) of the 1990 CAA Amendments contains the General Conformity Rule (40 CFR 51.850-860 and 40 CFR 93.150-160). The General Conformity Rule requires any Federal agency responsible for an action in a non-attainment or maintenance area to determine that the action conforms to the applicable State Implementation Plan (SIP). This Rule only applies to Federal actions located in Federal non-attainment or maintenance areas. Because the Kalaeloa HIARNG facility is located in an attainment area, the Proposed Action would not be required to undergo a review under the General Conformity Rule. However, other aspects of the Federal Clean Air Act requirements apply to HIARNG facilities at Kalaeloa and all sources of air emissions are subject to the requirements of the CAA.

3.3.1.2 State Requirements

As discussed above, the State of Hawaii Department of Health is the state agency that administers the CAA requirements. The Department of Health regulates stationary sources of air pollutants and issues permits for facilities. Permits typically allow for emission limitations and require monitoring of emissions and/or compliance demonstrations. The state does not regulate mobile sources such as aircraft, ground vehicles, or ground support equipment; however, these sources must meet Federal standards as required if implemented under the CAA.

3.3.2 Existing Conditions

3.3.2.1 Climate and Meteorology

The Kalaeloa area has relatively constant day lengths, solar irradiance, and temperatures. Data from the Western Regional Climate Center (WRCC 2009) are available for the U.S. Magnetic Observatory (the closest climate monitoring station to the site) for the period from 1949 to 1960. Based on these data, the average annual maximum temperature in the region is 83.7°F, and the average annual minimum temperature in the region is 65.4°F. August is the warmest month with an average maximum temperature of 87.2°F. The month with the lowest average minimum temperature is January at 61.4°F.

The annual average precipitation in the region is 20.4 inches. Most of the precipitation at Kalaeloa occurs during the winter season, from October through March. January is the wettest month, with an average rainfall of 4.5 inches.

The winds at Kalaeloa fall into seasonal patterns, with the dominant prevailing winds coming from the northeast or east-northeast direction (i.e., trade winds). These winds occur more than 70% of the time during the year. In the winter season, winds from the southwest (Kona winds) are generated from a low pressure center located northwest of the Hawaiian Islands. Kona winds tend to bring stormy conditions and rain. Winds typically vary between 5 and 15 miles per hour in the area.

3.3.2.2 Baseline Air Quality

Existing air quality in the Kalaeloa area is monitored by the State of Hawaii Department of Health. The State operates air quality monitoring stations at various locations on Oahu.

Each station, however, typically does not collect monitoring data for all criteria pollutants. The closest monitoring station to the site is located in Kapolei, and measures CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2. The nearest monitoring stations to the project site that measures O_3 are on Sand Island near Honolulu.

Representative air quality data for Kalaeloa for the period 2004-2008 are shown in Table 3.3-2. As shown in the table, the area meets both the HAAQS and NAAQS for all pollutants.

Table 3.3-2. Representative Air Quality Data for Kalaeloa (2004-2008)

Air Quality Indicator	*2004*	*2005*	*2006*	*2007*	*2008*
Ozone (O_3)[3]					
Peak 8-hour value (ppm)	0.056	0.046	0.042	0.036	0.050
Days above Federal standard (0.075 ppm)[2, 5]	0	7	1	3	6
Carbon monoxide (CO)[1]					
Peak 1-hour value (ppm)	2.1	1.5	1.4	3.8	1.7
Days above state standard (9 ppm)	0	0	0	0	0
Peak 8-hour value (ppm)	0.8	0.9	1.1	0.8	0.7
Days above state standard (4.4 ppm)	0	0	0	0	0
Particulate matter less than or equal to 10 microns in diameter (PM_{10})[1]					
Peak 24-hour value ($\mu g/m^3$)	54	53	59	75	61
Days above Federal standard (150 $\mu g/m^3$)	0	0	0	0	0
Annual Average value (ppm)	13	15	16	17	18
Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$)[1]					
Peak 24-hour value ($\mu g/m^3$) [4]	20.3	11.2	33.9	20.1	34.6
Days above Federal standard (35 $\mu g/m^3$)	0	0	0	0	0
Annual Average value (ppm)	3.29	3.71	3.76	3.48	5.39
Sulfur Dioxide (SO_2)[1]					
Peak 3-hour value (ppm)	0.007	0.024	0.004	0.010	0.009
Days above state standard (0.5 ppm)	0	0	0	0	0
Peak 24-hour value (ppm)	0.003	0.008	0.003	0.003	0.005
Days above Federal standard (0.14 ppm)	0	0	0	0	0
Annual Average value (ppm)	0.001	0.001	0.002	0.002	0.001
Nitrogen Dioxide (NO_2)[1]					
Annual Average value (ppm)	0.005	0.005	0.004	0.005	0.004

Notes: [1] Data from the Kapolei Lauwiliwili Street monitoring station.
[2] The Federal O_3 standard was revised downward in 2008 to 0.075 ppm.
[3] Data from the Sand Island monitoring station.
[4] The Federal $PM_{2.5}$ standard was revised downward in 2007 to 35 $\mu g/m^3$.
[5] The Federal eight-hour ozone standard was previously defined as 0.08 ppm (1 significant digit). Measurements were rounded up or down to determine compliance with the standard; therefore a measurement of 0.084 ppm is rounded to 0.08 ppm. The 8-hour ozone ambient air quality standards are met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to the standard.
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter
Source: USEPA 2009a.

3.3.2.3 Sources of Emissions

Existing air pollutant emissions at Kalaeloa originate from mobile and stationary-type sources. These include aircraft and vehicle engines, boilers, generators, and other industrial sources. Just west of Kalaeloa is Campbell Industrial Park (CIP), the largest industrial park in the state of Hawaii. Although stationary-source air pollutant emissions are concentrated in this area, the Department of Health (DOH) Clean Air Branch determined, based on monitoring data, that the Federal and state standards have been met in this region. In addition, CIP lies downwind of Kalaeloa during typical tradewind conditions, moving air pollution emissions away from the site.

3.3.2.4 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce negative economic and social consequences across the globe.

Recent observed changes due to global warming include shrinking glaciers, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges (Intergovernmental Panel on Climate Change 2007). Predictions of long-term environmental impacts due to global warming include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a significant reduction in winter snow pack.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP) rating. The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_{2e}). The CO_{2e} is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in Federal laws and Executive Orders. Most recently, the January 24, 2007 EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management was codified into law on February 17, 2009 and provides instructions and implementation strategies to reduce GHGs.*

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of GHG emissions (associated with the project) to global climate change is discussed in the context of cumulative impacts in Chapter 5 of this EA.

3.4 NOISE

3.4.1 Definition of Resource

Noise can be defined as any sound that interferes with communication, is intense enough to damage hearing, or is otherwise annoying (Federal Interagency Committee on Noise [FICON] 1992). Human response to noise varies according to the type and characteristics of the noise source, distance between the source and the receptor, sensitivity of the receptor, and time of day. Noise is commonly measured with instruments that record instantaneous sound levels in decibels (dB), which are based on a logarithmic scale (e.g., a 10-dB increase corresponds to a 100% increase in perceived sound). Under most conditions, a change of 5 dB is required for humans to perceive a change in the noise environment (USEPA 1972).

Sound measurements are often weighted to emphasize those frequencies heard especially well by the human ear. While the range of frequencies across which humans hear extends from 20 to 20,000 Hertz, the human ear is most sensitive to sounds in the range of 1,000 to 8,000 Hertz, with sensitivity diminishing at lower and higher frequencies. As a result, A-weighted sound level (dBA) measurements, which de-emphasize the high and low frequencies and emphasize the middle frequencies, are used to characterize sound levels that are heard especially well by the human ear. Human hearing ranges from approximately 20 dBA (the threshold of hearing) to 120 dBA (the threshold of pain).

The sound exposure level (SEL) is a measure of the physical energy associated with a noise event that incorporates both the intensity and duration of the event. For example, the SEL associated with an aircraft overflight would account for noise levels for the period of time when the aircraft is approaching (noise levels are increasing), the instant when the aircraft is directly overhead (noise levels are at a maximum), and the period of time when the aircraft is departing (noise levels are decreasing). As the SEL also considers the duration of a noise event, SEL values are typically higher than the maximum noise level measured for most noise events.

The day-night average sound level (DNL) is the energy-averaged sound level of all SEL values within a 24-hour period, with a 10-dBA penalty assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. to compensate for the annoyance associated with the occurrence of nighttime noise events. The DNL is the preferred noise metric of the Federal Aviation Administration (FAA), USEPA, the Department of Defense, and many other agencies. Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments because there is a consistent relationship between DNL and the level of annoyance.

Land use activities that are most sensitive to noise include residential, public services, commercial, cultural, and recreational. Although aircraft noise represents the greatest contributor to the overall noise environment in and around an airfield, other sources of noise (e.g., vehicular traffic) also influence total ambient noise levels. Most people are exposed to average sound levels of 50 to 55 dBA (DNL) or higher on a daily basis. Research has indicated that about 87% of the population is not highly annoyed by outdoor average sound levels below 65 dBA (DNL) (FICON 1992). Therefore, the 65 dBA (DNL) noise contour is used to help determine compatibility of aircraft operations with local land use.

Noise sources can be transient (such as the passing of an aircraft) or continuous (the buzz of an electrical tower). Table 3.4-1 shows the noise level ranges used to define the level of noise impact.

Table 3.4-1. A-Weighted Noise Level Ranges

Noise (dB)	*Noise Impact*
60	Urban ambient noise level
70	Noise level of minor concern
75	Noise level of moderate concern
80	Intrusive noise level
85	Problematic noise level
90	Noise level to be avoided
Source: Newman et al. 1984	

3.4.2 Existing Conditions

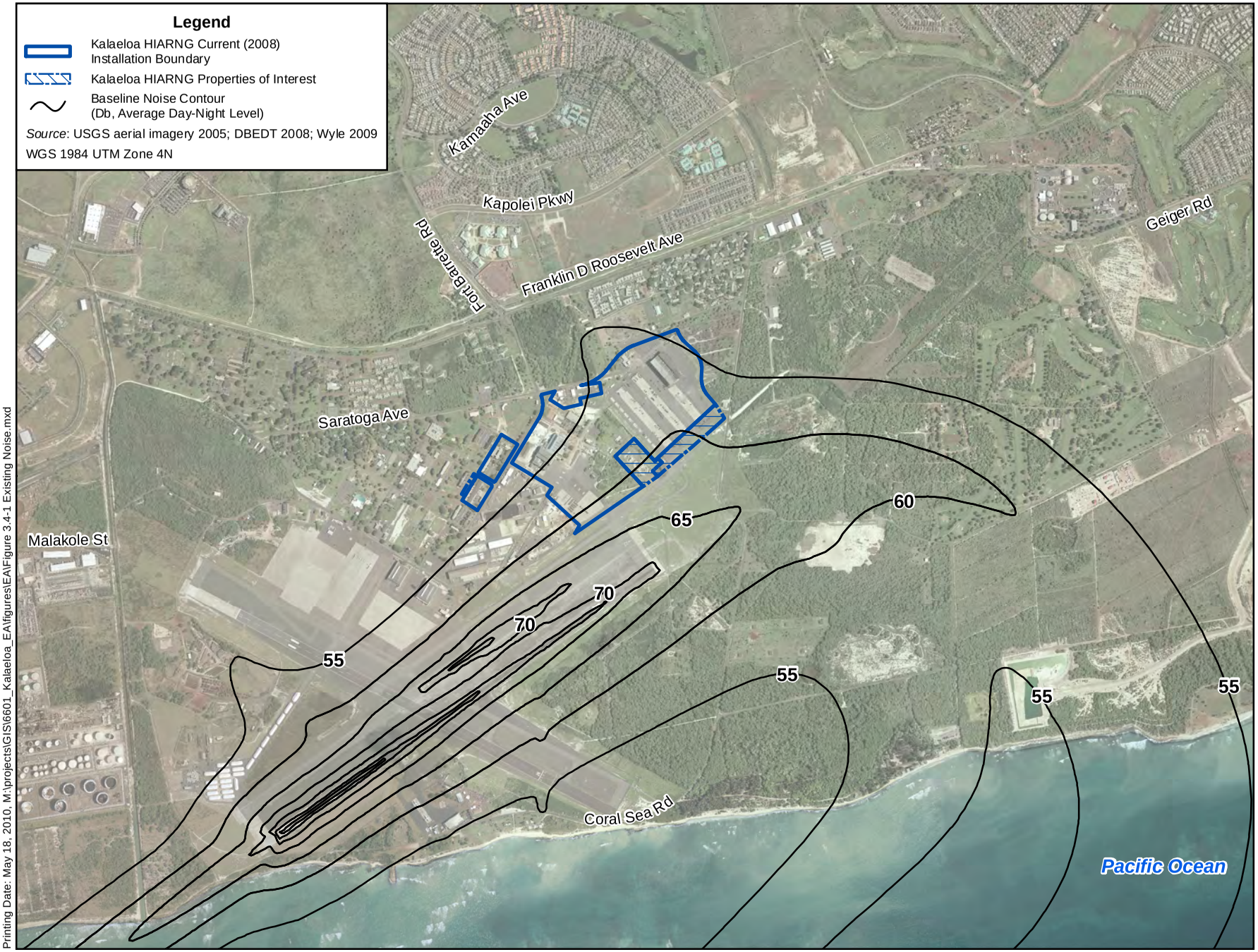
3.4.2.1 Aircraft Activity

Kalaeloa has a history of aircraft activity dating back to 1941, when the Air Force airstrip was constructed. A noise study completed for this EA (Appendix D) evaluated existing conditions from aircraft operations (baseline) as well as those under the proposed action. According to that report Kalaeloa Airport continues to generate takeoff and landing noise, with baseline average noise levels ranging from over 80 db (DNL) at the runways to 55 db (DNL) approximately 1.5 miles from the runway perimeter (Figure 3.4-1). Existing conditions are compatible with surrounding residential land use per State of Hawaii Department of Transportation regulations.

The primary sources of noise at Kalaeloa are aircraft operations. Aircraft noise levels are typically highest beneath the main approach and departure corridors and in the immediate vicinity of the runways. As aircraft take off and gain altitude, their contribution to the surface noise environment decreases. Depending upon the aircraft type and meteorological conditions, the altitude at which aircraft noise becomes indistinguishable from surface ambient noise levels can vary. Due to the current operations tempo and off-base training/deployments, military airfield operations have been reduced the past several years.

3.4.2.2 Ground-Based Activity

Current noise created by HIARNG activity at Kalaeloa is generated by normal vehicle operation and the infrequent use of large multi-axle trucks and convoys. Noise levels are comparable to those of normal highway traffic. Existing impacts outside of the HIARNG Kalaeloa facility are minimal. Currently, there is little to no construction noise generated on the proposed action site.



Printing Date: May 18, 2010, M:\projects\GIS\6601_Kalaeloa_EA\figures\EA\Figure 3.4-1 Existing Noise.mxd

Figure 3.4-1
Existing Aircraft Noise Levels
Kalaeloa, Oahu, Hawaii
May 2010

3.5 GEOLOGY AND SOILS

3.5.1 Definition of Resource

Geology describes the surface and subsurface materials of which a land area is composed, including soils and rocks. The characteristics of soils and underlying rocks include stability, slope, compatibility, shear strength, and productivity. The principal geologic factors influencing stability of structures are soil stability and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil characteristics can limit the proposed use of an area. Limiting characteristics include excessive erodibility or wetness, poor drainage, excessive occurrence of rock at shallow depths, and the presence of shrink-swell clays. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support structures and facilities.

Long-term geological, erosional, and depositional processes typically influence topographic relief of an area. Topography incorporates the physiographic or surface features of an area and is usually described with respect to elevation, slope, aspect, and landforms.

3.5.2 Existing Conditions

3.5.2.1 Soil

Kalaeloa is located on the Ewa Plain, an ancient coral-algae calcareous reef that was formed during the Pleistocene Period. The coral reef limestone is also known as caprock, a porous layer found between 50 and 1,000 feet below the ground surface. The soil that covers the Ewa Plain is reddish brown in color, and is historically acceptable to all plants. Soil is limited in Kalaeloa; only a thin layer covers the coral outcrop, with more found in cracks and holes (U.S. Department of Agriculture 1972). The soil is classified as moderately permeable (HCDA 2006). Beneath the soil and caprock is a layer of basal basalt, created by the Waianae and/or Koolau volcanic flows.

Information concerning soils onsite was obtained from the United States Department of Agriculture's (USDA) Soil Conservation Service National Cooperative Soil Survey and Soil Service Geographic Database. There are two types of soils identified on and around the site:

- Coral Outcrop
  - Most common type found on and around the site.
  - The surface texture is bedrock. The soils are clayey and may be shallow to an impervious layer.
  - Slow infiltration rates and may overlie a high water table.
- Fill land, Mixed
  - Gravelly sandy loam with moderately fine to fine textures and a high erosion potential.
  - Slow infiltration rates and layers impeding downward movement of water.
  - Top layer (0-5 inches) consists of gravelly sandy loam, 5-59 inches consists of fine sandy loam, and 59-70 inches is bedrock.

3.5.2.2 Topography

The area ranges in elevation from about 50 feet (ft) above mean sea level (amsl) along the northern-most boundary (by Independence Road) to a low of almost 30 ft amsl (along the runway in the south). The ground surface in the area generally slopes about 0.5% the south (HIARNG 2003a). No streams, rivers, or wetlands exist on-site, with the exception of three small sinkholes in the center portion of the site (see Cultural Resources, Section 3.8, for additional description and location).

3.5.2.3 Geology

The Pearl Harbor National Wildlife Refuge (PHNWR), originally established in 1972, is located approximately 6 miles northeast of Kalaeloa. The Kalaeloa Unit of the PHNWR, located at Long Point in Kalaeloa, was established in 2001 during military base closure proceedings (USFWS 2010a). Its supports a unique habitat of anchialine pools, sinkholes and salt water pools in the limestone coral reef that are connected to the ocean through cracks in the substrate. The site is closed to the public and located at the far southwestern corner of the BPNAS, approximately 2 miles from HIARNG facilities and is maintained by USFWS staff of PHNWR.

3.6 WATER RESOURCES

3.6.1 Definition of Resource

Water resources include both surface and subsurface water. Surface water includes all lakes, ponds, rivers, and streams within a defined area or watershed. Subsurface water, commonly referred to as groundwater, is typically found in certain areas known as aquifers. Aquifers are areas of mostly high porosity soil where water can be stored between soil particles and within soil pore spaces. Groundwater is typically recharged during precipitation events and is withdrawn for domestic, agricultural, and industrial purposes.

Due to dangers and damages associated with major flooding, legislation has been developed to limit construction within identified flood-prone zones. Specifically, development of areas within an identified 100-year floodplain zone (an area having a one percent chance of major flooding any given year) is typically limited to recreation and preservation activities. If construction within a flood hazard zone is considered, it must meet Federal Emergency Management Agency (FEMA) guidelines. Generally, FEMA requires that buildings be elevated above flood waters or that they are built to withstand inundation and their utilities are waterproofed and/or can break-away in the event of a flood.

The Clean Water Act (CWA) of 1972 is the primary Federal law that protects the nation's waters, including lakes, rivers, aquifers, and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. Under Section 404 of the CWA, jurisdictional "waters of the U.S." are regulated resources and are subject to Federal authority. The term "waters of the U.S." is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands. Areas meeting the waters of the U.S. definition are under the jurisdiction of the U.S. Army Corps of Engineers (USACE).

3.6.2 Existing Conditions

3.6.2.1 Surface Water and Stormwater

The annual average precipitation in the region is 20.4 inches (WRCC 2009). Most of the precipitation at Kalaeloa occurs during the winter season, from October through March. January is the wettest month, with an average rainfall of 4.5 inches.

Kalaeloa is near both the Honouliuli and Ewa Beach watersheds. The Honouliuli watershed consists mainly of agricultural and forested land. It drains to the Honouliuli Stream and eventually discharges into the West Loch of Pearl Harbor. Surface water from the Ewa Beach watershed also drains into Pearl Harbor. The low rainfall and high permeability of the soil and caprock allow water to infiltrate the ground easily. The facility is just over 5,000 ft from the ocean. Ordy Pond is a perennial pond created by a filled sinkhole, located to the southeast but not on the proposed HIARNG site (U.S. Department of Navy, 1999).

At the HIARNG Kalaeloa facility there are no naturally occurring streams or drainage channels. In undeveloped areas highly permeable soil and limestone rock allow stormwater to easily infiltrate into the ground. Stormwater runoff for paved and other non-impervious surfaces is managed through a system of 40 drywells that allow percolation into the ground. These are provided for under a Hawaii Department of Health permit for the State's Underground Injection Control (UIC) program (Earth Tech 1998b). State permit UO-2177 which was renewed on 15 April 2008 for the 40 drywells. HIARNG prepared a Stormwater Pollution Control Plan in 2007 to help manage stormwater at all its Oahu facilities (HIARNG 2007a).

Based on site observations, drainage from some paved areas on the site would flow to the perimeter of the paving where it can drain naturally into the permeable soils and rock. During heavy rain stormwater overflow of some of the drywells occurs within the former BPNAS (Belt Collins 1999). A conceptual study conducted for the HIARNG Kalaeloa Facility in 1998 (Earth Tech 1998b) documented areas on the site where stormwater would drain to drywells versus only sheet runoff and percolation into soil (Figure 3.6-1). To reduce the potential for flooding, they recommended additional wells particularly the eastern portion of the facility. The potential for flooding became even more of a concern when the Navy apparently closed the drainage pipe of the aircraft wash facility south of Building 282 prior to transfer of the property (Belt Collins 1999) but apparently did not provide for an alternate drainage outlet for the pit as HIARNG personnel reported that the pit typically contains water and sometimes requires pumping after it fills with water after heavy rain.

3.6.2.2 Flood Hazard Potential

The HIARNG Kalaeloa facility lies within Federal Emergency Management Agency (FEMA) Flood Zone D based on the September 30, 2004 Flood Insurance Rate Map panel 15003C0320F applicable to the area (www.fema.gov accessed 5/12/2010), an area in which flood hazards are undetermined because no analysis of flood hazards has been conducted, but which lie outside of the 100-year floodplain. The site is located approximately 1 mile from the ocean. The HIARNG property at Kalaeloa is not located within the Island of Oahu Tsunami Inundation Zone (C&C of Honolulu 2009a).

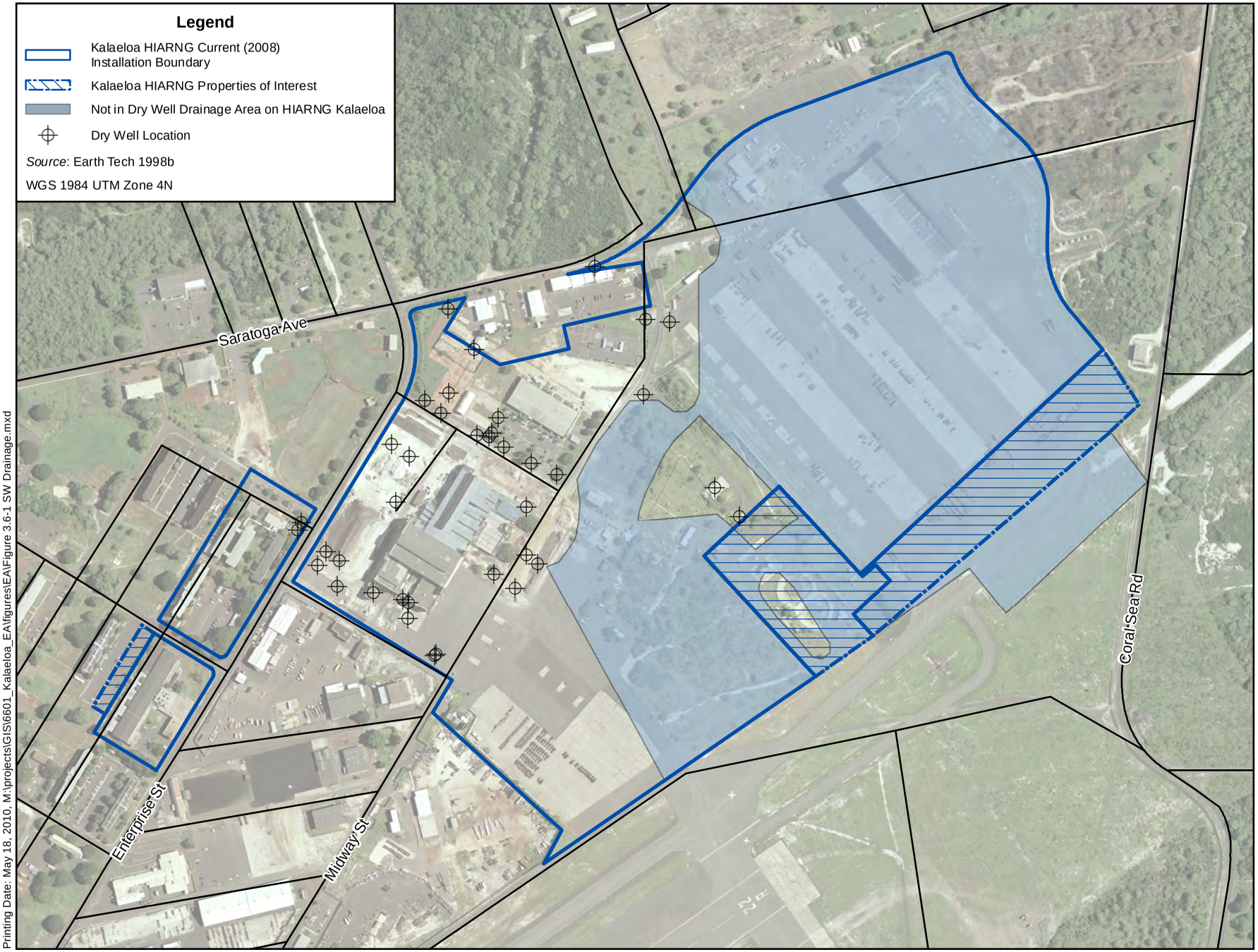


Figure 3.6-1
Stormwater Drainage
Kalaeloa, Oahu, Hawaii
May 2010

3.6.2.3 Industrial Water Discharge

Three additional injection drywells were issued State Department of Health Category E permits. These wells are permitted to receive industrial water as well as storm water. Permit UO-2016 with a renewal date of 15 April 2008 was issued for one carwash drainage drywell located adjacent to Building 537. Permit UO-1996 with a renewal date of 15 April 2008 was issued for two drywells located adjacent to Hangar 117 for FMS 1.

HIARNG currently holds State Permit No. HI SO00052 for its Maintenance Shops and Small Municipal Separate Storm Sewer System (Small MS4). In accordance with the permit requirements, a Stormwater Pollution Control Plan was prepared in February 2007 (HIARNG 2007).

3.6.2.4 Ground and Potable Water

Groundwater underlying the Kalaeloa area generally occurs under unconfined conditions within caprock material (caprock aquifer). It is in direct hydraulic contact with the ocean. While this aquifer qualifies as a source of drinking water under the Federal Safe Drinking Water Act (SDWA), the State of Hawaii has a more stringent standard for salinity and does not recognize it for potable use.

As part of the Regional Groundwater Study, collection of groundwater samples occurred from wells around BPNAS for six quarters between January 1995 and September 1996. Analysis of the samples found that pesticides, herbicides, and metals are present at low levels, though they pose no significant risks to humans or the environment. Annual monitoring conducted in 1997, 1998, 1999, and 2000 confirmed the findings of the study.

The Navy Public Works, Pearl Harbor (PWC Pearl) provides, operates, and maintains potable water from a well located approximately 3 miles north of Kalaeloa. The well meets standards for potable water use and is located outside and beyond the low-level contamination areas mentioned above. This well has two deep well turbine pumps capable of pumping a total of 6,000 gallons per minute (GPM) (Earth Tech, 1998). The system chlorinates and fluoridates the water before transmission and distribution. Two underground reinforced concrete reservoirs provide potable water storage, each with a capacity of one million gallons (Earth Tech, 1998). Approximately 3.2 miles of 6 to 24-inch diameter pipes support the existing potable water distribution system at HIARNG. Lateral pipes connect 25 fire hydrants throughout the HIARNG parcel to the water distribution system.

3.7 BIOLOGICAL RESOURCES

3.7.1 Definition of Resource

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to as vegetation and animal species are referred to as wildlife. Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species that are important to the function of the ecosystem, of special societal importance, or are protected under Federal or state law or statute.

3.7.2 Existing Conditions

3.7.2.1 Vegetation

Vegetation on the former BPNAS includes approximately 170 plant species (Botanical Consultations 1984 as cited in US Navy 1999). The dominant vegetation types were kiawe (*Prosopis pallida*) and lowland scrub. The HIARNG site and surrounding area was not mapped as any vegetation type because the entire area is primarily commercial, paved, or heavily disturbed. However, several sites that support unique vegetation are located within the region as described in Unique Habitat and Areas of Special Concern, Section 3.7.2.4.

3.7.2.2 Wildlife

Birds were the dominant wildlife identified on the former BPNAS (Botanical Consultations 1984 as cited in US Navy 1999). Twenty-three (23) species were identified during a survey conducted in 1984 of which 17 were ubiquitous, introduced species; five were indigenous; and one was endemic. Given the highly disturbed nature of the site and lack of native vegetation, birds present would most likely be non-native species or indigenous species common throughout Oahu such as the kolea (Pacific golden plover; *Pluvialis fulva*). The only mammals likely to be found at HIARNG Kalaeloa given the disturbed nature of the area were the introduced Indian mongoose (*Herpestes aurpounctatus*), rodents and feral cats. However, several sites that support unique wildlife are located within the region as described in Unique Habitat and Areas of Special Concern, Section 3.7.2.4.Kalaeloa Airport has a formal agreement with the US Department of Agriculture. The agreement with Animal and Plant Health Inspection Services and Wildlife Services, allows for the controlled eradication of birds that create a hazard to planes. Airport personnel are trained in bird hazing and keep records of all bird strike incidences. The airport exchanges bird information with the USFWS, State Department of Land and Natural Resources Forestry and Wildlife Divisions, and The Audubon Society (Ramos 2009). The Migratory Bird Treaty Act (MTBA) of 1918, enforced by the USFWS, protects migratory birds (USFWS 2010b). The MTBA is an international agreement with Canada, Japan, Mexico, and Russia that protects selected species of migratory birds from being killed (USFWS 2010b). The only bird on the MTBA protected species list that is found in the Kalaeloa vicinity is the Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), which is further discussed in Special-Status Species.

3.7.2.3 Special-Status Species

No Federal- or state-listed threatened or endangered species has ever been reported on the HIARNG Kalaeloa facility (US Navy 1999; HIARNG 2003a) and none are likely given the highly developed nature of the area. The Federal- and state-endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*) is found within the former BPNAS around Ordy Pond and some coastal areas. Two Federal- and state-endangered plants exist at the former BPNAS, the shrubs akoko (*Chamaesyce skottsbergii*) and round-leafed chaff-flower, ewa hinahina (*Achyranthes splendens*). Distributions of these species do not encompass the HIARNG Kalaeleloa facility area (US Navy 1999).

3.7.2.4 Unique Habitat and Areas of Special Concern

Two unique ecological features are within the vicinity of BPNAS, notably Ordy Pond and the Pearl Harbor National Wildlife Refuge (PHNWR).

Ordy Pond is a highly eutrophic, brackish, coastal, anchialine pond located off of Tripoli Street about one mile from HIARNG facilities and the Proposed Action. it is the only permanent water body on the former BPNAS lands and comprises approximately 3 acres with less than one acre of open water. The pond is surrounded by American mangrove (an introduced species) and supports mosquito fish that are fed upon by black-crowned night heron, a non-endangered native bird (Ogden, 1994 in NAS BPRP). The pond is also frequented by Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*) an endangered species, as well as various migratory birds. The Navy gave the area to the University of Hawaii after the BRAC for research and study purposes (US Navy 1999).

The Pearl Harbor National Wildlife Refuge (PHNWR) consists of two wetland units and one coastal upland unit.

The two wetlands units were established in 1972 as mitigation for construction of the Honolulu International Airport (USWFS 2008, 2009). The wetlands are located approximately 6 miles from HIARNG Kalaeloa facilities. One wetland is the 37-acre Honouliuli Unit which borders West Loch. The second wetland is the 25-acre Waiawa Unit bordering Middle Loch of the famous Pearl Harbor. The West Loch and Middle Loch of Pearl Harbor are sites of small urban refuge units. The wetland refuge supports recovery efforts for four of Hawaii's six endemic waterbirds (Hawaiian stilt, Hawaiian moorhen, Hawaiian coot, and Hawaiian duck). All four birds are listed as endangered species.

In contrast, the 38-acre Kalaeloa unit contains raised limestone coral reef and has the last remaining ancient coastal dryland plant communities that were once widespread throughout the `Ewa plain (USWFS 2008, 2009). The site is unique because of its rare anchialine pools consisting of sinkholes that are connected to the groundwater and experience tidal influence. This habitat supports native coastal plants such as the endangered plant species *Achyranthes splendens*, also known as ewa hinahina (USWFS 2008, 2009). The Kalaeloa Unit was added to the PHNWR in 2001 to protect native plants (USFWS 2010a). Kalaeloa is closed to the general public but has a volunteer program that offers college level educational programs and habitat restoration activities. The Kalaeloa unit of the PHNWR It is located near Long Point at the far southwest corner of the BPNAS, approximately two miles from HIARNG facilities and the site of the Proposed Action.

3.8 CULTURAL RESOURCES

3.8.1 Definition of Resource

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious, or other reasons.

Cultural Resources are defined as historic properties as defined by the National Historic Preservation Act of 1966 (NHPA), cultural items as defined by the Native American Graves and Repatriation Act (NAGPRA), archeological resources as defined by Archaeological Resources Protection Act (ARPA), sacred sites as defined by EO 13007 to which access is afforded under American Indian Religious Freedom Act (AIRFA) and collections and associated records as defined in 36 CFR 79. NEPA requires that proponents consult early with federal, state, and local agencies that have jurisdiction by law over some aspect of a proposed action or can provide special expertise during the NEPA process. Examples include consulting with the State Historic Preservation Office (SHPO) regarding historic structures; with

federally recognized Indian tribes; with native and Indigenous groups such as Hawaiian's and Hawaiian organizations; and with those whom may hold expertise with respect to cultural, traditional and customary uses and practices. Accordingly, various agencies and organizations were requested to comment on the DOPA including five local and native Hawaiian organizations.

Cultural resources can be divided into three major categories: archaeological resources, architectural resources, and traditional cultural resources.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains. Archaeological resources can include campsites, roads, fences, trails, dumps, battlegrounds, mines, and paleontological specimens found in an archaeological context, as well as a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance.

Traditional cultural resources can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Hawaiian groups consider essential for the continuance of traditional culture. Traditional cultural resources can also include important archaeological resources such as human burials.

Under NHPA, as amended, only significant cultural resources, known or unknown, warrant consideration with regard to adverse impacts from a proposed action. Archaeological and architectural resources generally must be more than 50 years old to be considered for protection under the NHPA. However, more recent structures, such as Cold War era military buildings, may warrant protection if they are "exceptionally significant." To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion in the NRHP.

The criteria for evaluating cultural resources in terms of their potential nomination to the NRHP provide a systematic, definable means to evaluate historic and cultural properties. The criteria specified in 36 CFR § 60.4 are as follows:

> *The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:*
>
> *(a) That are associated with events that have made a significant contribution to the broad patterns of our history; or*
>
> *(b) That are associated with the lives of persons significant in our past; or*
>
> *(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*
>
> *(d) That have yielded or may be likely to yield information important in prehistory or history.*

Additionally, NRHP Criteria Considerations for evaluating cultural resources are applied to cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years; all of which are ordinarily not considered eligible for the NRHP (NPS 1997). However, such properties will qualify if they are integral parts of districts that do meet the criteria, or if they fall within the following categories:

(a) A religious property deriving primary significance from architectural or artistic distinction or historical importance; or

(b) A building or structure removed from its original location but which is primarily significant for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

(c) A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building associated with his or her productive life; or

(d) A cemetery that derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or

(e) A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or

(f) A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or

(g) A property achieving significance within the past 50 years if it is of exceptional importance.

Resources must also possess integrity (i.e., their important historic features must still be present and recognizable).

Traditional Cultural Properties can be evaluated for NRHP-eligibility as well. However, even if a traditional resource is determined to be not eligible for the NRHP, it may still be significant to a particular community or Native American tribe and protected under other laws and regulations discussed below. The significance of a Traditional Cultural Property is usually determined by consulting with the affiliated cultural group.

Several other Federal laws and regulations have been established to manage cultural resources, including, the Archaeological and Historic Resources Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). In addition, coordination with federally-recognized Native American tribes must occur in accordance with the American Indian Religious Freedom Act (1978); EO 13007, *Sacred Sites*; EO 13175, *Consultation and Coordination with Indian Tribal Governments*; and the DoD requirements relating to the 1999 *Annotated American Indian and Alaska*

Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment, through consultation, of the effect of proposed DoD actions that could significantly affect tribal resources, tribal rights, and Indian lands before decisions are made by the respective services.

To determine what types of cultural resources may be present, recent cultural resources studies at JFHQ-HIARNG in Kalaeloa and historic records were reviewed. An intensive buildings survey report that includes architectural resources at Kalaeloa was prepared in October 2009 as part of HIARNG's compliance with Section 110 of the National Historic Preservation Act, which requires a Federal agency to identify and evaluate historic properties under its jurisdiction or control. The resulting determinations of NRHP eligibility for archaeological and architectural resources are reflected in this document.

3.8.2 Existing Conditions

The Area of Potential Effects (APE) includes those areas likely to be affected by the proposed project activities. As part of the NEPA review process, several agencies and Hawaiian organizations were requested to comment on the DOPA as they may hold special expertise with respect to cultural, traditional and customary uses and practices which could be incorporated into the discussion below. The APE consists of three architectural resources, consisting of individual buildings proposed for renovation under the Proposed Action. All three resources are located within the JFHQ-HIARNG at Kalaeloa. In order to provide a regional perspective, the types of cultural resources that are known to occur on the island are discussed briefly in the following section.

3.8.2.1 Historic Background

There is a long history of Native Hawaiian occupation on the Ewa Plain. The most recent studies suggest the plain was first occupied just after 1,000 AD (Athens et al. 1997). The Ewa Plain was part of the Honouliuli ahupuaa, and the population likely settled around the mouth of Honouliuli Stream and inland and up the coastline of Pearl Harbor. It is thought that little agricultural activity occurred on the dry Ewa Plain (Athens et al. 1997). The land that the HIARNG at Kalaeloa now occupies was used for ranching, and growing sisal and sugarcane from 1877 until the 1930s.

The U.S. Marines purchased 206 acres at Kalaeloa in 1932 and the property became the BPNAS. Construction on the base began in November 1941, but the Navy revised the building plans to make the buildings bombproof following the Japanese attacks on Pearl Harbor December 7, 1941. The Navy commissioned BPNAS on April 15, 1942, and the 3,700-acre installation was manned by 12,000 Navy servicemen. BPNAS's primary mission was to support the Naval operations in nearby Pearl Harbor, but its role quickly expanded to include aircraft repair and maintenance for carrier-based aircraft for the duration of the war (E2M 2009).

After World War II ended, BPNAS became the primary Naval Air Station for Naval operations in the Pacific throughout the Cold War era until its close in 1989. BPNAS closed in 1999 in accordance with a recommendation from BRAC. Since then, the former BPNAS installation has had ongoing redevelopment by Federal, state, and county agencies, as well as military and private organizations. As part of this reorganization, HIARNG acquired a 150-acre parcel of land from the former Naval installation, including numerous existing buildings to adapt for its use.

Archaeological surveys have identified numerous sites of significance at BPNAS ranging from pre-EuroAmerican contact Hawaiian to World War II-era sites, including sites with human skeletal remains present (Helber, Hastert, and Fee 1997). BPNAS also contains Category I and Category II historic buildings that are significant from the installation's history during World War II and the early Cold War Era. There are no known current cultural practices occurring at Kalaeloa.

3.8.2.2 Archaeological Resources

Numerous archaeological surveys have been conducted at the former 3,700-acre BPNAS, including the HIARNG property. A 1998 survey of the area occupied by HIARNG found no archaeological sites on this property. Pre-contact Hawaiian archaeological sites have been identified in the southeast and northwest corners of BPNAS; however, these sites are well outside the proposed 150-acre HIARNG site (HIARNG 2003a).

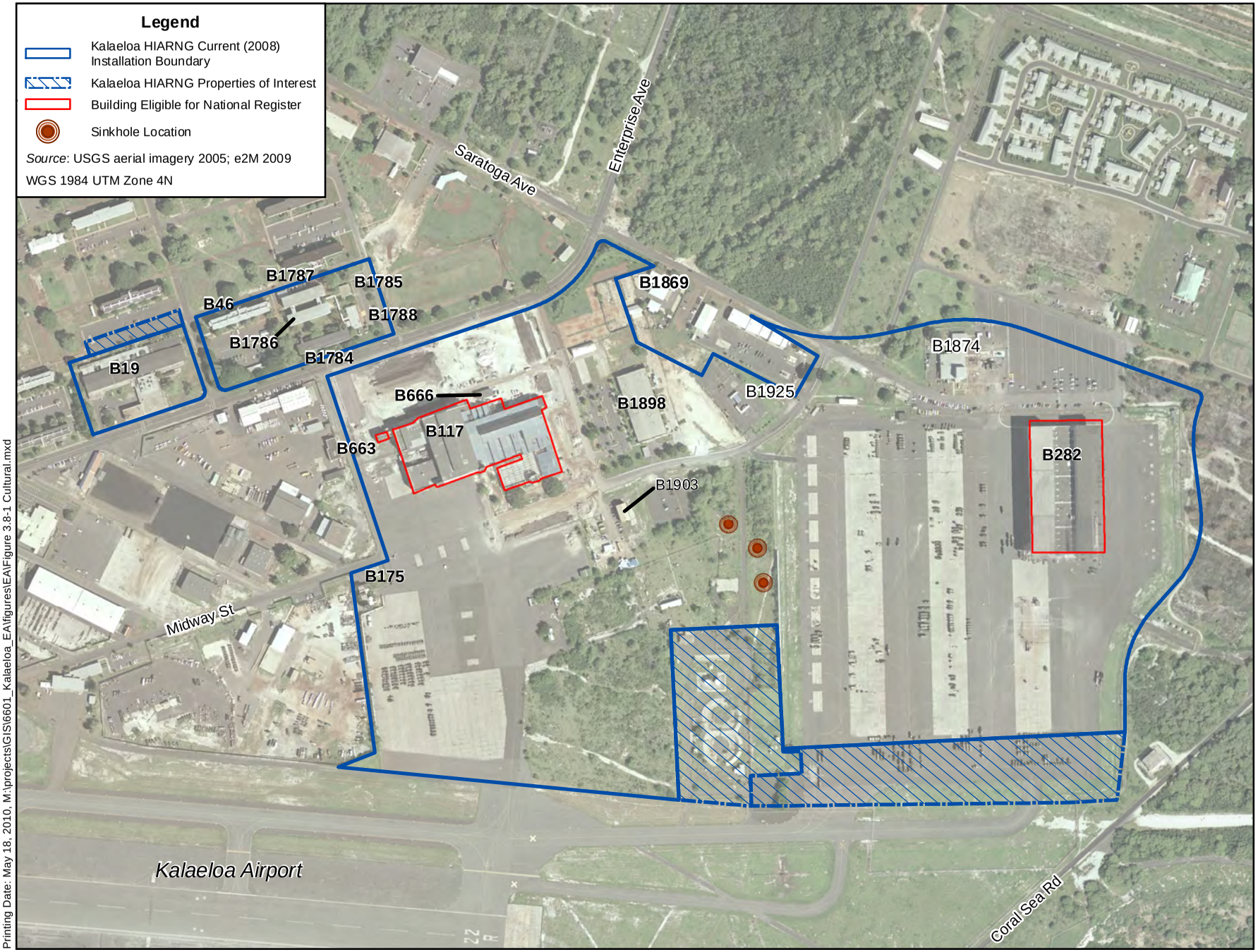
When areas of known or inferred archaeological and traditional features may exist, a more sensitive analysis may be conducted. Areas of High Archaeological Sensitivity at Kalaeloa apply to three areas which contain sinkholes. The three sinkholes are adjacent to a fenced parking lot southeast of Building 282 (Figure 3.8-1) and have been assessed for archaeological data. No cultural deposits were found, but there is potential paleo-environmental data that could be recovered, as indicated by previous investigation of sinkholes in the area but outside of the APE that have produced archaeological samples (Tuggle et al. 1999).

In 2000, the sinkholes were characterized as follows:

- Sinkhole #1 extends approximately 20 ft. down to a soil floor and measures 1.4 meters in diameter. There is no visible water present. A shelf exists in the wall of the sinkhole. There is a dark, ashy deposit present in the wall approximately 4 ft. above the floor.
- Sinkhole #2 has a diameter of 1 meter and extends approximately 4 ft. down to a coral rock/rubble- strewn floor.
- Sinkhole #3 is a small pit with trees growing in the center. The trees make access into the sinkhole difficult (Tolleson 2000).

3.8.2.3 Traditional Cultural Resources

There are no known sacred sites or traditional cultural resources at HIARNG at Kalaeloa or the former BPNAS. Previous investigations have not shown any evidence of prehistoric agricultural activity such as the production of dry land taro, or the growth of medicinal plants or any other activity associated with activities practiced by modern Native Hawaiians. There are no current cultural practices occurring at this location (HIARNG 2003a).



Printing Date: May 18, 2010, M:\projects\GIS\6601_Kalaeloa_EA\figures\EA\Figure 3.8-1 Cultural.mxd

Figure 3.8-1
Cultural Resources at HIARNG Kalaeloa
Kalaeloa, Oahu, Hawaii
May 2010

3.8.2.4 Architectural Resources

There are 14 buildings and structures on the proposed HIARNG parcel. Previous cultural resources surveys for historic buildings have recommended or determined four of these buildings officially eligible for inclusion in the NRHP (E2M 2009). These historic buildings are Buildings 19, 117, 282, and 663 (see Table 3.8-1). Three of these historic properties, Buildings 117, 282, and 663, are included in the Proposed Action (Figure 3.8-1).

HIARNG organizes all of its buildings and structures into one of five (I-V) categories that are ranked according to historical importance as follows:

Category I: Property of major importance

Category II: Property of importance

Category III: Property of minor importance (includes properties that contribute to the significance of Category I and II properties, but may not individually meet the National Register criteria)

Category IV: Property of little or no importance

Category V. Property detrimental to the significance of adjacent historic properties

HIARNG has determined that Buildings 117 and 282 are both considered to be Category I properties of major importance. Building 663 is a Category II property of importance.

Table 3.8-1. Historic Buildings at HIARNG Kalaeloa

Bldg. No.	*Function*	*Year Built*	*Era*	*Command*	*Category*
117	Plane Maintenance Hangar	1941	World War II	World War II	I
282	Hangar	1958	Cold War	Operations and Aircraft Support	I
663	Aviation Armament	1944	World War II	World War II	II
Source: E2M 2009					

Building 117 is a Facility Maintenance Shop that was built in 1944 as an airplane assembly and maintenance hangar at NASBP during World War II. Designed by architect Albert Kahn, it is an immense building of over 132,000 square feet comprised of shops, offices, storage spaces, and classrooms. Building 117 is divided into four major sections, which are the large hangar, two separate shop spaces, and an office area (HABS HI279-O). The gable roof of the hangar rises to 78 feet tall (HABS HI279-O). Modeled after a similar structure in Jacksonville, Florida, it is the only building at the former BPNAS with pile foundations. All other sites used spread footings due to a top layer of hard coral overlying crumbly coral. At the site of 117, however, the hard coral did not exist due to previous grading when it was built (HABS HI279-O). Building 117 is determined eligible under National Register Criterion A for its central role at Barbers Point Naval Air Station, and under Criterion C for its architectural significance.

Figure 3.8-2. Building 117 at Kalaeloa

Building 282 is a Kalaeloa Readiness Center that was built in 1958 as a Cold War-era maintenance hangar at NASBP. The building consists of three parts including a central, two-story, concrete-block building with a flat roof. This central block has two exterior elevators and houses offices, classrooms, and storage. Metal-framed open service pavilions flank the sides of the central block. These pavilions originally housed aircraft repair but now are used for vehicle storage. Building 282 is eligible for inclusion in the NRHP under Criterion A because of its significance to NASBP when it provided around-the-clock surveillance of the Pacific Ocean during the Cold War. The building is also eligible under NRHP Criterion C as a rare and outstanding example of a Naval Cold War-era hangar.

Figure 3.8-3. Building 282 at Kalaeloa

Building 663 was built in 1943 as an aviation armament weapons storage facility and shop for Naval aircraft during World War II. Located adjacent to Building 117, and connected to it by a utility girder, the building is associated with the repairs and maintenance that occurred in both of these buildings during the war. It is a two-story, concrete-block building with a flat roof and an irregular footprint. It is eligible for the NRHP under Criterion A for its function during World War II, which was critical to the repair and maintenance of carrier aircraft at NASBP. It is also significant under NRHP Criterion C for its design elements that accommodated its function.

Figure 3.8-4. Building 663 at Kalaeloa

3.9 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.9.1 Definition of Resource

Socioeconomic characteristics include demographics, employment, and economic activities in an area. Impacts to socioeconomic resources by new development or change of land use can impact community attributes like public services and housing availability.

Socioeconomics describes the extent and influence of human activity in a region, with particular emphasis on population characteristics and measures of economic activity. Impacts to these fundamental socioeconomic resources can also influence other related community attributes such as housing availability and public services provision.

In 1994, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued to focus the attention of Federal agencies on human health and environmental conditions in minority and low-income communities. The Order works

to ensure that disproportionately high and adverse human health or environmental effects on low-income and minority communities are identified and addressed.

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was issued in 1997 to protect children, who may be disproportionately affected by environmental risks. Children may suffer from negative environmental influences disproportionately as compared to adults. In order to address these environmental health and safety risks, EO 13045 was issued in 1997. EO 13045 helps to ensure that Federal agencies' policies, programs, activities, and standards address environmental risks and safety risks to children. To address these issues, the socioeconomics analysis in this EA evaluates age characteristics of the population, including distribution of children and locations where numbers of children may be disproportionately high.

To provide a thorough evaluation of environmental justice issues, the socioeconomics sections of this EA include data and analysis regarding the distribution of race and poverty status in the Region of Influence (ROI).

3.9.2 Existing Conditions

3.9.2.1 Population

The population of the State of Hawaii was 1,211,537 in 2000 (USCB 2000). Kalaeloa is located on Oahu Census Tract 85 (Barbers Point Housing), which consists of the former BPNAS. Census data for 2000 showed the tract population to be 1,311. The total population for the Ewa area in 2000 was approximately 68,000 (DPP 2008). With the rapid growth in the Ewa area, the population is projected to reach 177,000 by 2030 (DPP 2008). The current number of personnel stationed at HIARNG Kalaeloa is approximately 1,290 full- and part-time personnel.

3.9.2.2 Employment and Earnings

Tourism is the most productive industry on the island of Oahu. Military, government and agriculture are also important sectors of Oahu's economy. Kalaeloa lacks tourist attractions drawing visitors to the site. Kalaeloa has historically been dominated by military and industrial use, with residential development now growing rapidly in the area. The Ewa area is projected to provide people with up to 65,000 non-construction jobs in 2030 (DPP 2008).

3.9.2.3 Environmental Justice

In order to evaluate issues of environmental justice, data related to the distribution of race and poverty status must be examined. For purposes of this analysis, minority and low-income populations are defined as:

- *Minority Populations:* Persons of Hispanic, African American, American Indian and Alaskan native, Asian, Pacific Islander, or other non-white race (as reported in the 2000 census).
- *Low-Income Populations*: Persons living below the poverty level, based on a total annual income of $25,360 for a family of four persons in Hawaii (Federal Register 2009).

U.S. Census 2000 data for census tract 85; the nearest community, Ewa Beach; and the City and County of Honolulu were evaluated. Population distribution data for these are summarized in Table 3.9-1.

Minorities comprise approximately 38% of the population in census tract 85 compared to 90% of the population of Ewa Beach and 79% in Honolulu County (USCB 2000). The percent of population living below the poverty level in census tract 85 was 4.1% compared to Ewa Beach at 9.9% and the City and County of Honolulu at 9.9% (USCB 2000).

Table 3.9-1. Minority and Low-Income Population Data

Geographic Area	*Total Population (2000)*	*Minority (2000)*		*Below Poverty Level (2000)*	
		Population	*Percent of Total*	*Population*	*Percent of Total*
Census Tract 85	1,311	498	38	54	4.1
Ewa Beach	14,650	13,017	90	1,430	9.9
Honolulu County	876,156	689,672	79	83,937	9.9

As of 2000, the total number of children under the age of 18 living in census tract 85 was 515 (USCB 2000). This represents approximately 3% of the total population of 1,311. The percentage of children living in the City and County of Honolulu is somewhat lower at 26.5%.

Currently, within approximately 1.5 miles around the HIARNG Kalaeloa facility there are schools, day care facilities, and parks. The Hawaii National Guard also operates a Youth Challenge Academy Program for at-risk youths which operates out of Building 19. None of these are currently affected by safety zones or other risk factors associated with the installation.

3.10 TRANSPORTATION AND CIRCULATION

3.10.1 Definition of Resource

Transportation refers to the movement of vehicles on roadways. Primary roads include highways and are designed to move traffic efficiently without offering access to all of the areas passed through. Secondary, or surface roads, are used to access commercial and residential areas. Roadway operating conditions and the adequacy of the roadway system to accommodate vehicles are typically described in terms of average daily traffic (ADT) volumes and level of service (LOS) ratings. LOS ratings range from a rating of A for free-flowing traffic conditions to a rating of F for congested conditions.

Transportation planning and improvements are ongoing in the Kalaeloa area; therefore, conditions are not static. Plans for transportation improvements in the surrounding area are those that have been initiated to address 'background' growth (i.e., growth and change in the system regardless of the proposed action evaluated in this EA), and are described further below.

3.10.2 Existing Conditions

3.10.2.1 Regional Access

Kalaeloa has over 20 miles of existing roadways (HCDA 2006). The two major thoroughfares include Interstate H-1 (H-1) and Farrington Highway (State Route 93) (see Figure 3.10-1). The H-1 Freeway is primarily an east-west freeway located north of the proposed project site, and is the major route used to travel between Honolulu and Kalaeloa. The freeway traverses through much of Oahu, connecting various cities, neighborhoods, local attractions, and other key facilities throughout the island. Fort Barrette Road

connects the project site to the H-1 Freeway and handles a large percentage of the traffic flow to and from the proposed project area.

Farrington Highway (State Route 93) is also a heavily traveled route running east-west through the area (Figure 3.10-1). This highway is located between the H-1 freeway and the project site. Farrington Highway is north of the proposed project site and is located generally parallel to, and one-half mile south of, the H-1 Freeway. Fort Barrette Road also connects the project site to Farrington Highway.

Regional Transportation Issues and Proposed Improvements

In 1985, as part of the General Plan, the City and County of Honolulu designated the Ewa plain as one of the primary areas for future growth in population and employment (PB Americas 2009). As development has occurred in the Ewa plain, of which Kalaeloa is considered a part, traffic and circulation have become major issues in the area. This has been caused primarily from development occurring faster than the implementation of improvements to transportation infrastructure. The issue is also caused by a lack of transportation connectivity in the Ewa plain as development precludes the ability to construct a comprehensively linked roadway system (PB Americas 2009). Much of the new traffic in the area is attributed to residential community development.

Several studies have been conducted that identified a number of transportation projects for the Ewa region to improve travel to, and within, the Kalaeloa District. Most of these projects have been identified and/or confirmed through the *Oahu Regional Transportation Plan 2030*, conducted by the Oahu Metropolitan Planning Organization (ORTP) (April 2006). The planning process assesses the long-range transportation needs for the region over the next 20 or more years. The *ORTP* also recognizes the City and County of Honolulu's Locally Preferred Alignment for the City's proposed transit system (i.e., bus routes). The Minimum Operating Segment – considered the first phase of the transit system – ends in East Kapolei just north of the Kalaeloa District. An anticipated future extension would ultimately loop through the Kalaeloa District, connecting it to the overall mass transit system. Additionally, the May 2009 *Ewa Roadway Connectivity Study* (PB Americas 2009) identifies and evaluates opportunities and constraints for developing roadway connectivity plans to improve traffic circulation within the Ewa plain. Figure 3.10-2 shows an overview of the many very recent roadway improvements identified in the area. These would improve access to the Kalaeloa District in the vicinity of the proposed project site. As the figure demonstrates, numerous roadways have not yet been constructed and are identified as "missing major roadways." Other segments are identified as either arterial (primary) roadways under construction or connector (secondary) roadways under construction.

Efforts are underway by the City and County of Honolulu, State of Hawaii and the Ewa Plain development community to complete the missing links and make other improvements in the roadway system to improve traffic flow through the area (PB Americas 2009). According to the Kalaeloa Master Plan, connection of Geiger Road and Saratoga Avenue near the proposed project site would alleviate traffic congestion in the vicinity and would result in Franklin D. Roosevelt Avenue and Geiger Road/Saratoga Avenue being the primary east-west routes near the proposed HIARNG facilities (Figure 3.10-2).

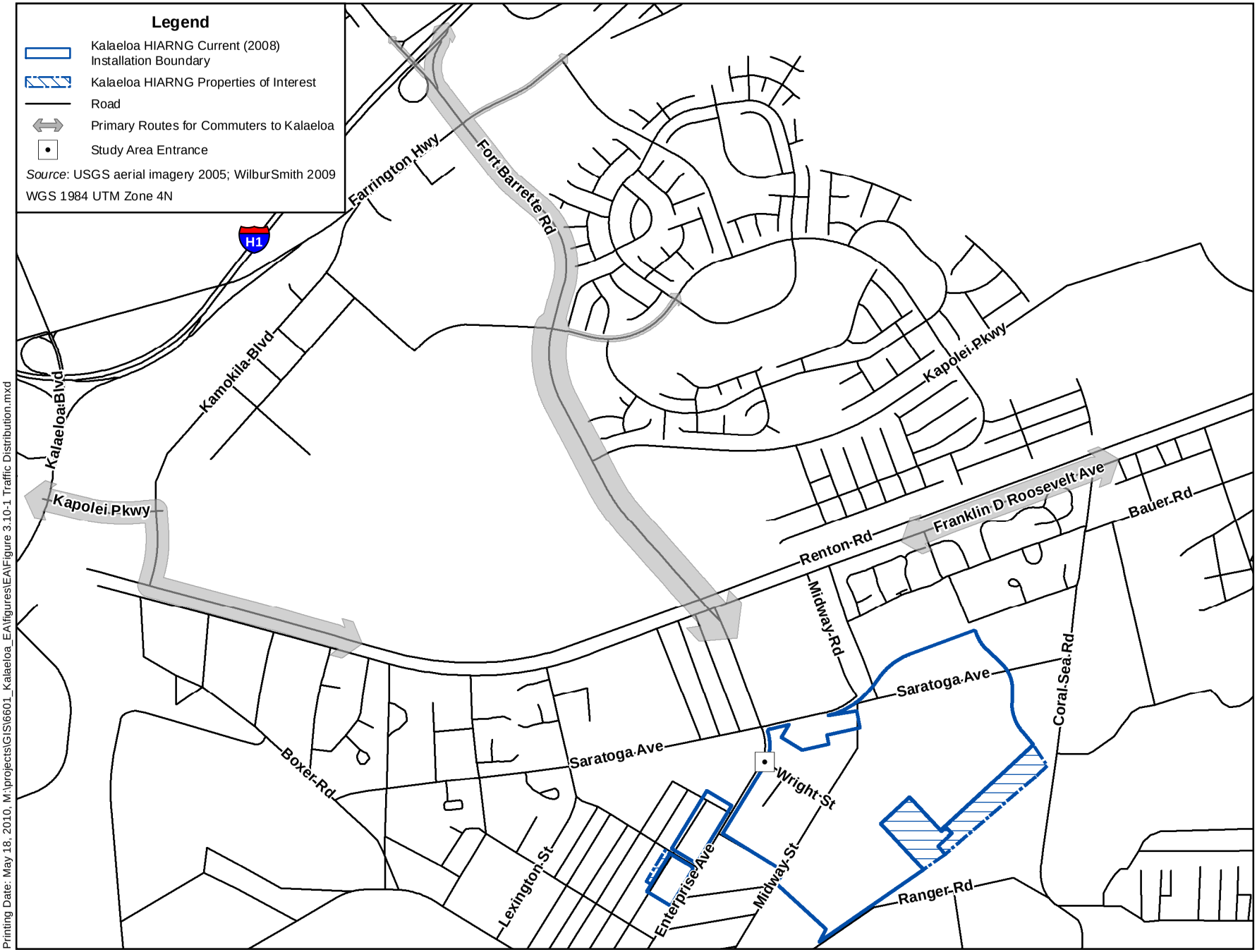
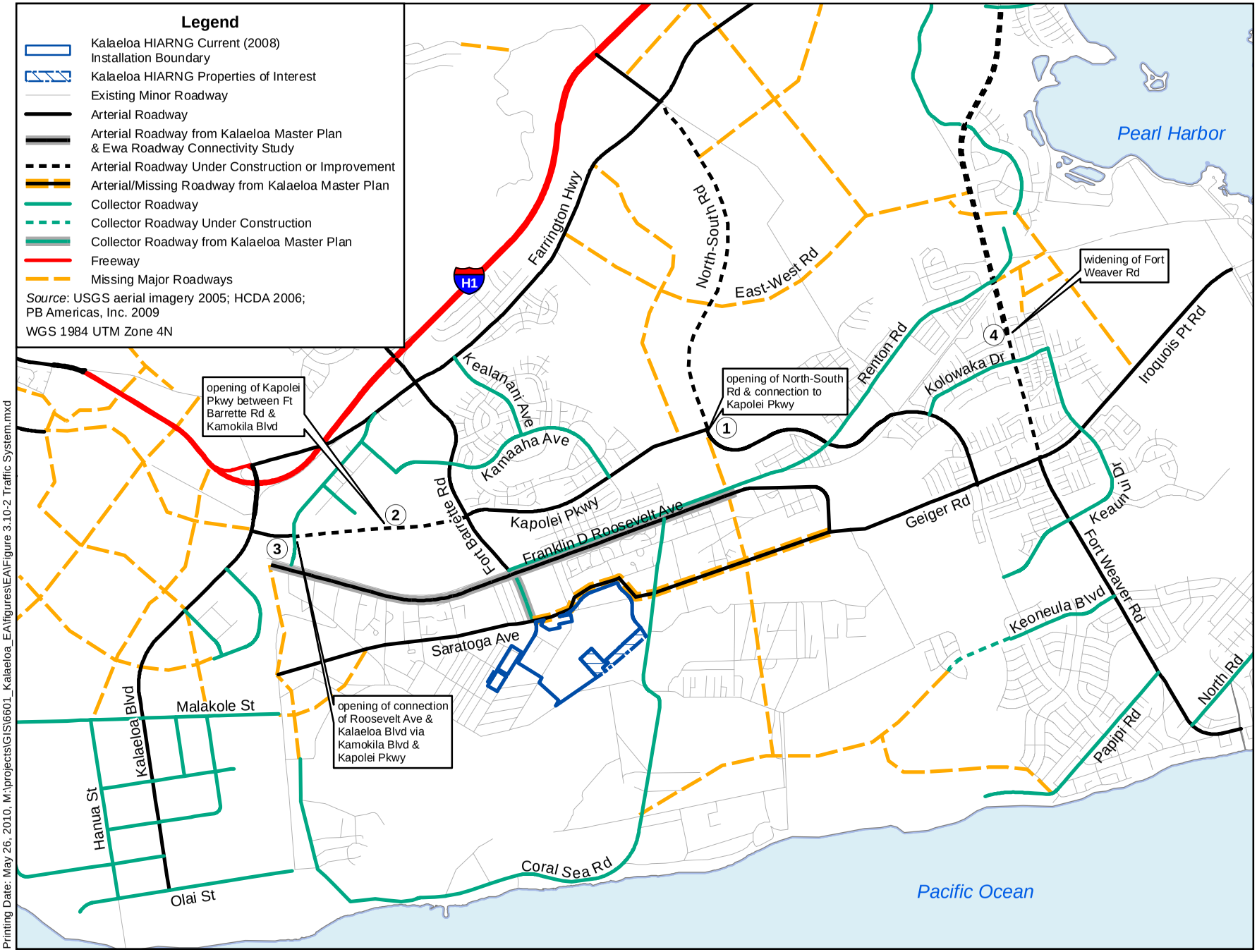


Figure 3.10-1
Regional Access to HIARNG Kalaeloa
Kalaeloa, Oahu, Hawaii
May 2010



Printing Date: May 26, 2010, M:\projects\GIS\6601_Kalaeloa_EA\figures\EA\Figure 3.10-2 Traffic System.mxd

Figure 3.10-2
Planned Roadway Improvements for the Kalaeloa District
Kalaeloa, Oahu, Hawaii
May 2010

3.10.2.2 Local Access

The two main access points onto the Kalaeloa site are at Fort Barrette Road (which turns into Enterprise Street) and Roosevelt Avenue (Figure 3.10-1). Both of these roadways pass through the Saratoga/Enterprise intersection when approaching the HIARNG facility.

Fort Barrette and Roosevelt face heavy traffic from nearby residences in the early morning and evening commute hours. The main entry to the HIARNG Kalaeloa facility is east of Building 117, off of Enterprise Avenue. A secondary access gate, not currently in use, is located off of Saratoga Avenue, just west of Building 282. Primary access to the HIARNG Kalaeloa facility is via Enterprise Street from H-1, the nearest highway.

Fort Barrette Road/Enterprise Street is a north-south roadway that provides direct access from the proposed project site to Farrington Highway and the H-1 Freeway. It is a two-lane divided roadway from south of Farrington Highway to Franklin D Roosevelt Avenue. South of Roosevelt Avenue it extends as Enterprise Street, a three-lane roadway (one lane in the southbound direction and two lanes in the northbound direction) (Wilbur Smith Associates 2009, Appendix E).

Roosevelt Avenue is an east-west roadway that connects Fort Barrette Road to Kalaeloa Blvd. to the west and Fort Weaver Road to the east, via Geiger Road. The roadway includes one travel lane in each direction, with left turn pockets at most intersections.

Saratoga Avenue is an east-west roadway that extends from Boxer Road to Independence Avenue and connects many residential neighborhoods to other major roadways. This road has one lane in each direction.

Wright Street is an east-west local roadway that serves as the primary entrance to the proposed project site. It extends from Enterprise Street to Midway Street, providing one travel lane in each direction. Midway Street is a north-south local roadway that serves as the secondary entrance to the proposed project site. It extends from Roosevelt Avenue to Boxer Road, encompassing the entire existing Naval Air Station. This roadway has one travel lane in each direction (Wilbur Smith Associates 2009, Appendix E).

Local Traffic Conditions

A traffic study was completed for this EA based on traffic counts conducted in August 2009 by Wilbur Smith Associates (Appendix E). The intersections that were studied included the following (also see Figure 3.10-3):

- Fort Barrette Road/Enterprise Street/Roosevelt Avenue, and
- Enterprise Street/Saratoga Avenue.

Existing intersection operating conditions were evaluated for the morning peak hour (7:00 AM to 8:00 AM) and evening peak hour (3:45 PM to 4:45 PM). The traffic study found that during the AM peak hour, both the study intersections operate at an unacceptable LOS. As summarized in Figure 3.10-3, the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection operates at LOS F with an average delay of 84 seconds per vehicle. The worst approach of the Enterprise Street/ Saratoga Avenue intersection operates at LOS F with an average delay of 112 seconds per vehicle.

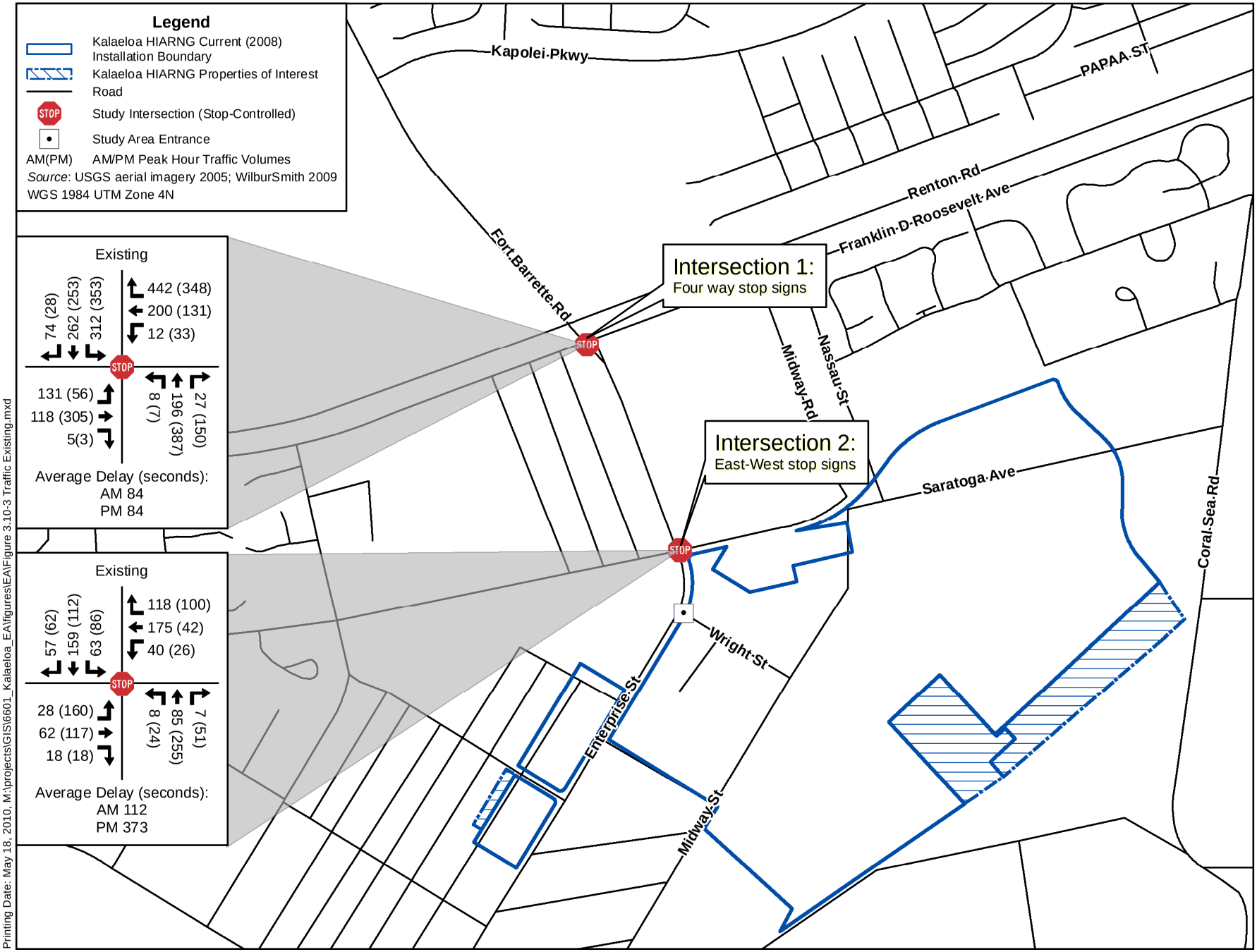


Figure 3.10-3
Existing Traffic Volumes
Kalaeloa, Oahu, Hawaii
May 2010

Similar to the AM peak hour, during the PM peak hour, both the study intersections continue to operate at an unacceptable LOS. The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection operates at a LOS F with an average delay of 84 seconds per vehicle. This intersection experiences a significant delay in the southbound approach (Fort Barrette Road), primarily for the southbound left turning movement. The worst approach of the Enterprise Street/ Saratoga Avenue intersection operates at LOS F, with an average delay of 373 seconds. The poor operation of this intersection is due to the significant delays created by eastbound movements (see Section 4.10 for a full discussion).

Traffic flows are changing relatively quickly as a result of ongoing roadway improvements in the vicinity of Kalaeloa. For example, since August when the traffic counts were conducted several significant roadway improvements have been completed. First, the Kapolei Parkway has been opened to connect with the North/South Road. This has helped reduce congestion at the Fort Barrette Road/Enterprise/Roosevelt Avenue intersection. Moreover, roadway improvements in the vicinity of Cotsco, located at 4589 Kapolei Parkway, have lessened traffic congestion considerably at the Saratoga/Enterprise intersection based on observations of HIARNG staff located at Kalaeloa.

Parking

Designated parking areas exist at the proposed project site. The only area where parking is not sufficient is at B19 because the building was transferred to the HIARNG, but an adjacent parking lot was not transferred. Negotiations are underway for an access agreement to utilize half of the adjacent parking lot. No other parking issues have been identified.

3.11 HAZARDOUS MATERIALS AND WASTES

3.11.1 Definition of Resource

Hazardous materials and wastes include liquid, solid, contained gas, or sludge wastes that pose a threat to human health and safety or the environment. Hazardous wastes and materials may be subject to numerous Federal regulations, including the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Federal Water Pollution Control Act, Clean Air Act, Clean Water Act, Safe Drinking Water Act, Toxic Substances Control Act, Federal Insecticide, Fungicide and Rodenticide Act, Emergency Planning and Community Right-to-Know Act, and Pollution Prevention Act.

A hazardous material is any item or agent (biological, chemical, physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Toxic materials are specific hazardous materials identified in regulations. Hazardous wastes are specifically defined or determined as such based on their ignitability, corrosiveness, reactivity, and toxicity. The potential impacts hazardous materials and waste have on human health and the environment are largely dependent upon their types, quantities, toxicities, and management practices. Past mishandling of the substances described above on military installations are addressed through investigation and cleanup under the installation restoration program (IRP).

3.11.1.1 Toxic Materials

For the purposes of this EA, toxic materials include the substances described below.

Asbestos

Asbestos is the name of a group of naturally occurring minerals that may separate into very fine fibers, which are extremely heat-resistant and durable. Asbestos and ACM have been used in a variety of applications, including being used to insulate boilers and pipes, and as a component of various construction and industrial materials. Asbestos becomes a health hazard when microscopic-sized fibers become liberated or released into the air. Once emitted to the atmosphere, these fibers may remain suspended in the air for long periods of time. When ACM is inhaled, these fibers may become lodged in body tissues, especially the lungs. Inhalation of asbestos fibers is known to cause asbestosis, a chronic disease of the lungs, and mesothelioma, a cancer of chest membranes. Other cancers, primarily of the digestive tract, have also been associated with exposure to asbestos.

Lead-based Paint

In the past, lead pigments were used to increase the durability of paint and provide added anti-corrosion properties. Exposure to lead-based paint (LBP) is associated with adverse health effects, including permanent damage to the central nervous system. Lead exposure can result from the ingestion of paint chips or associated dust generated from deteriorating paints or from improper paint removal processes. Young children are at greatest risk from LBP exposure.

The Federal government banned the use of LBP in 1978. Consequently, buildings constructed on Kalaeloa prior to 1978 may contain LBP (USEPA 2007). The LBP in these facilities is generally managed in place in accordance with accepted industry guidelines and practices. These guidelines focus upon minimizing the potential for LBP dust creation, direct contact with the LBP surfaces, and contamination of the surrounding environment. The future renovation of Kalaeloa facilities or construction of new facilities at Kalaeloa would not include the use of LBP.

Polychlorinated Biphenyls (PCBs)

PCBs are highly stable organic chemical compounds with low flammability, high heat capacity, and low electrical conductivity. In the past, PCBs were extensively used as a component of many materials, most notably as heat insulating materials and as dielectric fluids used in electrical transformers and capacitors. PCBs are known to cause skin irritation and cancer and are highly persistent in the environment. In 1979, the USEPA banned most uses of PCBs. In addition, effective controls have been mandated related to existing PCB-containing equipment.

As part of existing waste management plans, fluids that potentially contain PCBs are analyzed to ensure that they are properly disposed of in accordance with all Federal, state, and local laws and regulations by licensed disposal contractors. Kalaeloa is required to address existing PCB sources in accordance with Federal, state, and local laws and regulations.

3.11.1.2 Hazardous Materials

For the purposes of this EA, toxic materials include: products used for various maintenance or repairs and identified as hazardous on manufacturer material safety data sheets; petroleum, oils, and lubricants (POL); antifreeze; and miscellaneous other waste streams.

3.11.1.3 Hazardous and Universal Wastes

RCRA, as amended by the Hazardous and Solid Waste Amendments (and corresponding state of Hawaii HARs), define hazardous waste as:

- A solid waste not specifically excluded from being classified as a hazardous waste under 40 CFR 261.4(b) that exhibits any of the characteristics (i.e., ignitability, corrosivity, reactivity, toxicity) described in 40 CFR 261; or
- Is listed in 40 CFR 261 Subpart D; or
- Is a mixture containing one or more listed hazardous wastes from 40 CFR 261 Subpart D.

Hazardous wastes may take the form of a solid, liquid, contained gas, or semi-solid. In general, any combination of wastes that poses a substantial present or potential hazard to human health or the environment that has been discarded or abandoned is a hazardous waste.

RCRA (and HARs) requires that hazardous waste be systematically tracked from cradle-to-grave. This hazardous waste tracking system mandates the collection and retention of key information including: the generator of the waste, how the waste is routed to the receiving facility, a description of the waste, the quantity of the waste, identification of the facility that receives the waste, and other relevant data.

EPA and Hawaii universal waste regulations streamline hazardous waste management standards for federally-designated "universal wastes," which include: batteries, pesticides and mercury-containing materials. Universal wastes are considered hazardous however they are unique in that they are not considered in the determination of generator status.

3.11.2 Existing conditions

This section describes current conditions resulting from past and present use of hazardous materials at the Proposed Action site. Operations currently conducted at Kalaeloa require the use and storage of hazardous materials. These materials are primarily associated with vehicle maintenance and aircraft operations and typically include flammable and combustible liquids, acids, aerosols, batteries, corrosives, solvents, paints, and hydraulic fluids.

3.11.2.1 Hazardous Materials and Waste by Building or Area

<u>Kalaeloa Site-Wide</u>

The HIARNG Oil and Hazardous Substance Spill Prevention and Response Plan (OHSPRP, hereafter referred to as the HIARNG Spill Plan; HIARNG 2004) states that approximately 3,500 gallons of diesel and oil are stored at the Proposed Action site at Kalaeloa.

The following buildings store a substantial amount of hazardous materials or generate a substantial amount of hazardous waste.

Kalaeloa Building 117

The Navy used Building 117 as an aircraft maintenance hangar, historically generating waste associated with repair, painting, sandblasting, metal work, electroplating, and cleaning (Belt Collins 1999). Currently, the main hangar at Building 117 is used for vehicle and heavy equipment maintenance, and hazardous materials are used and stored on site. The materials include antifreeze, brake fluid, new and used batteries, petroleum, oil, and lubricants. Additional stored material includes paints and household cleaning products which are stored in lockers in small quantities.

The 2009 waste disposal log shows 271 gallons of used diesel and 532 gallons of oil were generated at Building 117. Most of the hazardous waste generated at Building 117 is universal wastes (such as batteries) and antifreeze.

Based on reviewable manifests from 2009, hazardous waste accumulation at Building 117 has been recorded at upwards of 700 - 800 lbs. This facility is currently a Conditionally Exempt Small Quantity Generator (CESQG) of hazardous materials.

Kalaeloa Building 282

The Navy used Building 282 for P-3 (fixed-wing aircraft) maintenance. Currently the building is used for classrooms, offices and storage. There is a hazardous materials storage container on the southwest side of the building. Hazardous waste generation at Building 282 is minimal and consists largely of universal wastes.

Kalaeloa Building 19

Building 19 contains an area for maintenance storage that houses paints and thinners, gloss enamel, gear oil, pesticides, and household cleaning materials stored in lockers.

HIARNG Aviation Units at Wheeler Army Airfield Buildings 829 and 832

Aircraft JP-8 fuel is obtained offsite and stored in 2,500 – 5,000 gallon mobile tank trucks at the AASF at Wheeler Army Airfield. Typically there are two trucks at least partially full present at any one time. Fuel used is approximately 25,000 – 35,000 gallons per month.

AASF #1 stores in lockers such hazardous materials as lube oil, solvents, methanol, engine cleaner, transmission fluid, JP-8, paints, diesel, and used oil (HIARNG 2004). According to the HIARNG Spill Plan (HIARNG 2004), there are two oil/water separators associated with the facility as well as POL storage areas. In 2009, the oil/water separator waste totaled about 600 lbs. of sludge. A POL storage area contains 55-gallon drums. The drums are handled in accordance with applicable laws, regulations and operational procedures.

Waste streams in 2009 totaled more than 300 gallons of used oil, 1,400 lbs. of oily rags, 19 gallons of aerosol cans, and an unspecified amount of used solvents. Readily available hazardous waste manifests

from 2009 show that AASF #1 may generate about 1,800 lbs. or more of hazardous wastes including heavy metals (cadmium and chromium), acids (nitric, chromic, and phosphoric), sodium dichromate, diethylenetriamine, and xylene. Documentation suggests that the HIARNG aviation units have the potential to generate between 1,500 - 2,000 lbs. of hazardous waste annually.

3.11.2.2 IRP and Petroleum Releases and Cleanup

The DoD created the IRP to investigate past hazardous and toxic materials storage and disposal activities at military installations as required by RCRA. The mission of the IRP is to identify and clean up contamination resulting from past DoD use and disposal practices. The IRP is a three-phase program consisting of a preliminary assessment and site investigation, remedial investigation and feasibility study, and remedial design and action. All areas were addressed except those summarized below.

Category 3 - Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial action.

The HIARNG Kalaeloa facility features that were identified as potential Category 3 properties included a transformer substation and areas investigated for PCB and hazardous waste releases. An electric substation was investigated for PCB releases and it was determined there were no releases above regulatory criteria. Additionally, three areas were investigated for possible PCB releases and PCB levels were found at levels that did not require removal or cleanup. Hazardous Waste Storage Area 2 was investigated and no removal or cleanup was found necessary.

There are two area-wide POIs that were assigned Category 3, the system of drywells throughout the site and regional groundwater (i.e., low concentrations of hazardous substances have been found in drywell samples and regional groundwater samples). Neither was determined to present a risk to human health or the environment; however, the Navy removed drywell sediments from certain wells that that would not meet municipal landfill disposal criteria and could potentially pose a future disposal problem for future land owners.

Category 4 - Areas where release, disposal, and/or migration of hazardous substances has occurred and all remedial actions necessary to protect human health and the environment have been taken.

Previous investigations identified three electrical substations and one land area that were determined to have releases that did not meet regulatory criteria. The three electrical substations were S117 downstairs (in Building 117), S117 upstairs (in Building 117), and S1789 near building 1788. Cleanup actions were conducted at these substations to remove PCBs. The S117 downstairs transformer room was cleaned and met regulatory cleanup for unrestricted use of the area. The S117 upstairs transformer room was cleaned but slightly exceeded criteria for unrestricted use, therefore, an LUC was established for this room (restricted access) and it is kept locked to implement this LUC.

A Category 4 designation was assigned to the area associated with HW-6 was located northeast of Building 282 (TEC 2009) and was a storage site for hazardous wastes comprised of six storage cells along the northeastern fence line. Soil from this area was determined to be contaminated with arsenic resulting in an unacceptable potential risk to human health. A removal action was conducted in 2001 and subsequently the area was determined to be suitable for unrestricted use.

In addition, a number of investigations were conducted at Kalaeloa because numerous USTs were suspected of leaking. An area east-northeast of the Fuel Farm was also suspected as a release area. However, information reported in an Environmental Condition of Property (ECOP; TEC 2008) indicates that all known fuel releases on the HIARNG Kalaeloa facility have been evaluated and are properly closed. No USTs remain in the ground at the HIARNG Kalaeloa facility or the adjacent fuel farm.

3.11.2.3 Asbestos and Lead-Based Paint

The following buildings at HIARNG Kalaeloa and the adjacent fuel farm have been found to contain LBP:

- Building 288
- Building 117
- Building 282
- Building 1787
- Building 1788
- Building 663
- Building 666
- Building 1676
- Building 1869
- Building 175
- Building T-4
- Building 1954
- Building 1855
- Building 1857
- Building 1858
- Building 1860
- Building 1863
- Building 169
- Building 1774
- Building 1874
- Building 66
- Building 762
- Building 537
- Building 19
- Building 1766 (Fuel Farm)
- Building 1859 (Fuel Farm)
- Building 609 (Fuel Farm)

The following buildings at HIARNG Kalaeloa and the adjacent fuel farm have been found to contain ACMs:

- Building 46
- Building 117
- Building 282
- Building 1787
- Building 1788
- Building 663
- Building 666
- Building 1676
- Building 1869
- Building 175
- Building 1785
- Building 1786
- Building 1898
- Building 1677
- Building 1818
- Building 1875
- Building 19
- Building 609 (Fuel Farm)
- Building 1766 (Fuel Farm)
- Building 1860 (Fuel Farm)
- Building 1863 (Fuel Farm)

3.11.2.4 PCBs

Previous investigations identified three electrical substations and one land area that were determined to have releases that did not meet regulatory criteria. The three electrical substations were S117 downstairs (in Building 117), S117 upstairs (in Building 117), and S1789 near building 1788. Cleanup actions were conducted at these substations to remove PCBs. The S117 downstairs transformer room was cleaned and met regulatory cleanup for unrestricted use of the area. The B117 transformer room upstairs (S117) was treated by scabbling and concrete encapsulation of approximately 280 ft^2 of the concrete floor. Because PCB levels were slightly above the cleanup requirement for unrestricted use of 10 µg/100 cm^2, the transformer room is restricted to industrial use (Earth Tech and Tetra Tech 2008).

At the fuel farm, previous investigations identified an area adjacent to electrical substation S1860 where PCB levels in the soil did not meet regulatory criteria. Substation S1860 may or may not have been the source of the PCBs. A soil removal action was conducted in the area to remove PCBs. The removal did not achieve a cleanup level allowing unrestricted (residential) use of this area. Therefore a land use control was established by the Navy that limits this area to industrial uses.

3.12 AIRSPACE

3.12.1 Definition of Resource

3.12.1.1 Airspace

Given its complexity, the following discussion describes airspace and its management in great detail. However, it should be noted that HIARNG is not proposing any modifications to existing airspace.

Management

Airspace management is defined as directing, controlling, and handling flight operations in the volume of air that overlies the geopolitical borders of the United States and its territories. In the United States airspace is a resource that is managed by the FAA, which has established policies, designations, and flight rules to protect aircraft on the airfield, en route, in Special Use Airspace (SUA) identified for military and other governmental activities, and in other military training airspace. The practices used to manage airspace consider how the airspace is designated, used, and administered to best accommodate the individual and common needs of the military, commercial organizations, and private aviation enthusiasts. Because of these multiple and sometimes competing demands, the FAA considers all aviation airspace requirements. Uses considered include; airport operations, Federal airways (FAA air routes approved for use at different altitudes and provided on aeronautical charts available for pilots), jet routes, Victor routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to satisfy all user requirements.

Classifications

The national airspace is divided into two broad categories, *controlled* and *uncontrolled* airspace. Within these two categories, there are a variety of classifications which determine flight rules, pilot qualifications, and aircraft capabilities required in order to operate within any section of the airspace. The specific classification of any area is determined by the FAA and is broadly based upon the following:

- Complexity or density of aircraft movements;
- Nature of operations conducted within the airspace;
- Level of safety required; and
- National and public interest.

Each type of airspace has its own designated unit. To describe how airspace is structured and managed, the explanation is grouped into major categories with sub-categories and definitions as follows:

- Class A Airspace (Controlled) - Class A airspace areas include airspace from 18,000 feet MSL up to 60,000 feet MSL, including the airspace overlying the waters within 12 nautical miles (NM) of

the coast of the 48 contiguous states, U.S. Territories, Hawaii and Alaska. All operations within Class A airspace must be under Instrument Flight Rules (IFR) and are under direct control of air traffic controllers. Class A airspace always starts at 18,000 feet MSL and it is not specifically charted or designated on commonly used maps. All flights in Class A airspace are under positive control.

- Class B Airspace (Controlled) - This airspace surrounds the nation's busiest commercial airports. This is the most congested airspace and has the most complex mix of aircraft operations with everything from single engine trainers to high speed jet transports. At its core, it extends from the surface airspace areas to 10,000 feet MSL. The overall shape of Class B can be likened to an upside down wedding cake of several layers (Figure 3.12-1). Each layer is divided into sectors with the exact dimensions and shape individually tailored to meet local traffic and safety needs. The outer limit of Class B can extend to 30 NM from the primary airport (i.e., Honolulu International Airport). Air traffic control clearance is required to operate in Class B airspace areas. To increase safety, the airspace is designed to minimize the number of turns aircraft are required to perform as they descend to an airport, while still enabling other aircraft to safely transition the area. Class B airspace is charted on sectional charts, Instrument Flight Rules (IFR) enroute (low altitude) charts, and terminal area charts. Operations must be with air traffic clearance.

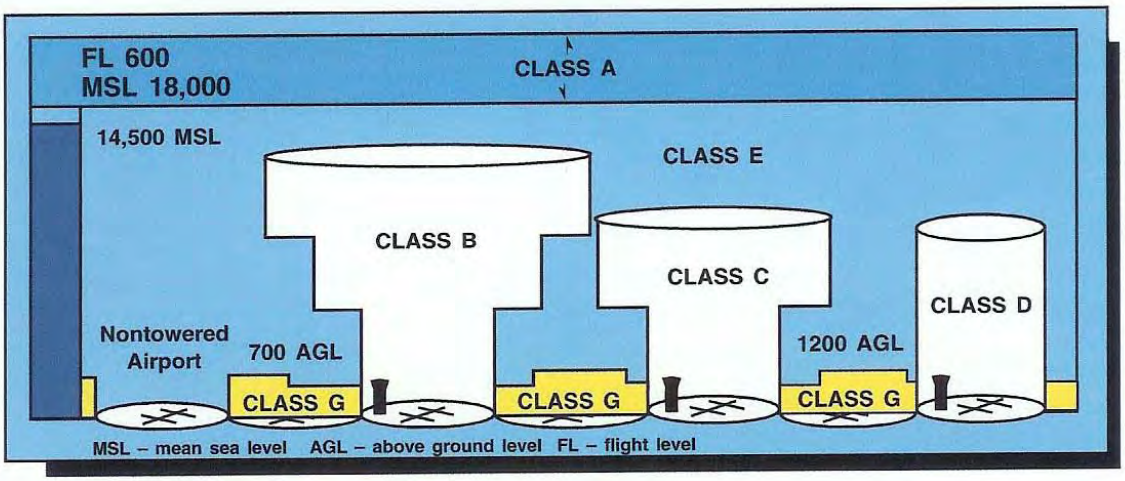


Figure 3.12-1. Airspace Classifications

- Class C Airspace (Controlled) - This airspace surrounds the busy airports of mid-sized cities with a large number of commercial flight operations, as well as some military airports. An operating control tower at the primary airport and radar services are key components of Class C airspace. The overall shape is also that of an upside down wedding cake but there are only two layers. The inner ring has a radius of 5 NM and is from the surface up to, but not including 4,000 feet above airport elevation. The outer ring has a radius of 10 NM and is from 1,200 feet above ground level (agl) to 4,000 feet above airport elevation. A third ring with a 20 nautical mile radius exists in which air traffic control provides traffic separation services to visual flight rules (VFR) aircraft who voluntarily request this service. Radio communications must be established with (ATC) prior to entering Class C airspace but specific permission to operate within the airspace is not required as it is in Class A and B. Class C airspace is charted on sectional charts, IFR enroute (low

altitude) charts, and in specific terminal area charts. Aircraft flight operations within Class C airspace should be viewed as complex and will normally require planning and coordination similar to that for operations in Class B airspace.

- Class D Airspace (Controlled) - This airspace is applied to airports with operating control towers but where the traffic volume does not meet Class C or Class B standards. Traffic usually lacks the heavy jet transport activity but often includes a complex mix of general aviation, turbo prop and business jet traffic. Radar service is often available. The above airport elevation shape is a five nautical mile radius surrounding an operational control tower from the surface up to, but not including, 2,500 feet agl. Class D airspace may have one or more extensions to accommodate IFR traffic. Where radar service is available ATC will provide separation service to IFR traffic and to participating VFR traffic. All traffic must maintain radio communication with the tower or have prior arrangements for operating within the Class D airspace. Class D airspace is charted on sectional charts, IFR enroute (low altitude) charts. Flight operations commonly involve Class D airspace and must be coordinated by the control tower. There are usually a large number of civilian and military flight training operations in and around Class D airspace. It is also important to consider that radar service may not be available. Currently, John Rodgers Field (Kalaeloa Airport) is Class D airspace from 6:00 am until 10:00 pm daily.
- Class E Airspace (Controlled) - Class E airspace exists primarily to assist IFR traffic. It includes all airspace from 14,500 feet MSL up to, but not including 18,000 feet MSL. It extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Radar coverage may or may not be available and there are no requirements for VFR communications with ATC. Class E airspace below 14,500 feet MSL is charted on sectional, terminal, IFR enroute (low altitude) charts. Aviation operations will routinely involve Class E airspace and should be coordinated with the applicable Air Route Traffic Control Center (ARTCC) or Terminal Radar Approach Control (TRACON). This will help to avoid conflicts with IFR traffic. As always, "see and avoid" is the recommended procedure. John Rodgers Field (Kalaeloa) has Class D airspace from 6:00 am until 10:00 pm daily, and the remaining time it is Class E airspace (e.g., 10:00 pm to 6:00 am daily).
- Class F Airspace - This is an international classification which is not utilized in the United States or Territories.
- Class G Airspace (Uncontrolled) - Class G is uncontrolled airspace and includes all airspace not otherwise designated as A, B, C, D or E. It is virtually non-existent in the eastern United States but relatively large blocks of Class G can be found in some areas of the Pacific, Hawaii and Alaska. Operations within Class G airspace are governed by the principle of "see and avoid." Aviation operations in uncontrolled airspace should be approached with caution.

In addition to airspace classifications, there are a variety of terms utilized to identify operational structures, hazards, and unique areas within the airspace. "Controlled" and "Uncontrolled" airspace are generic terms that broadly cover all airspace. These refer to the level of air traffic control required to operate within the airspace. Most controlled airspace has specific, predetermined dimensions whereas uncontrolled airspace can be of almost any size. Class G is the only class of uncontrolled airspace. Except as noted in the following descriptions, the FAA normally is the controlling agency for each area of the NAS.

Special Use Airspace (SUA)

This special designation is designed to alert users about areas of military activity, unusual flight hazards, or national security needs, and to segregate that activity from other airspace users to enhance safety. While most SUAs involve military activity, others involve civilian users such as the Department of Energy. Special Use Airspace is established by the FAA. Detailed information regarding the process for establishing SUA and other types of airspace is contained in FAA Handbook 7400.2, *Procedures for Handling Airspace Matters*. The DoD flight information publication AP/1A contains detailed information about current SUA. There are six different kinds of SUA. Airspace requirements for the proposed relocation of HIARNG helicopter units include airspace defined below.

- Restricted Areas (RA) - Restricted areas are established in areas where on-going or intermittent activities occur which create unusual, and often invisible hazards to aircraft such as artillery firing, aerial gunnery, practice bomb dropping and guided missile testing. Dimensions of the restricted area vary depending upon the needs of the activity and the risks to aircraft. Restricted areas differ from prohibited areas in that most RAs have specific hours of operation and entry during these hours requires specific permission from the FAA or the controlling agency. In addition, there may be a separate scheduling agency who must also grant permission. Agency personnel must understand that hazardous flight activity is occurring in the RA when it is active.
- Alert Area (AA) - Alert areas may contain a high volume of pilot training or an unusual type of aerial activity. There are no special requirements for operations within alert areas, other than heightened vigilance. All operations must be in compliance with the Federal Aviation Regulations. The types of flying involved could be military, aircraft manufacturers or a high concentration of flights (i.e. helicopter activity near oil rigs). Alert area dimensions differ for each area and are depicted on sectional charts, IFR enroute charts, or terminal area charts.

Other Kinds of Airspace

Due to the unique nature of military training operations, training and testing requirements, other airspace for special military use has been developed outside the Special Use Airspace (SUA) program. These are:

- Low Altitude Tactical Navigation Areas (LATN) - LATNs are large, clearly defined geographical areas wherein the Air Force practices random tactical navigation that typically ranges from surface to 1,500 feet agl. These areas are not charted.
- Local Flying Area - Most military facilities develop local flying areas within which they can conduct routine, non-hazardous training activity. These areas are normally developed in conjunction with local FAA controllers and airspace managers and are developed so they will not conflict with other airspace usage.

Airways

Airways are established routes used by military aircraft, commercial aircraft, and general aviation aircraft. They are the flight paths on which aircraft travel through airspace similar to land highways. There are two types of airway route structures. Low altitude routes, or Victor routes are those routes that are below 18,000 feet MSL. High altitude routes, or Jet Routes, are those routes that are above 18,000 feet MSL.

3.12.1.2 Air Traffic

Air traffic refers to movements of aircraft through airspace. Safety and security factors dictate that use of airspace and control of air traffic be closely regulated. Accordingly, regulations applicable to all aircraft are promulgated by the FAA to define permissible uses of designated airspace. The FAA also controls the use of airspace. These regulations are intended to accommodate the various categories of aviation, whether military, commercial, or private aviation enthusiasts. Hawaii is a major crossroads for published airways in the Hawaiian Islands and the Pacific Region and comes under Honolulu ARTCC, and Approach/Departure Control. There are seven (7) Victor Routes that intersect above the Honolulu VORTAC Navigation Aid which is located at the Honolulu International Airport approximately 8 NM west of Kalaeloa. The Victor Routes are designated asV4, V21, V8, V20, V2, V1, and V15 (Figure 3.12-2).

The FAA owns and operates the air traffic control system. The system of airspace designation makes use of various definitions and classifications of airspace to facilitate control. Controlled Airspace is a generic term that covers different classes of airspace. The controlling agency of any airspace is the FAA Air Traffic Control facility that exercises control of the airspace.

The regulatory scheme for airspace and air traffic varies from highly controlled to uncontrolled within the Honolulu ARTCC area. Less controlled situations include flight under Visual Flight Rules (VFR) or flight outside of U.S. controlled airspace. Examples of highly controlled air traffic situations are flights in the vicinity of airports where aircraft are in critical phases of flight, either take-off or landing, and flight under IFR, particularly flights on high or low altitude airways.

Special Use Airspace is specially designated airspace that is used for a specific purpose and is controlled by the military unit or other organization whose activity established the requirement for the Special Use Airspace (FAA, 2008). Special Use Airspace in and surrounding Hawaii includes restricted areas, as well as warning areas. There are also established Alert Areas within the region.

3.12.2 Existing Conditions

3.12.2.1 Kalaeloa Airport

The following discussion describes existing airspace conditions in detail, however it should be noted that HIARNG is not proposing any modifications to airspace. Air traffic in the Kalaeloa Airport area includes the Honolulu International Airport (IAP) co-located with Hickam AFR traffic approximately 8 nm to the east. Kalaeloa Airport was designated as the general aviation reliever airport for HNL on July 1, 1999. Kalaeloa Airport is also an alternate landing site for military and commercial airlines and is used on a daily basis by the Coast Guard. The airport is located under the final approach of runway RWY 8L at Honolulu IAP. Kalaeloa Airport is currently used by general aviation aircraft including rotary wing, the Honolulu Community College/University of North Dakota flight school operations, and the U.S. Coast Guard.

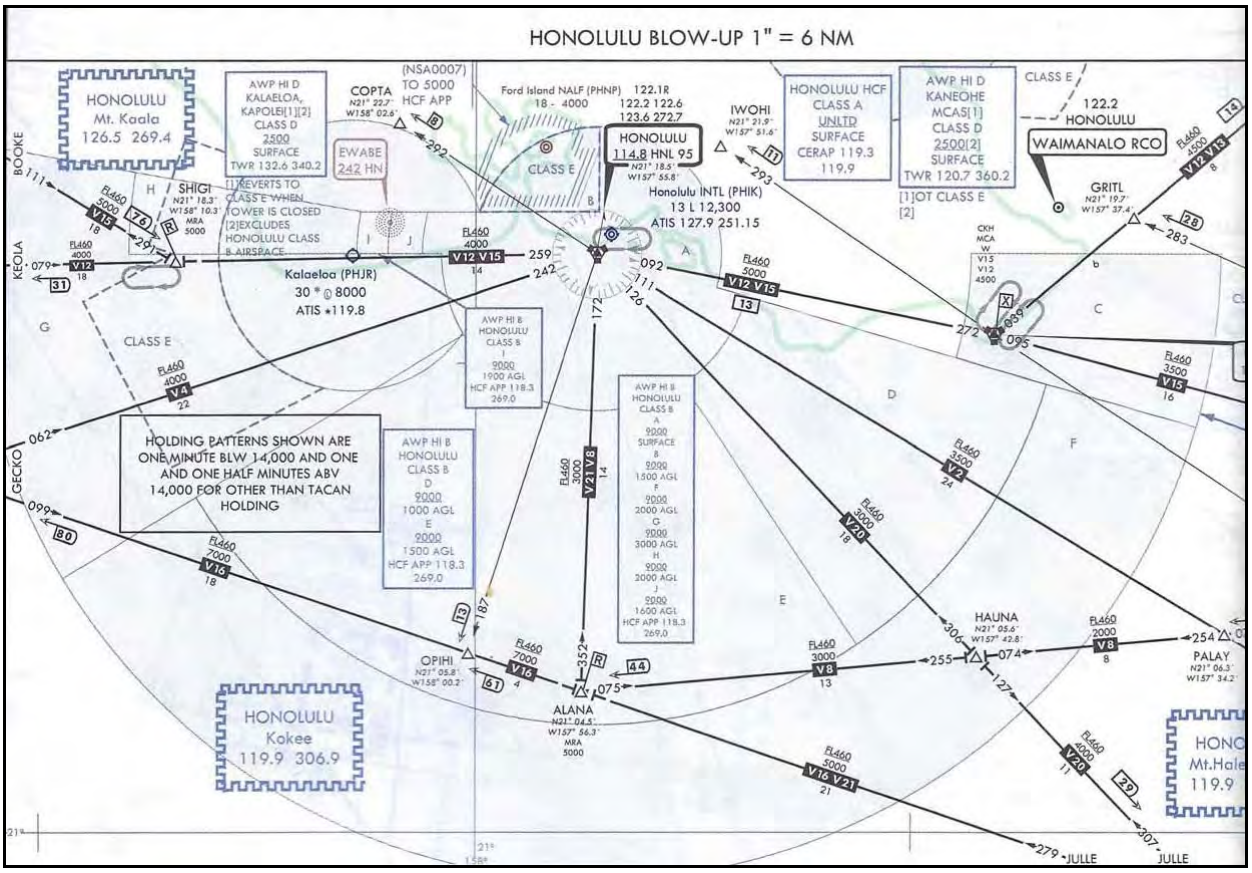


Figure 3.12-2. Honolulu Enroute Chart

As of January 2009, there were 22 aircraft based on the airfield and aircraft operations averaged 383 a day (81% general aviation, 18% military, 1% air taxi). Kalaeloa Airport has three active runways; one 8,000 feet by 200 feet (RW 4R/22L), one 6,000 feet by 200 feet (RW 11 and RW 29), and one 4,500 feet by 200 feet (RW4L/22R) (AirNav 2009). There are two published approaches to Kalaeloa Airport, a NDB RWY 4R and a VOR/DME or TACAN RWY 4R. Takeoff minimums/restrictions for departures can be found in the DoD Flight Information Publication (terminal high and low altitude documents). Airspace management is complex in the Kalaeloa Airport vicinity due to proximity of the Honolulu IAP. Kalaeloa Airport Class D airspace (surface to 2,500 feet agl) is active when the tower is operational (0600 to 2200 daily) and reverts to Class E airspace when the tower is closed. The Class D airspace also excludes Honolulu IAP Class B airspace. Honolulu IAP Class B airspace is sub-divided into 10 sectors (A through J) which allows for VFR arrivals and departures for Kalaeloa Airport when flying below the Class B airspace (AirNav 2009).

3.12.2.2 Training Airspace

Tactical flight training for the HIARNG occurs in Alert Area A311, Restricted Areas R3110B/C which are located to the north and northwest of Honolulu (Figure 3.12-3), and other locations throughout the Island. Routes to and from the training area are VFR and flight paths are random (following VFR flight rules). Due to the nature of VFR flying, current operations are not impacted by airspace management or existing flight routes.

3.13 UTILITIES AND PUBLIC SERVICES

3.13.1 Definition of Resource

Utilities include electricity, telecommunications, potable water, wastewater, solid waste, and stormwater. Utility system capacity can be identified by the existing infrastructure in place to provide the utility service, and can be further described in terms of the supply and demand for those utilities. Public services include schools and police, fire, and emergency services.

3.13.2 Existing Conditions

3.13.2.1 Utilities

Electricity

The Hawaiian Electric Company (HECO) is a public utility that provides electricity to homes and businesses island-wide. Specifically, the Kahe Power Plant is the primary power generating facility for the island of Oahu and is located approximately four miles northwest of Kalaeloa. The Navy Public Works Center (PWC) owns and operates the existing electrical distribution system at Kalaeloa. The primary source of power to the proposed HIARNG site is via three substations located on the north side of the property. This system is a combination of overhead and underground lines at both 11.5 and 4.16 kilovolts (Earth Tech 1998b). The proposed HIARNG facilities have an existing installed transformer capacity that is more than adequate to meet the new demands of the Proposed Action. However, the underground system shares a majority of manholes with the telephone distribution system. This will make it difficult for HECO to take over the power system after the HIARNG relocation. Electricity usage at Kalaeloa as well as at the HIARNG aviation units at Wheeler Army Airfield is provided in Table 3.13-1. Propane is also used at Kalaeloa.

Table 3.13-1. Hawaii Army National Guard Annual Energy Usage

HIARNG Location	*Electricity (kWh)*	*Propane (gallons)*
Kalaeloa	3,776,575	2,795
HIARNG Aviation Units at Wheeler AFB	353,834	0
Fort Ruger Units that would move to Kalaeloa	300,000*	0
Total	4,430,409	2,795

Note: Usage is for October 2008 to September 2009.
*Usage is estimated.

Figure 3.12-1. Airspace Associated with Flight Training

Telecommunications

Both Hawaiian Telcom and the Federal Oahu Telephone System lines serve the existing infrastructure at Kalaeloa, however, Hawaiian Telcom services all of the lines. Telephone infrastructure is not at capacity, but it is anticipated that that upgrades will be implemented as the Kalaeloa area is developed (Jacobs 2007).

Potable Water

The current primary potable water source at the former BPNAS is the Barber's Point well located near Makakilo, several miles north of Kalaeloa (Earth Tech 1998b). The well was constructed in the early 1940's and is equipped with two deep well turbine pumps capable of pumping up to 6,000 gpm (2,800 gpm and 3,200 gpm each). Potable water storage is provided by two underground reinforced concrete reservoirs which were also constructed in the early 1940's. The system supplying HIARNG Kalaeloa is still managed by the Navy. Current water use by HIARNG is listed in Table 3.13-2.

Table 3.13-2. Hawaii Army National Guard Annual Water Use

HIARNG Location	*Estimated Water Use (gallons)*
Kalaeloa	23,227,000
HIARNG Aviation Units at Wheeler AFB	591,000
Fort Ruger Units that would move to Kalaeloa	500,000*
Total	24,318,000

Note: Usage is for October 2008 to September 2009.
*Usage is estimated

Wastewater

Kalaeloa is included in the City of Honolulu's regional wastewater system and service is provided by the Honouliuli wastewater treatment plant (WWTP) through a series of gravity mains. The system is built of 15.3 miles of 4 inch – 30 inch diameter pipes, 12 lift stations and 7.3 miles of 4-18 inch diameter force mains (Gray et al. 1995). The main is located along the northern edge of the site along the Saratoga Avenue frontage. According to Navy PWC operational data for all of 1991, the average daily wastewater flow generated from Navy personnel and residents at BPNAS was approximately 0.57 MGD (US Navy 1999).

The main lift station 3R, located in the southern portion of Kalaeloa, is the only station that pumps wastewater generated from the HIARNG facility to Honouliuli WWTP. Investigation of the existing system when BPNAS closed determined that there is sufficient flow capacity to support future development of the area (Gray et al. 1995).

The Honouliuli WWTP presently has a design average dry weather flow capacity of 38 million gallons per day (mgd), with future plans to expand its capacity to 51 mgd (http://www.hwea.org/honouliuli-wrf). Currently, wastewater undergoes advanced primary treatment and is ocean-discharged.

It was estimated that with a total of 1,750 personnel at HIARNG Kalaeloa there would be a total sewerage treatment requirement for 0.06 mgd (Earth Tech 1998b). Assuming operation for 250 days per year, this is 15 million gallons annually. Currently, there are approximately 1500 personnel at Kalaeloa which are estimated to produce 11.1 million gallons of wastewater annually. The proposed action would add 374 full-time personnel Monday through Friday and 514 National Guard personnel on training weekends. Accordingly, the present capacity of Honouliuli WWTP is sufficient to accommodate the present and potential increases in wastewater flow resulting from the Proposed Action.

Solid Waste

The City and County of Honolulu Department of Public Works (DPW) has two main disposal facilities: the 1,800 ton/day H-POWER refuse to energy plant at Campbell Industrial Park and the Waimanalo Gulch Landfill in Ewa. There are no solid waste landfills on the former NASBP (US Navy 1999).

Solid waste generated at the HIARNG Kalaeloa facility includes general office waste, high- and low-grade paper, aluminum cans, newspaper, plastic, wooden pallets, and cardboard waste from packing and storage activities (HIARNG 2003b). The facility also generates industrial waste such as scrap metal and wood from vehicle and equipment activities. Special waste, such as lead-acid batteries, used motor oil, unserviceable tires and bulky items are also produced by HIARNG (Earth Tech 2003).

Kalaeloa has five 30-cubic yard dumpsters, emptied by a contractor biweekly. The Wheeler Facility has four 2-cubic yard dumpsters serviced twice a week (HIARNG 2003b). Total current waste generation estimates are shown in Table 3.13-3.

Table 3.13-3. Solid Waste Generation at HIARNG Locations

HIARNG Location	*Estimated Solid Waste Generation (tons/yr)*
HIARNG Kalaeloa	43
HIARNG Aviation Units at Wheeler AFB	65
Fort Ruger Units Moving to Kalaeloa	20*
Total	185.3
Source: Earth Tech 2003 *Note:* *Out of a total of 80 tons/yr, it is assumed that 25% is generated by units moving to Kalaeloa.	

3.13.2.2 Public Services

Schools

The Kalaeloa area is located within the State Department of Education's (DOE) Leeward District Kapolei Complex. Schools in this complex include four elementary schools (Mauka Lani, Makakilo, Kapolei and Barbers Point), Kapolei Middle School, and Kapolei High School. Barbers Point Elementary School is located within the Kalaeloa District and was originally constructed to serve families living at the former Naval Air Station.

The DOE has projected a need by 2030 for eight new elementary schools, three new intermediate schools, and at least one new high school in Ewa to accommodate development within the area (DPP 2008). The

Kalaeloa Master Plan identifies three school locations including the existing Barbers Point Elementary School (HCDA 2006).

Police, Fire, and Emergency

The City and County of Honolulu (CCH) Police Department provides police protection services for the Kalaeloa District from its Kapolei district police station headquarters. The CCH Fire Department Battalion 4 (West Oahu) provides fire protection services from the Kapolei and Makakilo Fire Stations. Federal Fire Department Station No. 12 currently protects Navy housing and Coast Guard assets within the Kalaeloa District. Ambulance units closest to the Kalaeloa District are located in Kapolei and the Waipahu Fire Station and there is a Rapid Response unit located at Saint Francis Medical Center West in the Ewa Beach area. The State Department of Transportation (DOT) maintains an airfield crash and rescue operation for its Kalaeloa Airport facility.

3.14 AESTHETICS

There are no special scenic vistas or viewplanes in the HIARNG Kalaeloa area. Topography is relatively flat and there are no ocean views or views of other special land or architectural features from the facility. To the north the Waianae Mountains gradually rise to elevations of several thousand feet.

SECTION 4
ENVIRONMENTAL CONSEQUENCES

4.1 EVALUATION METHODOLOGY

The analysis presented in this section represents an examination of the potential effects of the proposed action and alternatives (as described in Section 2) relative to the existing environmental conditions in each defined Region of Influence (ROI) or Areas of Effect (APE) (as described in Section 3). Potential environmental consequences that would result from the proposed action or alternatives are presented for each resource area in the same sequence presented in Section 3.

Temporary and permanent, direct and indirect impacts are evaluated. As defined by HAR 11-200-2, indirect impact or secondary impact means "effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." Indirect effects could include induced changes in the pattern of land use and related effects on air and water and other natural systems.

4.2 LAND USE

4.2.1 Approach to Analysis

Significance of potential land use impacts is dependent upon the level of land use sensitivity in areas affected by a proposed action. In general, land use impacts would be significant if they would: 1) be inconsistent or in non-compliance with applicable land use plans or policies, 2) preclude the viability of an existing land use activity, 3) preclude continued use or occupation of an area, 4) be incompatible with adjacent or vicinity land use to the extent that public health or safety is threatened, or 5) conflict with airfield planning criteria established to ensure the safety and protection of human life and property. Impacts to the coastal zone would be significant if land use and/or operations proposed do not meet the requirements and uses specified in the Hawaii Coastal Zone Management Act, HRS Chapter 205A.

4.2.2 Impacts

4.2.2.1 Proposed Action

Land Use Impacts

The U.S. Navy used the parcel for air, industrial and administrative operations. The U.S. Coast Guard and a state-operated commuter airport currently use the adjacent runway, thus aviation operations do not constitute a change in land use for the area. The Proposed Action does not present a conflict with land use as guided by the Kalaeloa Community Redevelopment Plan and the Ewa Development Plan, both of which designate the affected area for military use. Aviation operations in the Proposed Action would be consistent with the HCDA Master Plan that specifies uses of the Kalaeloa airport.

The proposed action would enhance the safety and efficiency of training operations and provide adequately sized and properly configured facilities to support the HIARNG mission requirements. In addition, all projects would be designed and sited to be compatible with existing land use and airfield safety guidelines.

Indirect impacts to off-installation land use as a result of the proposed action are not expected. The increase in personnel associated with the relocation of the HIARNG would result in minimal demand for housing and community services in the local area. In the context of the greater area, this increase is not expected to be of a magnitude to affect community land use and growth patterns. No change to land ownership is required to implement the Proposed Action.

Overall, HIARNG use of the Kalaeloa parcel for aviation operations and maintenance, administration, and personnel training would not present a significant impact to Kalaeloa area land use plans and policies.

Coastal Zone Impacts

The HIARNG Kalaeloa site is approximately one mile from the coast. Coastal zone resource components described in HRS Chapter 205A and effects to them are described below.

Recreational Resources: Provide coastal recreational opportunities accessible to the public.

The proposed changes at HIARNG Kalaeloa are not anticipated to affect existing coastal recreational resources. Access to and along the shoreline areas would not be affected by the proposed project. Average noise levels due to proposed aircraft operations would not increase significantly over current noise levels at Kalaeloa Airport.

Historic Resources: Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Buildings eligible for listing on the National Register of Historic Places are present on the HIARNG Kalaeloa facility. All these buildings would be retained. No significant archeological resources are known to be present on the site.

Scenic and Open Space Resources: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

The proposed HIARNG Kalaeloa site is at an inland location and would be developed to ensure visual compatibility with the surrounding area which is highly developed.

Coastal Ecosystems: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Development of the HIARNG Kalaeloa site is not expected to adversely impact coastal ecosystems. Construction and site design would employ BMPs and practices to minimize erosion and stormwater runoff. Demolition procedures would contain any potential pollutants from migrating from the site. Stormwater runoff would be controlled to prevent flow to the ocean. HIARNG would strive to achieve LEED silver standards for new construction to minimize stormwater runoff and any runoff would be controlled.

Economic Uses: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Development would be in an area currently used similarly to that proposed and in accordance with the Kalaeloa Master Plan. The project would not affect coastal development. The proposed site is inland and would not affect coastal development necessary to the state's economy.

Coastal Hazards: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

The proposed HIARNG facility lies within Zone D, outside of the 100-year flood zone. BMPs would be employed to minimize erosion or release of pollutants during construction. Construction and operations would not be near erosion prone areas.

Managing Development: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

This EA has been prepared for public review in compliance with HRS Chapter 343 and NEPA. In addition, applicable state, county, and Kalaeloa Master Plan requirements would be adhered to in the design and construction of the facilities.

Public Participation: Stimulate public awareness, education, and participation in coastal management.

A public presentation is planned as part of the planning process for this proposed action. Opportunities for comment and input on the Proposed Action include pre-consultation with agencies, public notification, and a 30-day comment period on the draft EA. In addition, responses to public and agency comments will be included in final versions of this EA.

Beach Protection: Protect beaches for public use and recreation.

The proposed project would have minimal impact on shoreline activities due to its inland location. As such, no construction is proposed in erosion prone areas or areas effecting sand transport.

Marine Resources: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

The proposed project would not adversely impact marine resource sustainability due to its inland location and distance from marine resources. The project is compatibility with surrounding land uses and Hawaii's Ocean Resource Management Plan.

Summary of Potential Coastal Zone Resource Impacts

Based on the considerations described above, impacts to the coastal zone would not be significant.

4.2.2.2 Alternative 1

The action as proposed under Alternative 1 would have the same impacts to land use and coastal resources as the Proposed Action.

4.2.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed projects would not occur. Baseline conditions, as described in Section 3.2, would remain unchanged. Therefore, potential impacts to land use and coastal resources from implementation of the no-action alternative would be minimal and not significant.

4.2.2.4 Special Procedures

Implementation of the proposed action would result in beneficial (but not significant) impacts to land use. No special procedures would be necessary to reduce impacts to below significant levels.

4.3 AIR QUALITY

4.3.1 Approach to Analysis

Emission thresholds associated with Federal CAA conformity requirements are the primary means of assessing the significance of potential air quality impacts associated with implementation of the proposed alternatives. A formal conformity determination is required for Federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds. Potential impacts are evaluated based on estimated direct and indirect emissions associated with implementation of the proposed alternatives. Air quality impacts would occur if implementation of the proposed alternatives would directly or indirectly:

- produce emissions that would be the primary cause or significantly contribute to a violation of state or Federal ambient air quality standards;
- establish land uses that would expose people to localized (as opposed to regional) air pollutant concentrations that violate state or Federal ambient air quality standards;
- cause a net increase in pollutant or pollutant precursor emissions that exceeds relevant emission significance thresholds (such as CAA conformity *de minimis* levels or the numerical values of major source thresholds for nonattainment pollutants);
- conflict with adopted air quality management plan policies or programs;
- foster or accommodate development in excess of levels assumed by the applicable air quality management plan; or
- expose sensitive receptors (e.g., schools, housing, childcare centers, etc.) to substantial pollutant concentrations or create objectionable odors affecting a substantial number of people.

4.3.2 Impacts

4.3.2.1 Assumptions

Air quality impacts from the proposed action would occur from (1) combustion emissions due to the use of fossil fuel-powered equipment; (2) fugitive dust emissions (PM_{10}) during earth-moving activities and the operation of equipment on bare soil; and (3) VOC emissions from application of asphalt materials during paving operations. Total emissions resulting from project activities have been estimated using data presented in Chapter 2, general air quality assumptions, and standard emission factors. The proposed action includes in total the renovation of eleven structures, demolition of one building, and the

construction of five new structures and motor vehicle and privately owned vehicle parking. To estimate annual emissions associated with construction for the proposed action, it was assumed that the following equipment would be used in the construction phase:

- *Building Renovations*: concrete/industrial saws, forklifts, hand construction tools (powered with air compressors), and welders;
- *New Building Construction*: excavator, grader, crane, aerial lifts, forklifts, welders, cement/mortar mixer, and pavers;
- *Parking Construction/Gateway Improvements*: grader, roller, pavers; and
- *Demolition*: dozer, tractor/loader/backhoe, and off-highway trucks.

In addition, it was assumed that heavy-duty trucks would be required to deliver materials to the site and/or transport waste from the site.

A list of estimated equipment required for construction, estimates of workforce requirements, and haul truck travel is provided in Appendix C, along with the emission calculations for all construction and operational activities.

4.3.2.2 Proposed Action

Construction Impacts

Emissions associated with construction activities were calculated on a year-by-year basis. The calculations use Tier 1 emission factors as a conservative estimate of overall emissions from off-road construction equipment, and emission factors from the MOBILE6 model to calculate emissions from construction delivery trucks and construction worker vehicles. Fugitive dust emissions were estimated using an emission factor of 0.11 tons/acre-month (Midwest Research Institute 1996). The estimates assume 10 acres total of grading/surface disturbance activities would be required over a 3-month period. Fugitive dust emissions from demolition activities were estimated based on the square footage of Building 282, which is to be demolished. The calculation uses an emission factor of 0.00042 lbs PM_{10}/cubic feet of building volume to be demolished (South Coast Air Quality Management District 1993). Accordingly, the building's volume is estimated to be twenty times its square footage (20 x 114,359 sq. ft.) for a total volume of 2,287,180 cubic feet. Demolition of Building 282 would generate approximately 0.48 tons of PM_{10}, whereas $PM_{2.5}$ produced would be approximately 21% of PM_{10} fugitive dust, or about .10 tons.

Table 4.3-1 provides a summary of the annual emissions due to construction at Kalaeloa HIARNG for the proposed action.

Table 4.3-1. Annual Emissions Due to Construction for the Kalaeloa HIARNG Relocation

Emission Source	*Air Pollutant Emissions (tons)*					
	CO	*NOx*	*VOC*	*SOx*	*PM10*	*PM2.5*
2011						
Fugitive Dust	-	-	-	-	3.30	0.69
Heavy Construction Equipment	23.27	20.73	1.06	2.99	1.32	1.18
Construction Trucks	0.27	1.21	0.08	0.00	0.03	0.03
Worker Vehicles	9.94	0.76	0.77	0.01	0.03	0.03
Total 2011	**33.48**	**22.70**	**1.91**	**3.00**	**4.68**	**1.93**
2012						
Fugitive Dust	-	-	-	-	3.30	0.69
Heavy Construction Equipment	10.21	8.76	0.45	1.26	0.54	0.48
Construction Trucks	0.22	1.04	0.08	0.00	0.03	0.03
Worker Vehicles	9.35	0.69	0.71	0.01	0.03	0.03
Total 2012	**19.78**	**10.49**	**1.24**	**1.27**	**3.90**	**1.23**
2013						
Fugitive Dust	-	-	-	-	3.30	0.69
Heavy Construction Equipment	13.31	11.28	0.63	1.63	0.68	0.61
Construction Trucks	0.19	0.89	0.07	0.00	0.03	0.03
Worker Vehicles	8.92	0.63	0.66	0.01	0.03	0.03
Total 2013	**22.42**	**12.80**	**1.36**	**1.64**	**4.04**	**1.36**
2014						
Fugitive Dust	-	-	-	-	3.30	0.69
Fugitive Dust – Demolition	-	-	-	-	0.48	0.10
Heavy Construction Equipment	46.74	39.10	1.50	5.64	2.34	2.09
Construction Trucks	0.17	0.76	0.07	0.00	0.02	0.02
Worker Vehicles	8.57	0.57	0.63	0.01	0.03	0.03
Total 2014	**55.48**	**40.43**	**2.20**	**5.65**	**6.17**	**2.93**

As shown in Table 4.3-1, emissions would be below the Federal CAA major source threshold of 250 tons per year for all construction phases. Construction emissions would therefore be less than significant with implementation of the proposed action.

Operational Impacts

Operational emissions associated with the proposed action would include emissions associated with aircraft operations and associated personnel increases. It should be noted that the operations would actually be transferring to Kalaeloa from other locations in Hawaii to consolidate functions; therefore, emissions may not represent an increase over current, state-wide emissions. For conservative purposes, no net emissions calculations were conducted to account for reductions at other installations.

Emissions from the proposed action would include (1) operations of aircraft transferring to the Kalaeloa HIARNG; (2) personal-owned vehicles (POVs) and government-owned vehicles (GOVs) associated with the basing of personnel at Kalaeloa HIARNG; and (3) ground/tactical support equipment (GSE/TSE) operations. It was assumed that the proposed action would result in no increases in use of government-owned vehicles or stationary sources.

As discussed in Chapter 2, aircraft that would be based at Kalaeloa HIARNG would include the following:

- 12 Chinook helicopters (model CH-47D);
- 5 Blackhawk helicopters (models UH-60 and UH-60M); and
- 2 light utility helicopters (models OH-58 or UH-72A);
- 1 fixed-wing aircraft (model C-26E).

Operations were obtained from airfield modeling that was conducted for the noise analysis. Emissions for these aircraft types, and for GSE/TSE used in support of aircraft operations, were calculated using the FAA's Emissions and Dispersion Modeling System (EDMS) (CSSI 2005), which provides emission factors for aircraft operations at various airfields. Kalaeloa airfield was selected in the model, and emissions were calculated based on the number of landings and takeoffs anticipated. For conservative purposes, touch-and-go operations were modeled as a combination landing and takeoff cycle.

Emissions from POVs and GOVs were calculated based on the anticipated usage and number of trips projected on a daily basis. Emission factors for vehicles were obtained from the USEPA's MOBILE6 emissions model (USEPA 2003), which was run for climatic conditions at Kalaeloa and provided emission factors in grams/mile. Emission calculations for all operational sources are provided in Appendix C.

Table 4.3-2 presents emissions for the proposed action, assuming full transfer of personnel and operations and completion of all construction projects by the year 2015. These data show that annual emissions would not exceed the significance threshold of 250 tons per year established by the Federal CAA for any criteria pollutant. Operational emissions would therefore be less than significant with implementation of the proposed action.

Table 4.3-2. Annual Emissions Due to Operations for the Kalaeloa HIARNG Relocation

Emission Source	*Air Pollutant Emissions (tons)*					
	CO	*NOx*	*VOC*	*SOx*	*PM10*[1]	*PM2.5*[1]
Aircraft Operations	59.61	3.18	25.85	1.57	N/A	N/A
GSE/TSE	1.243	4.50	0.345	0.011	0.279	0.271
GOVs	0.45	0.04	0.04	0.00	0.00	0.00
POVs	39.35	2.50	2.89	0.046	0.13	0.13
Total Annual Operational Emissions	**100.65**	**10.22**	**29.13**	**1.63**	**0.41**	**0.40**
Note: [1]Emission factors for PM_{10} and $PM_{2.5}$ for aircraft are not currently available in EDMS.						

4.3.2.3 Alternative 1

The action as proposed under Alternative 1 would have the same impacts to air quality as the Proposed Action.

4.3.2.4 No-Action Alternative

Under the No-Action Alternative, the proposed construction and demolition activities and subsequent operations would not occur. Baseline air quality conditions, as described in Section 3.3, would remain

unchanged. Therefore, no significant impacts to air quality would occur as a result of implementation of the No-Action Alternative.

4.3.2.5 Special Procedures

Demolition would include best management practices (BMPs) (e.g., watering and covering) to control dust from demolition debris. During construction dust would be controlled with appropriate dust fencing. All construction activities would comply with regulations for fugitive dust control under HAR Section 11-60.1-33 that require reasonable precautions to prohibit visible fugitive dust beyond the property line.

4.4 NOISE

4.4.1 Approach to Analysis

The primary factors considered in determining the significance of potential noise impacts is the extent or degree to which implementation of the proposed action or alternatives would alter the current noise environment and affect sensitive receptors and land use in the ROI. Land-use compatibility is currently the accepted measure of aircraft noise effect according to guidelines developed by the Federal Interagency Committee on Urban Noise (FICUN 1980) and subsequently included in FAA Order 1050.1E (FAA 2006). In general these guidelines indicate that all land uses, including residential and schools, normally are compatible with outdoor Day-Night Average Sound Levels (DNL values) less than 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. Potential changes in the noise environment can be beneficial (i.e., if the number of sensitive noise receptors exposed to unacceptable noise levels is reduced), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse, (i.e., if they result in increased exposure to unacceptable noise levels).

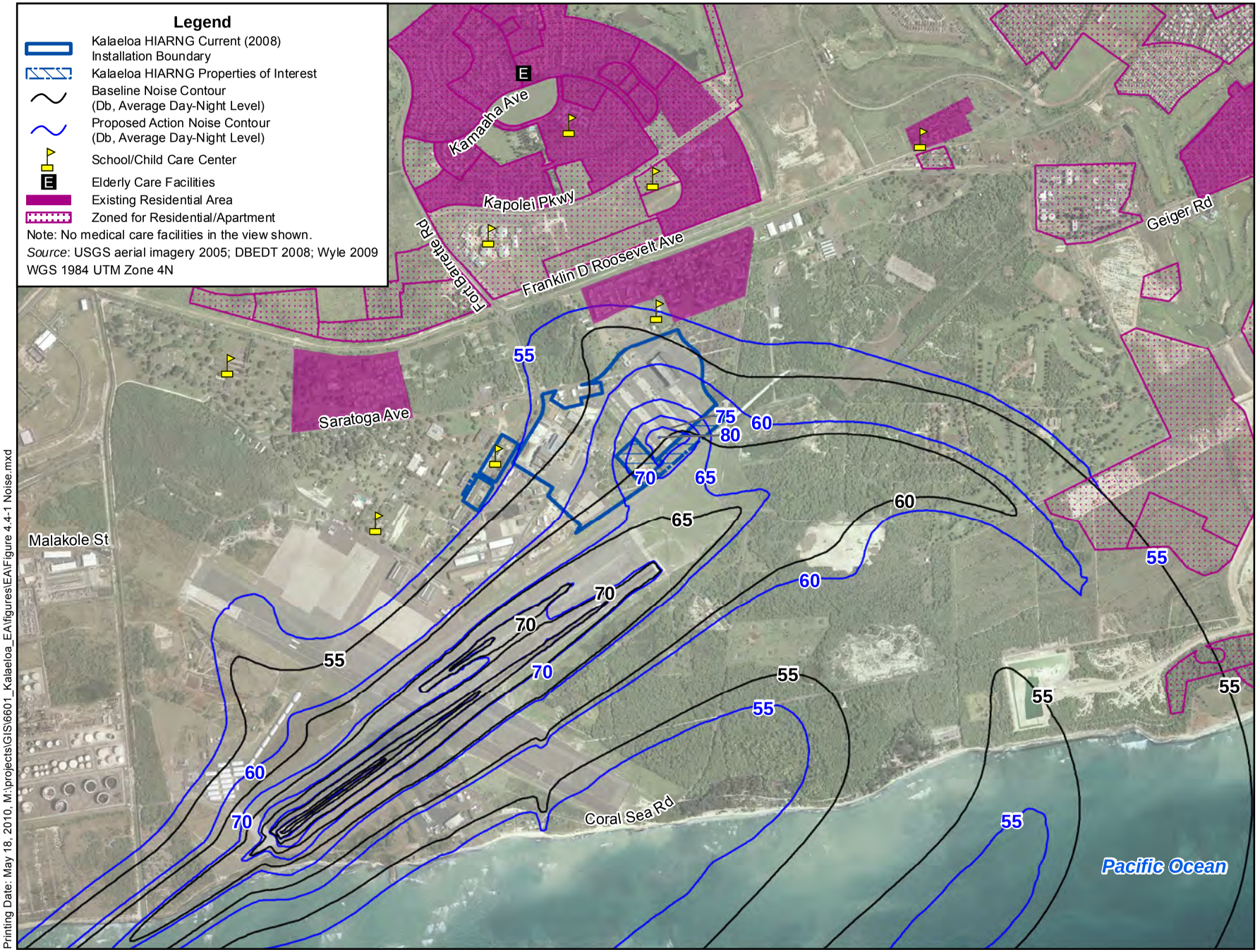
4.4.2 Impacts

4.4.2.1 Proposed Action

<u>Aircraft Activity and Maintenance</u>

Under the proposed action, average noise levels in the vicinity of Kalaeloa HIARNG and Kalaeloa Airport would increase slightly from baseline conditions. Total aircraft operations at the Kalaeloa airport would increase from 142,515 operations annually to an estimated 157,290 annually (a 10% increase). Figure 4.4-1 presents the baseline and projected average DNL noise contours in the vicinity of Kalaeloa HIARNG and Kalaeloa Airport. Proposed HIARNG aircraft operations would utilize existing runways and flight paths at Kalaeloa Airport and would therefore be similar to activities currently taking place at Kalaeloa Airport. Noise contours associated with proposed aircraft would extend only slightly beyond baseline contours (Figure 4.4-1). Project increases in noise average levels would be greatest in the area around and including the AASF due to maintenance (run-ups) on aircraft. The proposed run-ups would primarily be at idle power and would occur during the daytime period. None would occur during the nighttime (10 p.m. to 7 a.m.). The 65 dB (DNL) contour associated with increased noise levels does not extend outside of Kalaeloa HIARNG or Kalaeloa Airport and does not impact any noise-sensitive receptors such as the day-care center north of HIARNG Kalaeloa or residential areas. Therefore, no

significant noise impacts would occur from proposed aircraft activity and maintenance at Kalaeloa HIARNG and Kalaeloa Airport under the proposed action.



Printing Date: May 18, 2010, M:\projects\GIS\6601_Kalaeloa_EA\figures\EA\Figure 4.4-1 Noise.mxd

Feet
0 1,200 2,400
0 320 640
Meters

Figure 4.4-1
Aircraft Noise Levels for the Proposed Action
Kalaeloa, Oahu, Hawaii
May 2010

N
W E
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Ground-Based Activity

Under the proposed action, minor, temporary impacts to the noise environment in the vicinity of the proposed construction and demolition sites would occur. The use of heavy equipment for site preparation and development (e.g., vegetation removal, grading, and back fill) would likely generate brief increases in noise above average ambient levels. However, noise levels would be typical of standard construction activities, would cease with the completion of proposed construction and demolition activities, and would only occur during normal working hours (i.e., between 7:00 a.m. and 5:00 p.m., Monday through Friday).

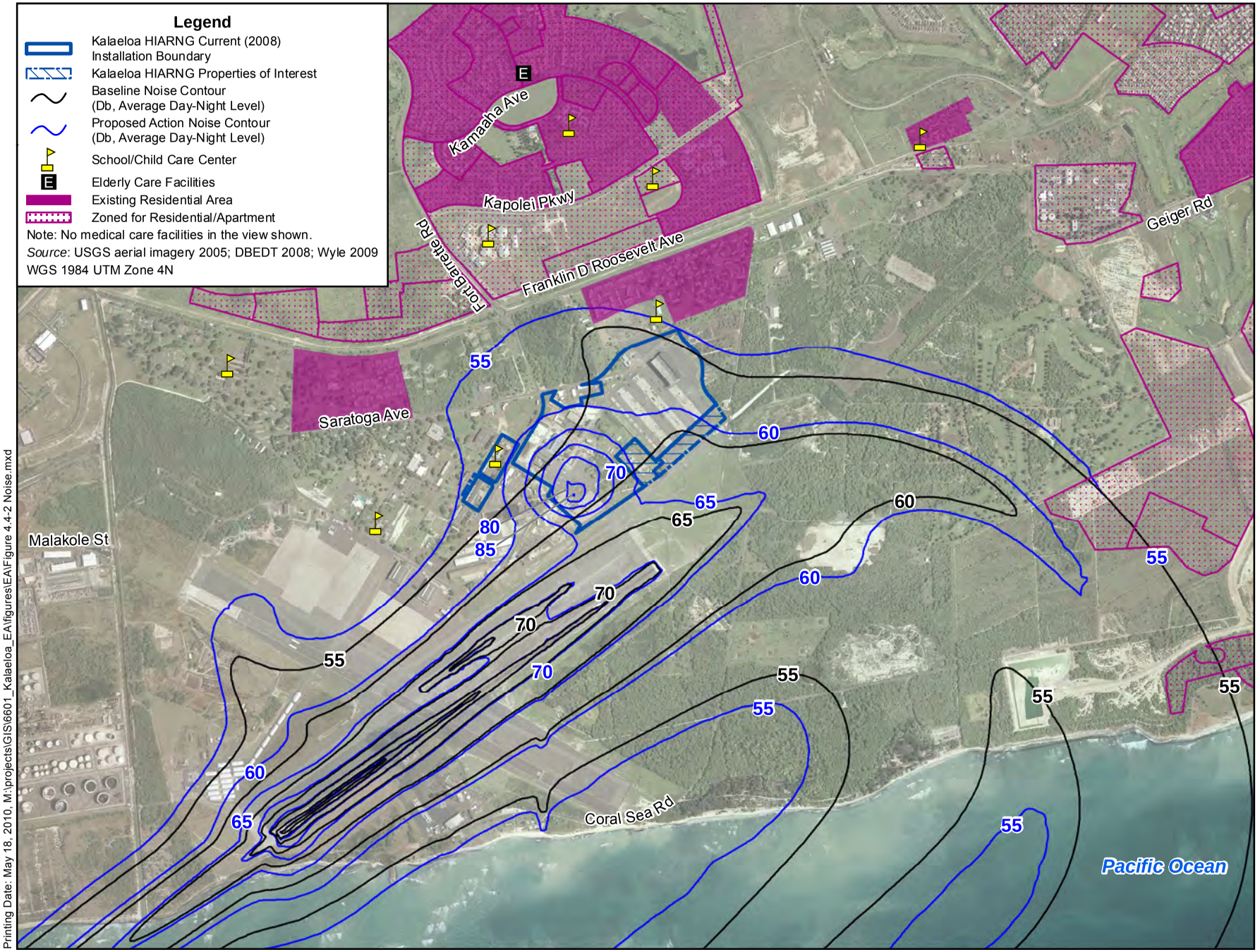
Construction equipment noise levels vary widely as a function of the equipment used and the activity level, or duty cycle. In a typical construction project, the loudest short-term noise levels for a few minutes during each cycle are those of earth-moving equipment, operating under full load, which are on the order of 85-90 dBA at a distance of 50 feet from the equipment (USEPA 1971). Construction equipment noise is considered to be a "point source," and attenuates over distance at a rate of 6 dBA for each doubling of distance. Thus, a noise level of 85 dBA at 50 feet would attenuate to 79 dBA at 100 feet and 73 dBA at 200 feet away from the source. During excavating, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement and site preparation. Although peak noise levels may be 85-90 dBA at a distance of 50 feet during some construction activities, the nearest noise-sensitive receptors (residential areas) are located approximately 1,000 feet from the installation. Thus, noise levels at these residential areas would not exceed ambient levels and no noise impacts would occur. In addition, the operation and use of the proposed facilities would not generate appreciable noise levels and the noise environment within the ROI would continue to be dominated by aircraft operations. Therefore, no significant noise impacts from proposed construction activities would occur with implementation of the proposed action.

4.4.2.2 Alternative 1

The AASF would be located in the southwestern portion of the parcel, placing noise sources associated with maintenance run-up activities further from the nearest residential areas and day-care center (located to the north of the HIARNG parcel) than under the proposed action. This shifts average noise levels generated from the AASF maintenance operations to the southwest (Figure 4.4-2) with the higher noise levels in particular shifted. Sensitive noise receptors are still all outside the 60 db (DNL) level. Overall, potential noise-related impacts associated with the aircraft activity, maintenance, and construction activities would not differ appreciably from those described above for the proposed action. Therefore, no significant noise impacts would occur at HIARNG Kalaeloa and Kalaeloa Airport from implementation of Alternative 1.

4.4.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and demolition activities would not occur. Baseline noise conditions, as described in Section 3.2, would remain unchanged. Therefore, no significant impacts to noise would occur as a result of implementation of the No-Action Alternative.



Printing Date: May 18, 2010, M:\projects\GIS\6601_Kalaeloa_EA\figures\EA\Figure 4.4-2 Noise.mxd

Feet
0 1,200 2,400
0 320 640
Meters

Figure 4.4-2
Aircraft Noise Levels for Alternative 1
Kalaeloa, Oahu, Hawaii
May 2010

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4.4.2.4 Special Procedures

Proposed construction and demolition activities would only occur during normal working hours (i.e., between 7:00 a.m. and 5:00 p.m., Monday through Friday), thereby reducing the likelihood that construction noise would be an annoyance. However, even without such a schedule, noise impacts would not be significant and no mitigations or special procedures beyond limitation of the time of day that construction and demolition activities may occur would be necessary to reduce impacts to below significant levels.

HIARNG has a Statewide Operational Noise Management Plan (HIARNG 2007b) that describes its noise management program and specific noise management procedures at each of its facilities, including Kalaeloa and the aviation operations at Wheeler Army Airfield. The plan includes general procedures for responding to noise complaints and these procedures would be applied for proposed future operations at Kalaeloa. With respect to proposed operations at Kalaeloa, aircraft flight routes could be adjusted in response to any noise complaints or issues identified, subject to approval by the FAA and Kalaeloa Airport.

4.5 GEOLOGY AND SOILS

4.5.1 Approach to Analysis

The protection of unique geologic features, minimization of soil erosion, and the location of facilities in relation to potential geologic hazards are considered when evaluating impacts of a proposed action. Generally, impacts on geological resources are not significant if proper construction techniques and erosion control measures are implemented to minimize or mitigate short- and long-term disturbance to soils. The analysis below focuses on soil disturbance resulting from the proposed construction and demolition projects.

4.5.2 Impacts

4.5.2.1 Proposed Action

Construction Impacts

The soils at the sites for the proposed action are coral outcrop and mixed fill, and are described in detail in Section 3.5. These types of soils are assumed to be of sufficient quality to support the HIARNG HQ building and no streams, rivers, or wetlands exist on-site. The Proposed Action is not located on soils categorized as prime or unique farm lands.

Implementation of the proposed construction and demolition activities would not significantly affect the geologic units underlying the installation. The proposed project sites are all on relatively flat terrain. While the proposed construction activities would require excavation, grading, and placement of fill material, no important topographic features would be affected and excavation and grading activities would not be excessive. Consequently, no significant impacts to topography would occur as a result of the proposed action.

It is estimated that 75 to 85% of all proposed new building footprints would be located on existing paved surfaces. Much of the construction for the proposed projects would occur in areas currently covered with concrete, asphalt, and buildings. BMPs would be implemented to prevent erosion during the construction process. Construction would result in the displacement of soil as a part of earthmoving and cut and fill operations for facility construction and renovation, however it is unlikely to lead to significant soil loss and thus would not create a significant impact on soil resources.

HIARNG would strive to achieve LEED silver design guidelines for new construction so that stormwater would be efficiently handled and soil erosion minimal. Overall, impacts to soil resources would not be significant.

Construction would include the clearing of trees, grasses, and/or other vegetation. The amount of soil displaced is incidental; BMPs would be used to manage erosion during construction. Spill countermeasures would be employed to prevent contamination of soil during any fueling and maintenance practices on construction equipment. Also, efforts would be made during the construction process to reduce the number of construction exits, which would result in a lower potential for sediment tracking off site. Measures would be taken to control erosion; details are described under water resources (Section 4.6). Overall, soil resources of the area would not be significantly impacted.

Operational Impacts

Ongoing operations and maintenance activities could also result in soil contamination from POL leaks or releases during refueling operations, vehicle and aircraft use, and maintenance activities (see Section 4.11). Some of the repair and renovation projects would provide improvements to facilities with hazardous materials which would lessen the potential for POL leaks or releases during ongoing operations at the installation. Overall, soil resources of the area would not be significantly impacted from ongoing operations at Kalaeloa.

4.5.2.2 Alternative 1

Reconfiguration of facilities as proposed under Alternative 1 would have the same impacts to geology and soils as the Proposed Action.

4.5.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and demolition activities would not occur. Baseline geological conditions, as described in Section 3.5, would remain unchanged. Therefore, no significant impacts to geological resources would occur as a result of implementation of the No-Action Alternative.

4.5.2.4 Special Procedures

No special procedures would be necessary.

4.6 WATER RESOURCES

4.6.1 Approach to Analysis

The analysis of water resources addresses all surface and groundwater resources that could potentially be affected by the proposed construction and renovation activities and subsequent operations. Significant impacts to water resources could potentially occur if the proposed action resulted in changes to water quality or supply. Significant impacts would also be considered if the Proposed Action threatened or damaged unique hydrologic characteristics, endangered public health by creating or worsening health hazards. Similarly, an impact would be considered if it resulted in a violation of established laws, regulations or permit requirements.

Impacts associated with flood hazards would be significant if projects associated with the proposed action would be subject to flood damage, flood hazards or would contribute to flooding on adjacent properties.

4.6.2 Impacts

4.6.2.1 Proposed Action

Construction Impacts

Stormwater

Construction activities of the Proposed Action could cause a temporary increase in stormwater runoff and total suspended particulate matter in the runoff. Management of stormwater runoff would be incorporated into the construction process. There are two conditions that can trigger regulatory stormwater control criteria during construction (per HAR Chapter 11-55, Appendix C): first, any disturbance of one acre or more of land, and second, any disturbance of "less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb one acre or more of total land area." If either of these conditions are met, a National Pollutant Discharge Elimination System (NPDES) General Permit Coverage Authorizing Discharge of Storm Water Associated with Construction Activities would be required. In addition, a Notice of Intent with the Hawaii Department of Health would be required. Both conditions are anticipated for the project, thereby requiring the preparation of plans for stormwater control during construction. The plans would incorporate BMPs to prevent storm water generated from the project from entering nearby waters (see Special Procedures below for more information). Because the proposed projects are likely to be implemented in an incremental and phased manner (i.e., relatively few projects in the same stage of construction at the same time), sources of stormwater runoff would be limited and readily controllable at any one point in time.

The selected construction contractor would be responsible for continuously maintaining all erosion and sediment control measures during the construction phase of the project. As part of a required BMP plan, aspects of the existing HIARNG Spill Plan measures also would be implemented during construction activities to prevent and/or minimize release of hazardous materials on to ground surfaces. Following project construction, soil erosion would be minimized by landscaping planting or paving any exposed soils, and by ensuring that any increased runoff from impenetrable surfaces is accommodated by the installation's storm water drainage system.

The BMPs described above would minimize effects to water resources during construction activities so that there would be no significant impacts from construction activities.

Operational Impacts

Stormwater and Industrial Discharge

HIARNG currently manages stormwater through discharge to drywells. The current amount of impervious surface area at the site is substantial (see Figure 2.1-1). Under the proposed action there would be an increase in impervious surface area, but any increase would be relatively small because nearly all the new building footprints would be on surfaces that are already paved. In addition, HIARNG would strive to achieve LEED silver standards for new construction and would incorporate techniques to maximize infiltration and minimize runoff. The overall effect would be a minimal, if any, increase in stormwater runoff.

Although new construction is expected to result in minimal, if any, stormwater discharge increases, there is inadequate stormwater drainage in the area of the existing aircraft washrack south of Building 282 (see Section 3.6). As part of the design and construction process for new buildings this stormwater runoff problem would be corrected. If it is determined that new drywells are the best stormwater control measure, an amendment to the existing UIC permit for stormwater disposal to drywells would be obtained from the Hawaii Department of Health.

All vehicle wash-racks and an aircraft wash facility associated with the aviation units would use re-circulating water systems so that there would be only infrequent sewer discharges. The facilities would incorporate a separator system to remove petroleum and solids. Disposal of these wastes would be in accordance with State and Federal requirements.

With implementation of the above measures, there would be no significant impacts resulting from stormwater discharges for planned operations.

Groundwater

Groundwater resources and potable water are not expected to be affected by the proposed action. Stormwater would be handled as described above. Design and construction of facilities where hazardous materials would be used and stored would meet HIARNG Spill Plan requirements and incorporate secondary containment and/or diversionary structures. These measures would prevent and/or minimize the potential for groundwater contamination from possible discharges of pollutants that could reach groundwater. Impacts to groundwater would not be significant.

4.6.2.2 Alternative 1

The impacts from the project siting alternative would not vary appreciably from those presented for the proposed action.

4.6.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and demolition activities would not occur. Baseline conditions for water resources, as described in Section 3.5, would remain unchanged. Therefore,

no significant impacts to water resources would occur as a result of implementation of the No-Action Alternative.

4.6.2.4 Special Procedures

BMPs for stormwater management during construction that would be employed would be described in a Construction BMP Plan that is required for NPDES permitting. Measures employed might include sandbags, earthen berms, erosion control matting, channel stabilization, silt fencing, brush barriers, storm drain inlet protection, temporary sedimentation basins, stone check dams, rock filter dams, construction exits, temporary and permanent seeding, the application of mulch, and buffer zones. In addition, the BMP Plan would describe regularly scheduled site inspections, BMP maintenance, and reporting to the Hawaii Department of Health Clean Water Branch (CWB).

BMPs employed during site operations would be per standard HIARNG procedures (HIARNG 2007a):

- All spills are reported to a single point of contact, the Installation On Site Coordinator.
- Maintenance activities are conducted inside the maintenance bays.
- Materials and parts are isolated from storm water contact.
- Good housekeeping procedures are applied throughout the facility.
- Spill kit is readily available and properly stocked.
- Employees are trained in spill prevention and storm water pollution prevention control measures and techniques.
- Pavement sweeping is performed as needed to pick up fallen debris.
- Routine inspections are performed.

All discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, would comply with the State's Water Quality Standards.

4.7 BIOLOGICAL RESOURCES

4.7.1 Approach to Analysis

Determination of the significance of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, cultural, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources would be significant if species or habitats of concern were adversely affected over relatively large areas or if disturbances caused reductions in population size, viability, or distribution of a special-status species.

4.7.2 Impacts

4.7.2.1 Proposed Action

Construction, demolition, and renovation activities associated with the proposed action would remove vegetation that is highly disturbed. There is no high-quality habitat for flora or fauna at the site. Landscaping of new construction may actually improve habitat quality for birds, including the indigenous

kolea. The proposed action would have no effect on endangered or endemic species found at Kalaeloa because none are present in the project area. Overall, impacts to biological resources would not be significant.

4.7.2.2 Alternative 1

The potential impacts of the alternatives for biological resources would not differ from those described for the proposed action.

4.7.2.3 No-Action Alternative

Under the No-Action Alternative, proposed construction and renovation activities would not occur. Baseline biological resources, as described in Section 3.1, would remain unchanged. Therefore, there would be no significant impacts to biological resources with implementation of the No-Action Alternative.

4.7.2.4 Special Procedures

No special procedures would be necessary to reduce impacts to below significant levels.

4.8 CULTURAL RESOURCES

4.8.1 Approach to Analysis

Procedures for assessing adverse effects to cultural resources are discussed in regulations at 36 CFR § 800.5 of the NHPA. An action results in an effect to a cultural resource eligible for the National Register when it alters the resource characteristics that qualify it for inclusion in the register. An adverse effect occurs when the undertaking directly or indirectly alters any of these characteristics in a manner that would diminish the property's integrity. Examples of adverse effects can include physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's eligibility; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; and neglect of the resource resulting in its deterioration or destruction; or sale of the property. In the case of the proposed action, potential effects to cultural resources could result from demolition to archaeological resources and ground-disturbing activities associated with demolition.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the type and location of the proposed action and by determining the exact locations of cultural resources that could be affected. Indirect impacts are those that may result from a change in activity levels or other occurrence that was a byproduct of the proposed action, such as the effect of increased vehicular or pedestrian traffic in the vicinity of the resource.

Because construction is involved with the proposed action, the following impact analysis includes ground disturbing activities that could affect archaeological sites (known and unknown) and modifications to structures that are potentially eligible, eligible, or are listed on the NRHP.

4.8.2 Impacts

4.8.2.1 Proposed Action

The Proposed Action would affect three buildings that are eligible for inclusion in the NRHP. None of the activities included in the Proposed Action would occur on the exteriors of buildings, but would occur in the building interiors only. None of the interior alterations would impact the historic character-defining features of these buildings, or those components that make these buildings eligible for inclusion on the NRHP. These historic features are described in the recent recordation and documentation in the 2009 Historic Buildings Survey and Evaluation Report (E2M 2009). Proposed activities and impacts to the buildings are described in Table 4.8-1.

Table 4.8-1. Proposed Actions to Historic Buildings

Building	*Design Drawing Number*	*Proposed Activity*	*Impact Analysis to Historic Features*	*Impact*
117	A0.3	Add permanent emergency generator and generator room to interior in lieu of emergency power socket.	Room will be added to interior and will not involve structural changes; Alteration was included in 2003 EA FONSI.	No significant impact
117	A0.3	Apply cementation epoxy coating to concrete-slab floor in high bay floor area.	Coating will be applied to existing concrete slab floor in core area.	No significant impact
117	A0.3	Solar hot water heater to supply hot water for Phase II	Heater will be positioned to minimize or eliminate visibility from exterior ground level.	No significant impact
117	A0.3	Remove Polychlorinated Biphenyls (PCB) contamination at old electric transformer loft.	Remediation work will involve superficial impact to interior wall.	No significant impact
117	A0.3	Move FMS#1 auto lubrication dispensing system from Building 666 to high bay in Building 117; System will be removable.	Relocation of system to the high bay of Building 117 will not have an impact to the building.	No significant impact
117	A5.1	Storage Rm. L133, relocated into FMS#1 parts; construct partition wall (removable).	Action was included in 2003 EA FONSI; change previous plan to add a partition wall.	No significant impact
117	A5.1	Electrical Supr. Office, Rm. L132, added; construct partition wall (removable).	Action was included in 2003 EA FONSI; change previous plan to add a partition wall.	No significant impact
117	None	Emergency window repair film applied to the interior of windows to keep existing (historic) windows in place and prevent them from falling inward	Film is clear and will not impact visual or structural integrity of the existing windows.	No significant impact
117	None	Upper floor women's showers and locker room to be removed.	This room is not a historic character-defining feature.	No significant impact

Building	*Design Drawing Number*	*Proposed Activity*	*Impact Analysis to Historic Features*	*Impact*
663	A18.2	Showers added to men's restroom, Rm. A109 and women's restroom, Rm. A108.	Action was included in 2003 EA FONSI; activity modified to include showers.	No significant impact
663	A18.2	Reception RM, 202, reduced and Powder Rm. 205 added.	Action was included in 2003 EA FONSI; activity modified to include showers.	No significant impact

Proposed modifications to Building 117 consist of repairs and infrastructure upgrades and would occur to the non-historic interior components of this building, or which would have a minimal impact to historic features. The only proposed action that would impact a historic, character-defining feature is the application of a protective film to the interior of the windows. However, this action would occur on the building's interior, and is an emergency repair to prevent further loss of deterioration of the original windows, which are in poor condition. The film is clear, and would not negatively impact the visual or structural integrity of the windows. As a result, proposed alterations will not diminish the building's qualities and characteristics that make it eligible for listing in the NHRP.

Proposed activities in Building 663 would involve alterations to existing interior partition walls. Showers would be added to the building's existing men's and women's restrooms, and the existing reception room (Rm. 202) would be slightly reduced to add a powder room in this area. These changes would not diminish the qualities and architectural characteristics that make Building 663 eligible for the NRHP, and thus there will be no significant impact.

Proposed modifications to Building 282 may include removal of interior partitions and other interior components that are not original and are not identified as historic character-defining features of this building. These historic features are described in the recent recordation and documentation of Building 282 in the 2009 Historic Buildings Survey and Evaluation Report (E2M 2009). Although specific project actions have not yet been determined, proposed alterations would not diminish the building's qualities and characteristics that make it eligible for listing in the NHRP.

No negative impacts, in the form of negative alterations and damage to a structure's historic nature and appearance are expected under the proposed action. All of the proposed alterations included in the Proposed Action would meet the Secretary of Interior's *Standards for Rehabilitation of Historic Properties*. As a result, an analysis of the impacts to historic properties in accordance with 36 CFR 800.5(1) criteria found no adverse effect from the Proposed Action. The finding includes those items described in Table 4.8-1 and will result in no adverse affect to historic properties such as Buildings 117, 282, and 663. HIARNG initiated Section 106 consultation with the SHPO on May 20, 2009 and received a response on September 2, 2009 (see Appendix G) for concurrence on this finding of no adverse effect. Furthermore, HIARNG will coordinate with the Hawaii State Historic Preservation Officer (SHPO) during building construction and renovations.

Implementation of the Proposed Action would not affect any National Register-eligible archaeological sites. All known archaeological sites at HIARNG at Kalaeloa are located outside the proposed HIARNG boundaries (HIARNG 2008). None of the archaeological sites have been identified or interpreted as

traditional cultural places or sacred sites. Areas of High Archaeological Sensitivity at Kalaeloa apply to three areas that contain sinkholes. However, these three sinkholes are not located within the proposed construction zone. The Proposed Action would not impact the three sinkholes found on the HIARNG property. The sinkholes are in restricted areas, inaccessible to HIARNG personnel, and have or will have fencing and signing around them to alert personnel of the presence of the sinkholes.

No traditional cultural properties are known to occur in the project area. However, in accordance with DoD policy, the HIARNG is consulting with the appropriate federally-recognized Native Hawaiian organization and interested parties in the vicinity to request comments and express any concerns regarding the proposed action. A list of organizations provided with the opportunity to comment is available is Section 8.2. Comments received on the DOPAA are found in Appendix H. If concerns are expressed, the HIARNG will work with the parties to reduce potential effects to traditional resources. With these conditions, no significant impacts to cultural resources would occur under the Proposed Action.

4.8.2.2 Alternative 1

Impacts under Alternative 1 would be the same under as the proposed action.

4.8.2.3 No-Action Alternative

Under the no-action alternative, the demolition of existing structures and the construction of new facilities and facility additions and renovations would not occur. Therefore, no NRHP–listed or eligible resources or resources of concern to Native Hawaiian organizations would be affected as a result of the No-Action Alternative. In summation, no significant impacts to cultural resources would occur.

4.8.2.4 Special Procedures

During construction, if any archaeological or cultural resources are discovered at any of the project sites, all activity, training, and/or construction would cease and a buffer zone would be clearly marked to prevent further impact to the discovery area (HIARNG 2008). Archaeological materials would be evaluated and their eligibility to the NRHP assessed by a professional archaeologist. If such materials were determined to be significant (eligible for the NRHP) they would be avoided or mitigated in accordance with Section 106 of the NHPA.

Any cultural resources or inadvertent finds would be evaluated by an archaeologist to determine the significance of the encountered resource(s), and the SHPO would be notified. As appropriate, there would be coordination with the Oahu Burial Council. No other special procedures would be necessary to reduce impacts to below significant levels.

4.9 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.9.1 Approach to Analysis

Significance of population and expenditure impacts are assessed in terms of their direct effects on the local economy and related effects on other socioeconomic resources within the ROI. Socioeconomic impacts would be considered significant if the proposed action resulted in a substantial shift in population trends, or notably affected regional employment, spending and earning patterns, or community resources.

In order to comply with EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, ethnicity and poverty status in the vicinity of the proposed actions have been examined to determine if any minority or low-income communities could potentially be disproportionately affected by implementation of the proposed action or alternatives. Similarly, to comply with EO 13045, *Protection of Children From Environmental Health Risks and Safety Risks*, the distribution of children was determined to ensure that environmental risks and safety risks to children are addressed.

4.9.2 Impacts

4.9.2.1 Proposed Action

Socioeconomics

Economic stimuli associated with the proposed construction activities, including increased construction sector employment and greater expenditures for construction materials, would provide short-term economic benefits to the local economy.

The proposed action would likely result in a slight increase in the population due to full-time personnel and their families moving to the area to reduce commute time. Using the population of the Ewa area of 68,000 (DPP 2008) and assuming 25% of the 283 full-time personnel move their families (average size of 4) to the area, the additional personnel would add 0.4% to the population. Given this small increase and the otherwise rapidly expanding population of the area, this impact would not be significant.

The average salary of full-time HIARNG personnel compared to the average per capita income of the regional population is unlikely to be substantially different. In combination with the relatively few families that might move to the area, this action would result in a minimal change to the average income in the ROI and would only slightly increase the total income. No appreciable, long-term economic changes would occur upon implementation of the proposed action. The relatively few family members who might move to the area and seek work would not notably affected regional employment. Similarly, spending and earning patterns and community resources would not be affected. Therefore, impacts to local or regional socioeconomic characteristics would not be significant.

Environmental Justice

Under the proposed action, construction and renovation activities would be contained entirely within the boundaries of the installation. No housing areas are immediately adjacent to the facility. The nearest housing development is a small housing area called Barbers Point Housing approximately 2,000 feet to the northwest of the HIARNG Kalaeloa facility. According to the 2000 census, no one in this housing development was living below the poverty level (USCB 2000). Traffic impacts would add slightly to the current traffic congestion in the area but would not disproportionately affect any minority or low-income group. Similarly, noise from aircraft would add somewhat to the existing Kalaeloa airport noise but would not disproportionately affect any minority or low-income group. Therefore, impacts with respect to environmental justice would not be significant.

Implementation of the proposed action would not result in environmental health risks or safety risks to children. Average noise levels at the nearby Kamaaina Kids day-care center on Bougainville Ave. and at

the HIARNG buildings used for the Youth Challenge Program (Buildings 19 and 1787) would be increased slightly over current levels but are not unacceptable using generally accepted criteria. During proposed construction and demolition projects, standard safety and security precautions (e.g., security fencing and dust barriers) would be implemented, and the existing security environment at the installation would prohibit access by unauthorized personnel. Based on the analysis above, no significant impacts to children would occur as a result of the proposed action.

To help address environmental justice issues, the public and local, county, state, and Federal agencies are being given an opportunity to comment on the proposed project and a public meeting will be held.

4.9.2.2 Alternative 1

Potential socioeconomic and environmental justice effects of the identified project alternative would be essentially identical to those described above for the proposed action.

4.9.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and renovation activities and operations would not occur. Baseline conditions, as described in Section 3.10, would remain unchanged. Therefore, anticipated benefits associated with increased construction expenditures and employment in the local economy would not occur, but this would not represent a significant socioeconomic or environmental justice impact.

4.9.2.4 Special Procedures

Short-term economic benefits to the local economy would result from implementation of the proposed action. In addition, implementation of the proposed action would not disproportionately impact minority or low-income populations. There would be no significant impact to the health and safety of children. For these reasons, no special procedures would be necessary to reduce impacts to below significant levels.

4.10 TRANSPORTATION

4.10.1 Approach to Analysis

Impacts to transportation and circulation would be considered significant if the proposed action affected the safety and/or the capacity of roads within Kalaeloa. Impacts of the action would also be considered be significant if it increased congestion along regional routes by degrading the LOS to E or worse at an intersection or substantially increased traffic delays.

4.10.2 Impacts

4.10.2.1 Proposed Action

Construction Impacts

Proposed construction activities would require the delivery of construction equipment and materials to the installation. The projects would be developed incrementally over several years. Construction vehicles accessing the project site would likely include cement vehicles, construction worker vehicles, and

additional heavy vehicles (including single unit and combination trucks). It is estimated that as many as 20 large trucks could be entering and leaving the HIARNG facility per day during construction periods. However, many trucks would be entering or leaving during non-peak traffic periods. The construction-related traffic would most likely access the project site from the north using the H-1 Freeway and from the west using local streets. Cement and aggregate would most likely come from Campbell Industrial Park so trucks would come from the west. It is assumed that Fort Barrette Road/Enterprise Avenue, Roosevelt Avenue, and Saratoga Avenue would experience the majority of construction traffic.

As discussed in Section 3.10, the study intersections currently operate at LOS F during peak traffic hours. To the extent that traffic is added to the roadway network during those hours, the construction-related traffic would further worsen the study intersection operations. However, some of the vehicles used for construction activities would be driven to the construction site and kept onsite for the duration of each project, resulting in only a minor increase in vehicle trips. Also, construction traffic would be predominantly during non-peak hours. Any increases in traffic volumes associated with the construction of each project would be temporary.

Overall impacts to traffic and transportation from construction would be temporary and would be small in comparison to the existing traffic problems (see the discussion below under Operational Impacts). Impacts to traffic conditions from construction would not be significant. If construction truck traffic were causing traffic problems, construction trucks could be required to access the HIARNG Kalaeloa facility from the west. If traffic from construction workers or construction vehicles caused traffic problems in the area, a potential measure to reduce the construction impacts could include providing a park and ride lot for construction workers. See Special Procedures below for additional discussion on these traffic control measures.

Operational Impacts: Full-Time Personnel

As discussed in Section 3.10, a traffic study was conducted for this EA (Appendix E) and two intersections were analyzed (Figure 4.10-1). The study found that under existing conditions both intersections operated at an unacceptable LOS of F (Table 4.10-1). Under the proposed action it was conservatively assumed that 283 full-time authorized personnel proposed to locate to the facility would be traveling to, and from, the site during peak hours. Under the proposed action, with this conservative assumption, the conditions would worsen. Based on traffic modeling, during the AM peak hour of 7:00 a.m. to 8:00 a.m. the worst approach (eastbound) of the Enterprise Street/Saratoga Avenue intersection would operate with an average delay of more than 1000 seconds per vehicle. The Fort Barrette Road/Enterprise Street/Roosevelt Avenue intersection would operate with an average delay of 137 seconds per vehicle (Table 4.10-1; Figure 4.10-1).

Table 4.10-1. Peak Hour Intersection Operations – Existing Plus Project Conditions (Preferred Alternative)

Intersection	*Traffic Control*	*Existing*			*Existing plus Project*		
		Delay	*V/C*	*LOS*	*Delay*	*V/C*	*LOS*
AM Peak Hour							
Fort Barrette Road/Enterprise Street/Roosevelt Avenue	AWSC	84	-	F	137	-	F
Enterprise Street/Saratoga Avenue	TWSC	112 (WB)	1.13	F	>1000 (EB)	>3	F
PM Peak Hour							
Fort Barrette Road/Enterprise Street/Roosevelt Avenue	AWSC	84	-	F	108	-	F
Enterprise Street/Saratoga Avenue	TWSC	373 (EB)	1.69	F	907 (EB)	2.84	F

Source: Wilbur Smith Associates 2009 (Appendix E).
Notes: AWSC = All way stop control; TWSC = Two way stop control; V/C = Volume to capacity ratio.
WB = West bound; EB = East bound.
Delay is presented in seconds per vehicle.

Similar to the morning peak hour, both the study intersections would operate at an LOS F during the afternoon peak hours of 3:45 p.m. to 4:45 p.m. During both the morning and afternoon peak hours, the average delay and volume to capacity ratios of the Fort Barrette Road/Enterprise Street/Roosevelt Avenue intersection are increased substantially. Therefore, the Proposed Action would result in transportation impacts at both the study intersections when considering the traffic study results in isolation (Table 4.10-1; Figure 4.10-1). However, this finding is based on a number of assumptions which are in flux and transportation improvements in the vicinity are not static.

First, the traffic counts were conducted in August 2009. Since that time, several significant roadway improvements have been completed. For example, the Kapolei Parkway has been opened to connect with the North/South Road. This has helped reduce congestion at the Fort Barrette Road/Enterprise/Roosevelt Avenue intersection. Additionally, Roosevelt Avenue was connected to Kalaeloa Boulevard to the west in Kapolei in the vicinity of the new Costco store. Anecdotal evidence is that congestion at the Saratoga/Enterprise intersection has lessened considerably since this improvement was completed.

Second, the traffic study assumed that *all* HIARNG full-time workers relocating to Kalaeloa would arrive from 7:00a.m. to 8:00a.m. on weekdays and would depart from 3:45p.m. to 4:45p.m. Fortunately, HIARNG already implements a flexible work schedule policy (see Appendix F). This includes 5-4-9 (work 5 days, 4 days, 9 hours each with every other Monday off), Flexitour (starting times between 6 AM and 8a.m.), and limiting agency core hours from 9:00a.m. to 3:00p.m. daily to accommodate individual staff schedules. As a result, many staff will not be using the above intersections during peak hours thereby lessening the impact of the proposed action on traffic congestion.

Third, the OMPO model predicts the number of vehicles expected to be on the road in 2030 based on the mixture of types of land use in the area. For example, residential would have a different number and type of vehicles than commercial and industrial land uses. The OMPO model does not include intersections and it does not account for improvements. Instead, it only considers roadways and transportation networks. Specific improvements at a particular intersection that increase the volume of cars handled (i.e.,

capacity) are not part of the OMPO model. For example, the Saratoga/Enterprise intersection is assumed to be signalized in the OMPO 2030 model, but the signalization does not in and of itself change the actual number of vehicles queuing at the intersection or that can be accommodated on the roadway.

Fourth, as a result of the traffic study, Wilbur Smith Associates conducted a traffic signal warrant analysis. The analysis determines if signalization is necessary and is based on specific benchmarks or "warrants" which must be exceeded before signalization is prudent. For example, a crosswalk may be warranted in circumstances where there have been accidents involving pedestrians such as in an urban setting. Alternatively, signalization may be warranted if turning delays exceed a particular LOS threshold.

Based on the warrant analysis, both intersections studied will need traffic lights (i.e., signalization) in the future. The intersections are predicted to operate at LOS F in year 2030 whether the HIARNG project is implemented or not. However, even with signalization, the Saratoga/Enterprise intersection will be congested (LOS F) at peak hours unless more lanes are added to improve the intersection's capacity to handle vehicles. This is primarily because Saratoga has one lane in either direction travelling east and west. Vehicles wishing to turn onto Enterprise from Saratoga create a lengthy delay for vehicles behind them that intend to travel straight through the intersection.

One option would be to signalize the intersection which is warranted as mentioned. However, traffic congestion would still occur at unacceptable levels even with a traffic light primarily because signalization does not address the most critical problem, a lack of physical capacity (i.e., additional lanes) to accommodate vehicles making turns onto Enterprise Road. Another alternative would be to add dedicated turning lanes. This would be particularly helpful for eastbound traffic turning from Saratoga onto Enterprise Road. Once again however, with only two stop signs in place to regulate traffic flow as is presently the case, traffic congestion would continue. Another alternative would be to place a four-way stop using signage. However, this would actually worsen conditions because it would interrupt the majority of traffic which flows north/south along Enterprise Road.

As mentioned previously, the intersections currently operate at an unacceptable level of service and will continue to be congested with or without the implementation of the HIARNG project unless both signalization and roadway improvements are made. Fortunately, there are plans to improve roadway capacity in Kalaeloa. Among them, is the creation of a major east-west road within Kalaeloa by realigning and connecting Saratoga Road with Geiger Road. This will serve as a major arterial roadway as shown in the Kalaeloa Master Plan (Figure 3.10-2). There is also a possibility of establishing a 100-foot wide Right-of-Way along Enterprise Road to accommodate future expansion from one to two lanes (Ching 2010).

Operational Impacts: Training by Reserve Personnel

The Wilbur Smith Associates Traffic Study also includes an analysis of the potential impacts to traffic during training. The proposed relocation of all units to Kalaeloa would consolidate inactive duty reserve HIARNG personnel to the project site. These staff members would be on-site between 38 and 63 days each year for training purposes, including at least one weekend per month and two consecutive weeks during the summer annually. The actual number of on-site days for a given reserve unit would vary according to the training requirements. The traffic analysis assumes that the maximum number of reserve personnel that could potentially be on site at any time would not exceed 322 staff members, which

represents the total number of reserve personnel for the aviation units. However, in most cases the number of reserve personnel training at Kalaeloa at any one time would be fewer than this number as sub-units train at various other locations depending on mission requirements. In addition, daily training hours can vary considerably so that reserve personnel may not be commuting during peak hours. Neighbor island troops are not anticipated to be located at the facility except for brief (2-3 day) intermittent training sessions that normally occur in the summer and/or on weekends for typically not more than 30 personnel.

Assuming a worse-case scenario and with all 322 personnel training at Kalaeloa and arriving and/or leaving during peak traffic hours, both the study intersections would continue to operate at LOS F during the AM peak hour but with greater delays. The Enterprise Street/Saratoga Avenue intersection would have an average delay of greater than 1,000 seconds per vehicle and the Fort Barrette Road/Enterprise Street/Roosevelt Avenue intersection would have an average delay of 226 seconds per vehicle. Similar to the AM peak hour, both the study intersections would have increased delays during the PM peak hour. However, for reasons described previously in the Operations – Full-Time Personnel section, results of the traffic study should be viewed in context. Care should be taken in extrapolating the study's results relative to traffic congestion in the vicinity of HIARNG facilities now and in the future.

Operational Impacts: In Times of an Emergency

This EA evaluates the impacts of the proposed action only and not existing disaster-response capabilities. However, it should be noted that the existing operations at the HIARNG Kalaeloa facility include the majority of the non-aviation disaster response capabilities that are, or will be, present at Kalaeloa. Furthermore, there are no munitions stored, or proposed for storage, at HIARNG's Kalaeloa facilities.

HIARNG is a responder of last resort. Police, fire and medical personnel would be the first to respond to an emergency. When called upon, not all HIARNG personnel are likely to be directed to Kalaeloa. It is likely that some personnel may be directed to report directly to other military facilities, strategic locations, or to the site of the disaster itself rather than Kalaeloa. The response of HIARNG would be highly dependent on the nature of the situation, type of emergency, and severity of the disaster. As such, adverse impacts from the proposed action of relocating HIARNG personnel to a central facility are not anticipated, even in times when Army National Guard personnel are asked to assist in an emergency.

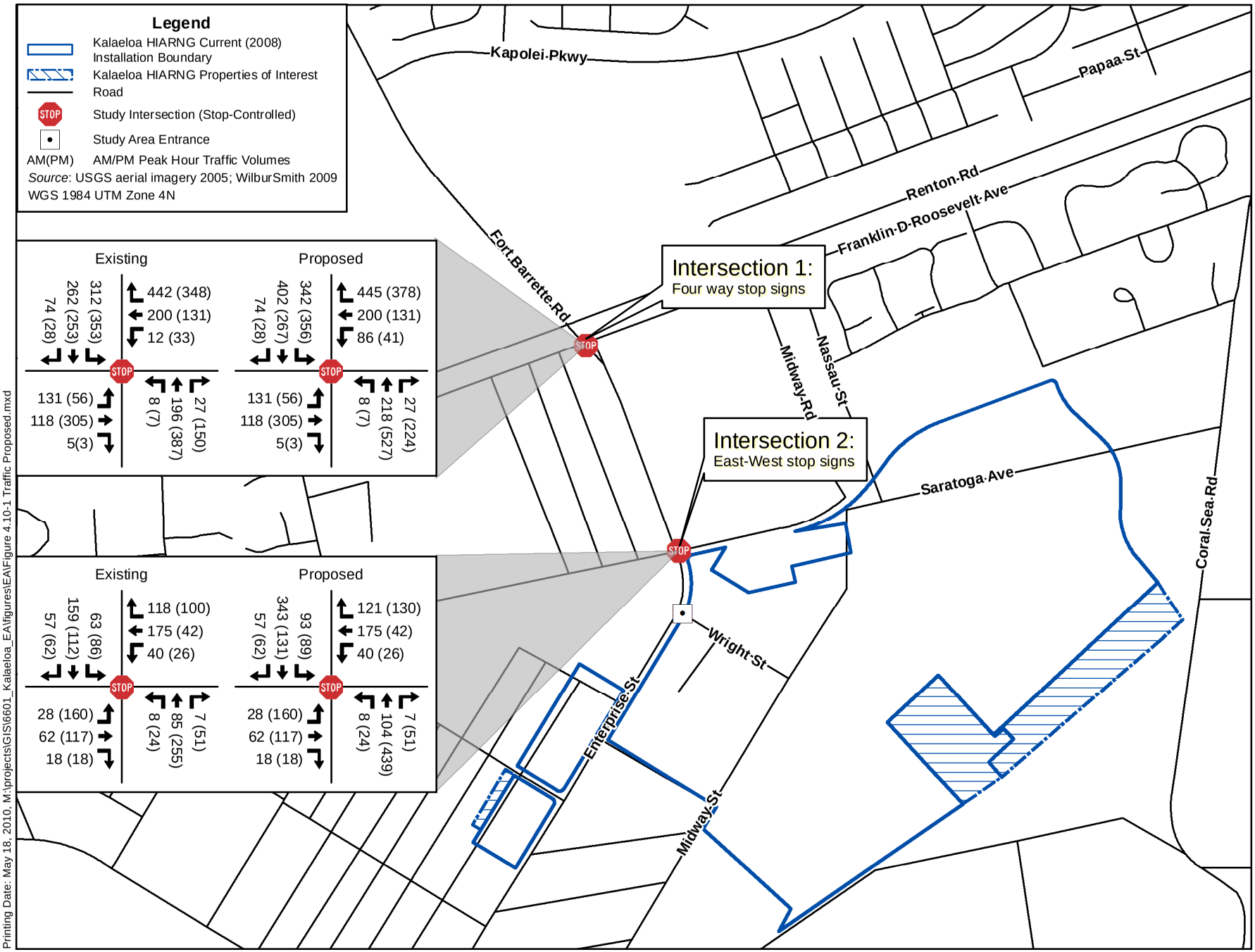

Figure 4.10-1
Existing and Proposed Action Traffic Volumes
Kalaeloa, Oahu, Hawaii
May 2010

The above analysis evaluated traffic for the proposed action based only on the existing condition. However, the traffic situation at these two intersections in the future is very difficult to determine with the rapid growth and multiple plans throughout the entire region. Traffic management at this intersection must be viewed as part of that larger network of roads being planned. Current projects are underway that should reduce traffic at both intersections (Figure 3.10-2). These include the following projects:

- Opening of another section of the North-South Road and connection to Kapolei Parkway, completed in February 2010 – This project allows motorists from parts of Ewa an alternate route to the H-1 freeway via the North-South Road directly or via North-South Road to Kapolei Parkway to Fort Barrette Road north of the two intersections of concern near HIARNG Kalaeloa.
- Opening of Kapolei Parkway between Fort Barrette Road and Kamokila Boulevard will connect Ewa with Kapolei, with completion in 2010. This project will allow motorists easier access from Ewa who want to reach Kapolei for work, shopping, and other daily activities. It provides a direct and route instead of using existing roads, one of which would be using Roosevelt Avenue (see http://honoluludpp.org/HotIssues/KapoleiRoadways_Feb09.pdf).
- The opening of the connection of Roosevelt Avenue with Kalaeloa Blvd. to the west in Kapolei via short segments of Kamokila Blvd. and Kapolei Parkway, completed in March 2009 – This project allows motorists another major route to the HIARNG Kalaeloa facility.
- Widening of Fort Weaver Road, completed in December 2009 – This project will reduce the number of motorists travelling west to find an alternate route to the H-1 freeway due to long delays on Fort Weaver Road.

The Kalaeloa Master Plan (HCDA 2006) envisions east-west roads in the northern part of Kalaeloa to be the primary roads. The road improvement would Kalaeloa realign and connect Saratoga Road from Geiger Road to Franklin Street and Wakea Street. Fort Barrette Road between Roosevelt and Saratoga was envisioned as a secondary road. Numerous other roadway improvements are envisioned for the region (see Figure 3.10-2).

In summary, traffic delays at the two intersections of concern under existing conditions are unacceptable with an LOS of F. These delays are primarily the result of stop signs at these intersections. Delays would be increased even further with the additional commuters to the site under the proposed project. Mitigation is required for these intersections. It is likely that the projects currently in the progress or recently completed (described above) will correct the existing unacceptable traffic condition. If the existing traffic problem is not corrected by these improvements, it is assumed additional mitigation would be undertaken by the State of Hawaii DOT.

It is anticipated that the correction of problems causing existing unacceptable delays will result in acceptable traffic conditions under the proposed action. Therefore, with the assumed mitigation by DOT to correct existing conditions, impacts from the proposed action would not be significant.

4.10.2.2 Alternative 1

Construction

Impacts to traffic from construction activity would be similar to the impacts described under the Proposed Action. Impacts would not be significant.

Operations

Impacts to traffic from operations would be similar to the impacts described under the Preferred Alternative and would not be significant.

4.10.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and renovation activities would not occur. Baseline conditions for transportation and circulation, as described in Section 3.10, would remain unchanged. No significant impacts to transportation and circulation would occur with the No-Action Alternative.

4.10.2.4 Special Procedures

If construction truck traffic becomes a problem during construction, peak hour construction vehicles could be routed away from the problem intersections at Roosevelt/Fort Barrette and Saratoga/Enterprise and be required to access the site from the west via Kalaeloa Blvd and its new connection to the Kalealoa area via Kamokila Blvd. If traffic from construction workers is causing traffic problems in the area, a potential measure to reduce the construction impacts could include providing a park and ride lot for construction workers located near the H-1 Freeway. Shuttles could then be used to transport them between the park-and-ride lot and the project site.

For operational impacts, measures in progress or already completed by the Hawaii DOT that will alleviate traffic at the two main of concern intersections are identified above in the discussion of impacts. Traffic mitigation measures that will be taken by HIARNG include the following:

- Encouraging us of flex time and abbreviated work weeks;
- Offering staggered start/finish times;
- Allowing tele-commuting;
- Encouraging and providing incentive to use the mass transit rail line that is planned for the area;
- Encouraging biking to work for soldiers in the neighborhood;
- Encouraging the use of public transportation which is readily available in front of the facility;
- Incorporation into building design features such as showers, lockers, bike racks, and security to facilitate bicycling and other modes of transport; and
- Encouraging use of alternate routes to the facility.

4.11 HAZARDOUS MATERIALS AND WASTES

4.11.1 Approach to Analysis

Federal, state, and local laws regulate the storage, disposal, and transportation of hazardous materials and wastes. These laws have been established to protect human health and the environment from potential impacts. The significance of impacts associated with hazardous materials and wastes is based on the toxicity and amount of hazardous materials and wastes that are stored and disposed of, and the potential for releases to the environment. Impacts are considered significant if the storage, use, transportation, handling, or disposal of these substances increases human health risks or environmental exposure.

4.11.2 Impacts

4.11.2.1 Proposed Action

Construction Impacts

PCBs

Concrete would be removed from Building 117 from the former upstairs transformer room that has documented low-level PCB contamination. This material would be handled and disposed of in accordance with EPA and State requirements. Soil in the berm of the former Navy fuel storage facility has also been documented with low-level PCB contamination. Prior to removal from the site, this material would be tested and it would be handled and disposed of in accordance with EPA and State requirements for PCB-contaminated debris.

Lead

The OSHA "Lead in Construction" standard (29 CFR 1926.62) applies to all construction work where an employee may be occupationally exposed to lead. Subcontractors would be notified of the potential for lead-based paint. All work related to construction, including painting and decorating is included. Contractors who disturb lead-containing surfaces would comply with OSHA 29 CFR 1926.62 and HIOSH 12-148.1, regarding lead. Additionally, a Toxicity Characteristic Leaching Procedure (TCLP) lead analysis would be completed to characterize projected waste streams prior to disposal if debris contained lead and there were any potential that it could result in the debris being a hazardous waste. Of the buildings being demolished and/or renovated, the following buildings have been known to contain LBP:

- Building 117
- Building 282
- Building 1787
- Building 1788
- Building 666
- Building 19

Asbestos

Should a contractor identify suspected ACM during construction or demolition, the material would be tested, or assumed to contain asbestos. A qualified asbestos abatement contractor possessing a valid C-19 license would remove ACM. Contractors who remove ACM would comply with OSHA 29 CFR 1926.1101, Hawaii Occupational Safety and Health (HIOSH) 12-145.1, Asbestos, and HDOH asbestos rules (Chapters 501 – 504). Of the buildings being demolished and/or renovated, the following buildings have been known to contain ACM:

- Building 46
- Building 282
- Building 1787
- Building 1788
- Building 666
- Building 117
- Building 1785
- Building 1786
- Building 19

With proper identification, delineation, and disposal of PCBs, lead-based paint, and ACM, construction impacts for hazardous materials and wastes would not be significant.

Operational Impacts

Hazardous material storage and waste streams resulting from the project at Kalaeloa would be similar to those already being stored and generated, except that the volume from Kalaeloa and the HIARNG aviation units at Wheeler Army Airfield would be combined. Appropriate lockers and other facilities for hazardous material storage would be incorporated into the project.

Oil-water separator waste would be generated from the new re-circulating water vehicle and aircraft wash-racks that are proposed. All waste generated at maintenance shops would be contained where it was generated, and disposed of under the guidance of the HIARNG hazardous waste manager within the Environmental Office. All wastes would continue to be managed according to RCRA and State regulations.

Based on available information, the additional hazardous waste that is expected during the operational stage of the action may be enough to change the status of the facility from CESQG to SQG. In 2009, documentation suggests that Building 117 accumulated as much as 700 - 800 lbs. of hazardous waste. Similar documentation shows that the Army Aviation Support Facility #1 has the potential to generate between 1,500 - 2,000 lbs. of hazardous waste. If more than 2,205 lbs. is accumulated at one time, or if 220 lbs. of hazardous materials are being generated per month, this status would be upgraded to a Small Quantity Generator. If this occurs, a RCRA generator number would be required and obtained. These wastes would be disposed in accordance with Federal and state regulatory requirements.

JP-8 fuel for aviation operations would be required at the HIARNG Kalaeloa facility in similar quantities as at Wheeler. Aircraft JP-8 fuel would be obtained offsite and stored in 2,500 – 5,000 gallon mobile tank trucks at the HIARNG Kalaeloa facility. Fuel needs are estimated at 25,000 – 35,000 gallons per month. A facility would be constructed to provide safe parking for loaded fuel trucks and to meet USEPA requirements (40 CFR 112). Each parking area would require approximately 1,600 ft2. This facility would use berms, retaining walls or curbing, or retention ponds sufficient to contain all potential fuel stored. The HIARNG Spill Plan would be updated for Kalaeloa to show the safe parking facility, procedures if a leak were discovered, the maximum amount to be stored, and where any leaked fuel would migrate to.

With implementation of the procedures described above, there would be no significant operational impacts from hazardous materials and waste.

4.11.2.2 Alternative 1

The potential impacts of the alternatives for hazardous materials and wastes would not differ from those described for the proposed action.

4.11.2.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and renovation activities at Kalaeloa would not occur.

4.11.2.4 Special Procedures

Hazardous materials and wastes would be managed in accordance with all Federal, state, and local regulations, as well as existing HIARNG procedures specified in their Hazardous Material and Waste Management Plan (HIARNG 2001). In addition, all appropriate state and Federal regulations would be followed concerning removal and handling of any PCBs, ACMs and lead-based paint found during building demolition, renovation or construction activities. No additional special procedures would be necessary to reduce impacts to below significant levels. However, the HIARNG Spill Plan would be updated to include all new facilities and requirements.

4.12 AIRSPACE

4.12.1 Approach to Analysis

There are several factors that are used to assess the significance of impacts on air traffic. A first consideration is if a proposed action or an alternative would result in an increase in the number of flights such that they could not be accommodated within established operational procedures and flight patterns. A second consideration is if a requirement for airspace modification, or an increase in air traffic, might increase collision potential between military and nonparticipating civilian operations.

4.12.2 Impacts

4.12.2.1 Proposed Action

At present, air traffic conditions are sufficient to accommodate the Proposed Action and no expansion or substantive changes are proposed or anticipated. Flight operations military and civilian aircraft between 2004 and 2008 was at its peak in 2005 based on a 2009 Aircraft Noise Study for Kalaeloa Airport, Hawaii (Appendix D). In that year, there were 163,000 flight operations which is defined as a takeoff or landing of one aircraft. Overall, approximately 80% were general aviation aircraft and 19% were military operations. A majority of general aviation flights are propeller planes. HIARNG would contribute approximately 14,775 flight operations at Kalaeloa Airport annually. Of these, one out of every 30 is estimated to be during nighttime periods. HIARNG flights would represent approximately 9% of total flight operations and 3% of nighttime operations that occur each year at the Kalaeloa Airport. The Aircraft Noise Study found that there would not be a significant increase in noise, given the minor increase in flight operations resulting from HIARNG's relocation as described in this EA. On a daily basis, the Kalaeloa Airport has approximately 383 daily airfield operations. Under the proposed move of the HIARNG helicopters and fixed wing aircraft, there would be an increase of 39 airfield operations a day. The increase in flights due to the proposed HIARNG relocation would result in a negligible increase in overall traffic and could easily be accommodated within existing operational procedures and flight patterns. This increase in flight activity would be below historical levels of flight operations (447 daily airfield operations in 2005) and there would be no significant impacts to current airfield flight activity, airfield management, or airspace management surrounding the airport.

4.12.2.2 Alternative 1

Impacts under alternative 1 would essentially be identical to those described under the proposed action.

4.12.2.3 No-Action Alternative

Under the No-Action Alternative, there would be no impacts on airspace use. There would be no reduction in the amount of navigable airspace, no assignment of new or modified special use airspace, and no changes to existing restricted areas or alert areas. Similarly, there would be no change to en route airways or instrument flight rules procedures. There would also be no restrictions on access to, and no effect on, the use of airports or airfields available for public use, nor on arrival and departure traffic flows. There would be no construction that would obstruct air navigation and no new air traffic that would affect aviation safety.

4.12.2.4 Special Procedures

All existing safety procedures and precautions would continue to be implemented in accordance with all applicable regulations. Current and existing flight procedures would continue to be followed and no special procedures would be necessary to reduce impacts to below significant levels.

4.13 UTILITIES AND PUBLIC SERVICES

4.13.1 Approach to Analysis

Impacts are evaluated through a review of the required changes or extra capacity required for utilities and the provision of public services. Impacts would be significant if major new utility systems or substantial system upgrades were required. Such increases in capacity would require an additional or separate environmental impact evaluation by service providers. Impacts would also be significant if a major new public service was required, such as a fire or police station.

4.13.2 Impacts

4.13.2.1 Proposed Action

Electricity

The current electrical system has adequate capacity to provide power to the new facilities (Jacobs 2007, 2008). New feeder lines would be required and HECO would construct any additional substations that may be required. Current electrical usage of units moving to Kalaeloa is estimated at approximately 653,800 kWh. This would result in a total combined usage at Kalaeloa of approximately 4.43 million kWh. Although several new buildings are planned, they are not anticipated to increase total demand at the Kalaeloa facilities. HIARNG's goal is that all new facilities would meet LEED silver standards and HIARNG intends to replace older, less efficient energy systems. The resulting savings from energy efficiency is anticipated to offset the increase in the number of users from consolidating HIARNG units.

Telecommunications

Increased demands following the HIARNG relocation would require new telecommunication lines. An underground duct bank would be needed from Building 117 to the new facilities. An estimated 250 pair copper cable and 30 single mode fiber optic lines would be required for new buildings, in addition to more lines to upgrade other existing buildings. Installation of new manholes that are independent of the

existing joint-use manholes may also be required. Installation of new telecommunication lines would not result in a significant impact.

Potable Water

Although several new buildings are planned, it is anticipated that the total potable water demand at Kalaeloa under the proposed action would not substantially exceed current water usage at Kalaeloa plus usage by the units moving to Kalaeloa, estimated at approximately 24 million gallons annually, because of more efficient newer systems.

Presently, the volume of potable water used by HIARNG is spread between its various facilities (Wheeler, Diamond Head, Kalaeloa). By consolidating, as described in the proposed action, no increase in the volume of water used would be anticipated. However, there would be an increase in amount of water presently used at the Kalaeloa facilities, which is estimated to be 24 million gallons annually. To offset any potential increase in the amount of water used, HIARNG intends to achieve LEED silver standards in construction and renovation. This would result in older, less efficient devices being replaced by newer, more water efficient devices. The savings in efficiency are anticipated to compensate for any increase in the amount of potable water used at Kalaeloa. The existing water service is provided to the site by the City Board of Water Supply through the Navy system. A 24-inch main is located along the north and east of the site along Midway Street and Saratoga Avenue but the capacity is limited in the line and a replacement main is planned for the area (Jacobs 2008). There are plans being considered to improve the general utility infrastructure in the Kalaeloa area for future development (Jacobs 2007, 2008). These plans may include special taxes or fees on a prorated basis to the land owners. Water lines for the proposed projects would connect to the existing main unless a new line or other arrangements are available prior to construction. A new 12 inch to 16 inch transmission main would probably be installed south of the proposed JFHQ-HIARNG HQ site (Jacobs 2007). Furthermore, new water infrastructure would conform to Board of Water Supply standards. With the implementation of the above improvements, significant impacts to potable water use are not anticipated.

Wastewater

The average amount of wastewater generated at HIARNG Kalaeloa facilities is 0.06 mgd (Earth Tech 1998b). The estimated is based on serving 1,750 full-time and weekend HIARNG personnel and Youth Challenge student and faculty residents. The calculation assumes 250 days per year operation with a production of 11.1 million gallons of wastewater annually. With an increase in full- and part-time personnel of 663, discharge was estimated at 0.09 mgd and the total annual discharge would be 16.8 million gallons. Sewer lines at the HIARNG site have been determined sufficient to support the capacity of the relocated personnel with the existing system (Earth Tech 1998b). Wastewater is presently conveyed to the Honouliuli wastewater treatment plant (WWTP). The WWTP has sufficient capacity to accommodate the small increase in wastewater (0.03 mgd). Moreover, the WWTP has plans to increase its capacity from 30 million gallons a day (mgd) to 51 mgd. Based on this information, impacts from wastewater discharge would not have a significant impact.

Solid Waste

Construction and demolition debris would be generated and disposed of in accordance with State and Honolulu City and County requirements. The majority of the materials generated would likely be concrete and asphalt that would have to be removed to construct new buildings. This material would either go to a recycler or to a debris landfill such as the PVT Landfill in Nanakuli, Hawaii. The PVT Landfill is a 400-acre fully-lined, subtitle D facility that is licensed to accept construction and demolition debris, as well as special wastes such as CERCLA wastes, lead paint, asbestos-containing material and petroleum contaminated soil.

The amount of solid waste generated by operations is expected to be similar to what is currently being generated by all the units that would be consolidated at Kalaeloa. A private waste contractor would provide solid waste collection and disposal services for the Proposed Action. Recycling would be implemented to reduce waste streams. Bins would be set up to recycle cardboard, aluminum cans, plastic, white paper, and newspaper. Waste and recycled materials would be delivered to, and disposed of properly, at a Honolulu permitted county facility.

Safety

During any proposed construction or demolition activities, standard safety and security precautions (e.g., security fencing and dust barriers) would be implemented. In addition, the existing security environment at the installation would prohibit access by unauthorized personnel.

During operations adequate security for the facility would be available so Honolulu police may only be needed in an emergency. Existing and planned Honolulu Fire Department capabilities are adequate for the area. One component of HIARNG's move to the location would be the addition of the 297th Fire Fighting Engineers who could supplement the Honolulu Fire Department's capabilities. Crash and rescue capabilities already exist at the Kalaeloa Airport and are adequate to handle the aviation operations proposed (Ramos 2009).

Based on the analysis above, no significant impacts regarding public safety issues would occur as a result of the proposed action.

4.13.2.2 Alternative 1

Impacts to utilities and public safety would be identical to those under the Preferred Alternative.

4.13.2.3 No Action Alternative

Under the No-Action Alternative, the proposed construction and renovation activities at Kalaeloa would not occur, thus there would be no impact to utilities and public safety.

4.13.2.4 Special Procedures

Procedures specified in the HIARNG Solid Waste Management Plan (HIARNG 2003b) would be used for new facilities at Kalaeloa.

4.14 AESTHETICS

4.14.1 Approach to Analysis

In accordance with HAR 11-200-12, impacts would be significant if the proposed project "substantially affects scenic vistas and view planes identified in county or state plans or studies".

4.14.2 Impacts

4.14.2.1 Proposed Action

No scenic vistas or view planes have been identified in county or state plans for the area. No visual landmarks would be altered. The project area is located outside of the Special Management Area and not visible from the coast, therefore coastal views and scenic resources will not be significantly affected by the Proposed Action. Development of the property is consistent with the Kalaeloa Master Plan (HCDA 2006). Buildings planned would not exceed the height limitations specified in the Kalaeloa Master Plan and would be in accordance with architectural guidelines and preferences for the area. Based on this analysis, there would be no significant impacts to aesthetics.

4.14.2.2 Alternative 1

Impacts would be the same as the proposed alternative.

4.14.2.3 No Action Alternative

Under the No-Action Alternative, the proposed construction and renovation activities at Kalaeloa would not occur, thus there would be no impact to aesthetics.

4.14.2.4 Special Procedures

No special procedures would be required to mitigate impacts.

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SECTION 5
OTHER CONSIDERATIONS

5.1 CUMULATIVE IMPACTS

CEQ regulations stipulate that potential cumulative impacts should be considered within an EA. Cumulative impacts are defined as "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts can also result from commitment to larger actions. Analysis of cumulative impacts was conducted on a qualitative basis, and included an assessment of known land use changes within the Ewa region, as well as future potential actions within the area.

5.1.1 Recent Past, Present, and Future Projects at Kalaeloa

Since the closure of BPNAS, there have been substantial changes in the area due to the impacts of closure and the development of the entire Ewa region of Oahu. As of 2006, 25% (929 ac) of the former Barber's Point was retained by the Navy, 44% (1,621 ac) was conveyed to government or private owners, and 31% (1,146 ac) remained pending conveyance (HCDA 2006). Several projects have occurred on the former BPNAS, now called Kalaeloa, but most changes have been conversion of buildings to new uses. The HIARNG was allocated space at Kalaeloa and conducted an EA (HIARNG 2003a). As a result, they moved several of their units there. Currently there are approximately 1,290 full and part-time HIARNG personnel stationed at Kalaeloa. In addition, there have been several large construction projects at Kalaeloa including those listed below.

Seafarers Training Center – Completed 2004. A new Seafarers training facility for merchant mariners on the HIARNG Kalaeloa facility was constructed. The new facility included a new water survival training facility and a large tank to conduct water safety training. The action also included renovation of several other buildings (Office of Naval Research 2003). The facility holds classes of typically 50 students (with occasional classes up to 100 students), most from Oahu, for one week periods.

Instrument Landing System at Kalaeloa Airport – Completed in 2006. A new instrument landing system was installed for more efficient operation of the Kalaeloa airport. An EA completed for the project (FAA 2005) estimated that the total annual operations would increase from 150,693 take-offs/landings in 2003 to 213,400 take-offs/landings in 2010 (FAA 2005). Although that increase was not realized due to a number of factors such as the economic downturn, it does give an indication of the potential increases in usage that might be expected in the future.

Conveyance of Navy-retained Lands at Kalaeloa – Completed 2008. Commander, Navy Region Hawaii conveyed 499 acres of land and utilities at Kalaeloa that had been retained by the Navy following the closure of Naval Air Station Barbers Point (NASBP). The conveyance included former BPNAS utility systems (i.e., water, wastewater, electrical distribution and telecommunication systems and corresponding easements) to a private developer for potential reuse and development (Navy Region Hawaii 2008). According to the EA, foreseeable development of the subject parcel's were intended to be compatible

with the Kalaeloa Master Plan (HCDA 2006). Over a twenty year period, these include approximately 5,000 homes in a mixed use/transit-oriented setting, industrial and commercial uses, and public uses such as schools, parks and a public transit system.

Ke Kama Pono Building – Completed 2009. Construction of five approximately 2,000 square-foot residential units on Yorktown Road in Kalaeloa, Oahu to serve as facilities for the Ke Kama Pono program which provides services and programs for at-risk youth.

Kalaeloa Airport Aircraft Hangers – In Progress and Future Planned. DOT is in the process of constructing 10 T-hangars to accommodate 10 general aviation aircraft. DOT plans to construct an additional eight banks of T-hangars for 144 general aviation aircraft. They also plan to develop eight lease lots and related access roads for use by lessees on about 54 acres of previously cleared and paved land (Kawaoka 2009). These projects provide for housing of aircraft at the airport which is projected to result in greater usage (increased aircraft operations at Kalaeloa airport).

New Housing – Present to 2025. The Kalaeloa Master Plan projected 6,352 new housing units in three phases (2007 to 2025) (HCDA 2006).

New Commercial Space - Present to 2025. The Kalaeloa Master Plan (HCDA 2006) estimates a total construction of 116,583 ft^2 of commercial space, 725,028 ft^2 of office space, 1,819,388 ft^2 of light industrial space, and 470,436 ft^2 of light industrial mixed use space over the three phases of development (2007 to 2025) for a total of 3,131,435 ft^2 of projected buildings.

Enterprise Energy Corridor – Planned for Construction by 2013. There are plans to construct a 12kV energy corridor on Enterprise Street between Roosevelt Avenue and Midway Street (Malama 2009). This corridor is intended for use by HIARNG and others.

FBI Complex - Planned for Construction by 2013 – A new building complex is planned on a 10-acre plot near Enterprise Street and Saratoga Avenue (Malama 2009).

Widening of Fort Barrette Road – Unknown Construction Date. This DOT road widening project has been planned for several years. An EA was conducted for the expansion in 2006. This project has been put on hold for a number of years (Malama 2009).

*Desalination Project – Unknown Construction Date***.** The Board of Water Supply has plans to construct a 5 mgd desalination plant on a 20-acre parcel at Kalaeloa (DPP 2008). Capacity could be increased to 15 mgd in a second phase and even further up to 35 mgd at a later date.

Renewable Energy Projects – Unknown Construction Date. Several solar power construction projects are planned for the western portion of Kalaeloa on vacant land (Malama 2009).

US Coast Guard at Kalaeloa Airport Aircraft Hanger – Unknown Construction Date. The Coast Guard plans to construct an additional hanger at the airport (Malama 2009).

Fire Department Training Facility – Unknown Construction Date. The Honolulu Fire Department has plans to establish an island-wide training facility at Kalaeloa (DPP 2008).

*Kalaeloa Regional Park – Unknown Construction Date***.** A new park utilizing vacant land at Kalaeloa is envisioned (DPP 2008). The park is intended to be a major nucleus of community activity. The park would include sports and recreation facilities, including ocean recreation, and cover 468 acres (Honolulu Star Bulletin 2005).

Drainage System Improvements – Unknown Construction Date. The drainage system for the Villages of Kapolei currently consists of a golf course retention and disposal system where stormwater is discharged into large pits and a large ditch near the Kalaeloa boundary (DPP 2008). The stormwater drainage into a coral pit at Fort Barrette Road and Roosevelt Avenue is inadequate to handle the runoff from a 100-year storm (HCDA 2006). A new system to handle stormwater runoff may be required in the future for areas within Kalaeloa.

5.1.2 Other Projects in the Region

New Housing – Present to 2011. Housing in the Ewa area has been rapidly increasing. Numerous housing developments are proposed within approximately 1.5 miles of Kalaeloa. These developments are located to the north and east of Kalaeloa and include City of Kapolei and Villages of Kapolei to the North, Ewa Villages, Ewa Gentry Makai, and Ocean Pointe to the east. The developments, on over 1,000 acres of land, have a total of 7,200 residential units as of 2008 and are projected to have 14,400 units when built out sometime after 2011 (PB Americas 2009).

Schools – Present to 2030. DOE has projected a need for eight new elementary schools, three new intermediate schools, and at least one new high school in the Ewa region (DPP 2008).

University of Hawaii West Oahu – Unknown Future Date. The University of Hawaii west campus is projected to have 800 faculty and staff and 7,600 students (DPP 2008).

Resort Development – Present to 2030. Ko Olina Resort to the west and the Hoakalei Resort at Ocean Pointe (under construction) to the east are projected to include almost 9,200 visitor units by 2030 (DPP 2008). The marina at Ocean Pointe would be the region's principal recreational marina destination for local residents and visitors with over 1,100 acres (DPP 2008).

HECO Campbell Industrial Park Generating Station Expansion – Construction Complete. The plan is for one 110-megawatt combustion turbine generator and auxiliary systems to be used as a peaking unit. Construction is complete and preliminary performance testing is underway (HECO 2009).

H-Power Campbell Industrial Park Station Expansion – Unknown Construction Date. H-Power proposes to expand the existing 28 acre H-Power power plant. The current processing capability of the plant is 2,160 tons-per-day of municipal solid waste which is turned into refuse-derived fuel for combustion to generate up to 57 megawatts of energy. The plan is to expand capacity of 900 tons-per-day burn and to add a new turbine generator, which would provide an additional source of renewable energy to the City and County of Honolulu (C&C of Honolulu 2009b).

New Fire Stations – Unknown Construction Date. To meet projected population and economic growth by 2030, the Fire Department estimates Ewa will need four new fire stations (DPP 2008).

Road Development – Various Construction Dates. Numerous projects to improve or construct new roads are planned (DPP 2008; Figure 3.10-2). These include completion of the North-South Road and additional portions of Kapolei Parkway, projected for 2010 (Malama 2009). These would provide a direct link between Kalaeloa Boulevard, Fort Barrette Road and the North-South Road. Planned roadways would also link the western part of Ocean Pointe with the planned Kalaeloa Regional Park and the extension of North-South Road

Rapid Transit System – Unknown Construction Date. An elevated or an at-grade separated rapid transit system is planned for the area and there are plans to start at a point near North-South Road and continue east. Plans further into the future allow extension of the system through Kalaeloa to the City of Kapolei, with a planned ending near the intersection of Kapolei Parkway and an extension of Hanua Street.

5.1.3 Specific Cumulative Impact Concerns and Conclusions

As listed above, numerous projects are planned that would construct new facilities. The Kalaeloa Master Plan (HCDA 2006) projects a total of 3,131,435 ft^2 of projected office space by 2025. This projected total compares to a total of 687,000 ft^2 of proposed new building space (excluding covered parking) in this EA. This amounts to slightly less than five times the total projected commercial, office, and industrial space in the Kalaeloa Master Plan by the year 2025. The planned HIARNG Kalaeloa construction would be a relatively small component of these overall building plans and would not be incompatible with these other planned projects.

Projects are proposed at the Kalaeloa Airport to increase hanger space for private aircraft. These would likely increase the number of aircraft flying out of the airport. Overall, the number of aircraft operations being proposed by HIARNG at Kalaeloa would contribute to the increase in area air traffic but it would be small compared to the total aircraft operations at present and projected for the future at the airport. Relative to prior use of BPNAS by the U.S. Navy, HIARNG will perform less aircraft activity. The HIARNG will use the existing flight patterns established by the FAA for aircraft landing during training exercises and deployments. HIARNG aircraft operations would be compatible with all known planned operations at the airport.

Aircraft operations at Kalaeloa Airport had been rising steadily since the closure of BPNAS but leveled off with the economic downturn (see Appendix D). However, with the addition of new aircraft hangers and a fueling station (Ramos 2009), there likely would be increased use of the airport by small private planes. The Instrument Landing System EA (ILS)(FAA 2005) conducted at Kalaeloa Airport projected aircraft operations at 213,400 annually by year 2010 (Appendix D of the 2005 EA). This contrasts with aircraft operations which were estimated to be 142,515 presently. The proposed action's annual aircraft operations are anticipated to be 14,775 annually, a majority of which presently occur at the Kalaeloa facilities. HIARNG estimates that with the relocation of 19 helicopters and 1 fixed-wing aircraft, air traffic would increase by less than 7% at Kalaeloa. As such, increases in noise from the use of the airport facilities would be minimal and not a significant increase over present flight operations. Also, it should be noted that HIARNG does not anticipate conducting night flights except where warranted by an emergency.

Regionally, the number of planned and proposed construction projects and road projects in the Ewa are massive. The new commercial building and housing projects planned for the area would add to existing

traffic. Traffic patterns would shift substantially with completion of various phases of the road projects planned in the area. These simultaneous changes of more traffic and road projects make it difficult to predict future traffic conditions. The total number of personnel that would be moving to the area from the proposed action or alternative action, while substantial and adding to the overall traffic load, would be relatively small in relation to all other sources and the shifts that would likely be occurring due to ongoing road projects. The proposed and alternative action would benefit from, and be compatible with, development of the rapid transit system that is proposed for the area.

Based on the planned development for the area surrounding HIARNG Kalaeloa summarized above, it is clear that tremendous changes are occurring in the region and those changes will be ongoing for the foreseeable future and throughout the time planned for the proposed action described in this EA. As discussed in Section 4, major changes are ongoing in land use and transportation infrastructure for the entire Ewa area. Given the magnitude of all the recent and proposed changes in the region and the current level of activity at the Kalaeloa airport, the relative impacts of the proposed action on land use, air quality, noise, geology and soils, water resources, biological resources, cultural resources, socioeconomics and environmental justice, transportation, hazardous materials and wastes, airspace, utilities and public services, and aesthetics would be relatively small.

5.2 RECOMMENDED MITIGATION MEASURES

Mitigation is recommended to reduce impacts to transportation to less than significant. Traffic delays at the two intersections of concern under existing conditions are unacceptable with an LOS of F. These delays are primarily the result of stop signs at these intersections and a lack of physical capacity to handle turning movements. Delays would be increased even further with the additional commuters travelling to the site under the proposed project. Section 4.10 describes a number of roadway improvements proposed, planned, in progress and recently completed in the vicinity. It is likely that these roadway improvements will alleviate much of the peak commuting hour congestion at the two intersections. Nonetheless, a number of mitigation measures are proposed to help reduce impacts to traffic from implementation of HIARNG's proposed relocation to Kalaeloa. Several policies have been established at HIARNG (see Appendix F) which include the following:

- Encouraging employees to avoid peak traffic times (7:00-8:00 AM and 3:45-5:00 PM) by establishing core business hours of 9:00 AM to 3:00 PM;
- Encouraging the use of flexible schedules through an established policy and application process for flex time;
- Offering abbreviated work weeks (i.e., 5-4-9 Flexible work schedule);
- Offering staggered start/finish times;
- Allowing telecommuting;
- Encouraging biking to work for soldiers in the neighborhood;
- Encouraging the use of public transportation, which is readily available in front of the facility;
- Incorporating design features into buildings to support multi-modal transport such as showers, lockers, bike racks, and security to facilitate bicycling and other modes of transport;
- Encouraging and providing incentives to use the mass transit rail line that is planned for the area;
- Promoting car-pooling and ride-sharing; and
- Encouraging the use of alternate routes to the facility.

With the implementation of these mitigation measures and the completion of proposed roadway improvements in the area, the impact on traffic should be nominal. Furthermore, the HIARNG anticipates working in collaboration with the HCDA and DOT to help address traffic concerns. To assist these agencies, HIARNG will consider conducting new traffic counts at a future date closer to the relocation based on discussions with HCDA and DOT. The HIARNG also anticipates reporting annually to the DOT regarding the use and implementation of flex time and flexible work schedules by staff, as well as any additional measures implemented at the facility during the four phase project.

5.3 PARTICIPATION BY GOVERNMENT AGENCIES AND THE PUBLIC

5.3.1 Government Agency Participation

A draft Description of Proposed Action and Alternatives (DOPAA) for the project was provided to agencies for comment via an August 25, 2009 letter to the agencies listed in Section 8.2. Additional opportunities to comment on this project include a 30-day period for review of the draft EA and a second 30-day review period for the final EA and draft FONSI. Comment letters on the DOPAA and the preliminary draft EA are provided in Appendices.

5.3.2 Public Participation

Public outreach, information, and participation are essential elements of any complex undertaking. HIARNG has provided and will continue to provide opportunities for the public to participate in the NEPA process to promote open communication and improve the decision-making process. Participation is encouraged by persons and organizations having potential interest in the Proposed Action and Alternatives – including minority, low-income, and Native American groups (including Native Hawaiians). Formal opportunities to comment on this project included a public scoping meeting to discuss the proposed action and alternatives, a 30-day period for public review of the draft EA and a second 30-day public review period for the final EA and draft FONSI. Prior to the formal comment opportunities described above, a draft DOPAA for the project was provided to the groups listed in Section 8.2. No adverse comment letters were received from these groups, which are summarized in Appendix H.

A public notice is being published in local newspapers for the 30-day draft EA review to ensure that interested persons and organizations are notified. In addition, copies of the draft EA are provided to local libraries and are provided to individuals, organizations, Native Hawaiian groups/organizations, and pertinent government agencies. The draft EA is also available on the OEQC website. Following a review of comments received during the public review period, HIARNG will determine whether the Proposed Action would have significant adverse impacts, and if significant impacts are identified, a NOI to prepare an EIS would be published in the Federal Register and an EIS preparation notice would be published in OEQCs *Environmental Notice*.

If it is determined that significant adverse impacts would not result from the Proposed Action, the NGB and HIARNG will issue and publish a draft FONSI. A public notice for the final EA will be published in local newspapers, and copies of the documents provided to local libraries and interested parties. This second public notice will initiate a second public review period, during which HIARNG will consider any comments on the final EA and draft FONSI submitted by agencies, organizations, and members of the public. Once any public comments are considered, and if the HIARNG makes a final determination that

the project will have no significant adverse impacts on the environment, the NGB will sign the FONSI and the action will be implemented.

5.4 PERMITS AND APPROVALS REQUIRED

5.4.1 Permits

The permits that would be required before implementation of the project are listed below.

State of Hawaii

- NPDES Notice of Intent, Appendix C (NOI-C) Permit, Department of Health. Stormwater associated with construction activities.
- Community Noise Control, Department of Health. A Noise Variance Permit would also be required if work is required during evenings and weekends.
- Coastal Zone Management Federal Consistency Determination.
- UIC Program Permit (Injection Well [drywell] Permit), Department of Health. Required if determined during site design to be the best method for management of stormwater.

City and County of Honolulu

- Building and Renovation Permits, Department of Planning and Permitting
- Grading Permit, Department of Planning and Permitting

5.4.2 Approvals

Plan review and approval would be required by the following agencies:

- Federal Aviation Administration – for approval in accordance with Airspace Utilization Advisory Circular No. 70-2E.
- DOT Airports Division – for Kalaeloa Airport use and approval via Memorandum of Agreement or Understanding.
- Hawaii Department of Business, Economic Development, and Tourism, Office Planning – for coastal zone impact evaluation and consistency review.
- Board of Water Supply – for water supply requirements.
- Naval Facilities Engineering Command – for use of utilities.
- CCH Department of Environmental Services – for solid waste management.
- Disability and Communications Access Board – for compliance with Americans with Disabilities Act.

5.5 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Resources that are committed irreversibly or irretrievably are those that cannot be recovered if the Proposed Action, or the alternative to the Proposed Action, is implemented. The proposed action would entail permanent construction of approximately 600,000 ft^2 of new buildings plus 165,000 ft^2 of covered parking and renovations to 328,000 ft^2 of existing buildings. Most of the materials used for construction and renovation would likely be irretrievably committed, although ultimately some of the metals could be

salvaged and recycled. There would likely be some increase in the use of electricity and water with the construction of additional space, however using LEED silver design standards would minimize energy and water usage. The use of energy savings devices and energy efficient building design would also reduce consumption and the need for a commitment of larger resources, In addition, wastewater flows may increase, however with the installation of water savings devices such as low flow faucets and fixtures, the amount of wastewater generated can be readily accommodated by existing treatment infrastructure. Accordingly, the amounts of irretrievable or irreversible resources that will be needed to implement the Proposed Action are not anticipated to be significant.

SECTION 6
COMPARISON OF ALTERNATIVES AND CONCLUSIONS

This EA evaluates the potential environmental impacts associated with the implementation of the proposed construction, demolition, and renovation projects, and subsequent HIARNG operations at Kalaeloa.

6.1 COMPARISON OF THE ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

The proposed action would move various Hawaii Army National Guard units to Kalaeloa including the Oahu-based aviation units, Joint Forces Headquarters, and miscellaneous other smaller units. It would include constructing or renovating buildings for these units and units already at Kalaeloa including an Aviation Support Facility, Headquarters Readiness Center, Brigade Readiness Center, and Aviation Readiness Center. The Proposed Action and Alternative 1 Action differ with respect to the relative placement of the various new buildings. The proposed action has the arrangement of buildings that would be more efficient and maximize use of building space. In contrast, Alternative 1 would move aviation operations slightly further from residential areas but the building arrangement would not be as efficient for operations and utilization of building space would not be as efficient. Impact comparisons for the resource areas evaluated are listed in Table 6.1-1.

Table 6.1-1. Comparison of Alternative Impacts

Resource	*Proposed Action Impact*	*Alternative 1 Impact*	*No Action*
Land Use	No significant impact	No significant impact	No impact
Air Quality	No significant impact with BMPs	No significant impact with BMPs	No impact
Noise	No significant impact	No significant impact	No impact
Geology and Soils	No significant impact	No significant impact	No impact
Water Resources	No significant impact with BMPs	No significant impact with BMPs	No impact
Biological Resources	No significant impact	No significant impact	No impact
Cultural Resources	No significant impact with SOPs	No significant impact with SOPs	No impact
Socioeconomics and Environmental Justice	No significant impact	No significant impact	No impact
Transportation	Less than significant impact with mitigation. Mitigation requires coordination with other agencies, and cannot be implemented solely by HIARNG.	Less than significant impact with mitigation. Mitigation requires coordination with other agencies, and cannot be implemented solely by HIARNG.	No impact
Hazardous Materials and Waste	No significant impact	No significant impact	No impact
Airspace	No significant impact	No significant impact	No impact
Utilities and Public Services	No significant impact	No significant impact	No impact
Aesthetics	No significant impact	No significant impact	No impact

6.2 HRS 343 SIGNIFICANCE CRITERIA

The Significance Criteria in HAR Title 11, 200-12 for environmental impacts were reviewed and analyzed to determine whether the proposed project would have significant impacts. The evaluation

included all phases of the proposed action, both direct and indirect impacts and short-term and long-term effects, and the cumulative effects. Each of the significance criteria listed below is followed by the evaluation.

1. Involves an irrevocable commitment or loss or destruction of any natural or cultural resource.

Neither the proposed action nor Alternative 1 would result in an irrevocable commitment or loss or destruction of any natural or cultural resource. There are no known rare, threatened, or endangered species located at the site or in the immediate vicinity. There are no known important archeological resources. Historic buildings present on the HIARNG facility would be retained.

2. Curtails the range of beneficial uses of the environment.

Neither the proposed project nor Alternative 1 would affect the beneficial uses of the environment. The land that would be used is vacant and contains no important natural resources. Uses proposed would be in accordance with guidelines in the Kalaeloa Master Plan.

3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

As shown in this EA, neither the proposed action nor Alternative 1 would have a significant impact to the environment; they would be consistent with the State of Hawaii's long-term environmental policies, goals, and guidelines. Furthermore, both the proposed project and Alternative 1 are consistent with their land use designations and entitlements.

4. Substantially affects the economic or social welfare of the community or state.

The proposed project or Alternative 1 would have negligible direct beneficial effects on the local economy during construction as the construction crew would be expected to already be residing with the City and County of Honolulu. In the long-term, relatively few individuals that would be newly assigned to Kalaeloa would likely move to the area. As such, the proposed project or Alternative 1 may have a slight beneficial effect on the local community economy through the purchases of goods and services from local merchants and service providers.

5. Substantially affects public health.

During both construction and operation of the proposed facility under the proposed action or Alternative 1, no adverse impacts to the public's health are anticipated. Safety and health BMPs, as specified in this EA, would be in place and there would be compliance with all Federal, state, and county regulations during construction and operations.

6. Involves substantial secondary impacts, such as population changes or effects on public facilities.

The scale of the changes in personnel and aircraft operations in the Proposed Action or Alternative 1 is small in relation to the current facilities use and proposed future changes for the area. There would be minimal effects on public facilities or services in the area.

7. Involves a substantial degradation of environmental quality.

During construction, there would be short-term air quality and noise impacts. In the long-term, impacts in these areas would be minimal, particularly when viewed in relation to the activity throughout the Ewa area. There are no sensitive biological resources, water bodies, wetlands, or floodplains located in the project area. Therefore, no substantial degradation of environmental quality is anticipated.

8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

Because of the tremendous changes occurring and planned for the Ewa area, including areas near the HIARNG Kalaeloa facility, the additional cumulative effects from the proposed action or Alternative 1 would be minor. In addition, they are in accordance with the Kalaeloa Master Plan and the Ewa Development Plan.

9. Substantially affects a rare, threatened, or endangered species or its habitat.

No rare, threatened, or endangered species or their habitats are known to be present on the HIARNG Kalaeloa facility.

10. Detrimentally affects air or water quality or ambient noise levels.

During the construction phase, there would be short-term air quality and noise impacts. To minimize air quality impacts during construction, dust control measures would be implemented to minimize wind-blown emissions. Noise impacts from construction would be minimized by limiting construction activities to daylight hours and by following all applicable regulations. Noise from proposed aircraft operations would increase average noise levels only minimally above existing levels and noise levels for sensitive populations or residential areas would not exceed levels generally considered acceptable for those receptors.

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 HIARNG Kalaeloa facility and immediately surrounding area has no water bodies or wetlands and is not located in the 100-year floodplain or tsunami inundation zone. The area is not known to be erosion-prone or geologically hazardous.

12. Substantially affects scenic vistas and view planes identified in county or state plans or studies.

The HIARNG Kalaeloa facility area is not identified as a scenic vista or view plane and the proposed action or Alternative 1 would not affect any scenic views or view planes. Design features would be in accordance with the Kalaeloa Master Plan.

13. Requires substantial energy consumption.

The Proposed Action or Alternative 1 would create an additional demand for electricity, although it would not be substantially above what is currently used by the various HIARNG units that would be moving to Kalaeloa considering more efficient buildings and the goal of achieving LEED silver design standards. Fuel used by aircraft that would be moved to Kalaeloa is not expected to increase substantially over what is currently being used.

Based on analysis of the 13 significance criteria above, the proposed action or Alternative 1 would not result in significant environmental effects.

SECTION 7
REFERENCES

AirNav. 2009. http://airnav.com/airport/PHJR, accessed on November 20, 2009.

Athens, J.S., J. Ward, H.D. Tuggle, and D.J. Welch. 1997. Environment, Vegetation Change, and Early Human Settlement on the Ewa Plain: A Cultural Resource Inventory of Naval Air Station Barbers Point, Oahu, Hawaii, Part III: Paleoenvironmental Investigations. Prepared for the Department of Navy, Pacific Division, Naval Facilities Engineering Command.

Belt Collins. 1999. Environmental Baseline Survey (EBS). Portion of Naval Air Station Barbers Point, Oahu, Hawaii. Prepared for the Hawaii Army National Guard. June.

(CCH) City and County of Honolulu. 2009a. Flood Evacuation Zone Maps. http://www.honolulu.gov/dem/maps.htm. Accessed December 1, 2009.

CCH 2009b. Environmental Impact Statement, H-POWER Expansion Project, Kapolei, Oahu, Hawaii. May.

CSSI (CSSI Inc). 2005. Emissions and Dispersion Modeling System.

DoN (Department of the Navy). 1999. Final Environmental Impact Statement for the Disposal and Reuse of Naval Air Station Barbers Point, Hawaii. Pacific Division, Naval Facilities Engineering Command.

DPP (Department of Planning and Permitting, City & County of Honolulu). 2008. Public Review Draft, Ewa Development Plan. October.

Earth Tech. 1998a. Final Feasibility Study for the Relocation of the Hawaii Army National Guard to Barbers Point Naval Air Station. Prepared for the Hawaii Army National Guard, State of Hawaii, Department of Defense.

Earth Tech. 1998b. Final Conceptual Study for the Relocation of the Hawaii Army National Guard to Barbers Point Naval Air Station. Prepared for the Hawaii Army National Guard, State of Hawaii, Department of Defense.

Earth Tech and Tetra Tech. 2008. Final Remedial Action Completion Report for Base Realignment and Closure Property Former Naval Air Station Barbers Point Oahu, Hawaii Department of the Navy. Prepared for Naval Facilities Engineering Command, Hawaii. February.

E2M. 2009. Draft Final Historic Building Survey and Evaluation Report of Ten Facilities, Hawaii Army National Guard. Prepared for the Office of the Adjutant General, Hawaii Department of Defense. May.

Engineering-Environmental Management, Inc. 2009. Historic Building Survey and Evaluation Report of Ten Facilities, Hawaii Army National Guard. Prepared for the Hawaii Army National Guard. March.

FAA (Federal Aviation Administration). 2005. Environmental Assessment, Construction and Operation of an Instrument landing System (ILS) On Runway 04 Right, Kalaeloa Airport, Kapolei Hawaii. August.

FAA. 2006. Environmental Impacts: Policies and Procedures. National Policy Order1050.1E, CHG 1. March.

FAA. 2008 FAA Order JO 7400.2G, April 10, 2008.

Federal Register. 2009. Vol. 74, No. 14, January 23, 2009, pp. 4199-4201.

FICON. 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. Federal Interagency Committee on Noise. August.

FICUN. 1980. Guidelines for Considering Noise in Land-Use Planning and Control. Federal Interagency Committee on Urban Noise. June.

Gray et. al. (Gray, Hong, Bills & Associates, Inc.), 1995. Baseline Study: Infrastructure Issues Associated with the Closure of Barbers Point Naval Air Station, Ewa District, Oahu, Hawaii. Prepared for Barbers Point Naval Air Station Redevelopment Commission under direction of Helber Hastert & Fee.

HCDA (Hawaii Community Development Authority). 2006. Kalaeloa Master Plan. Prepared by Belt Collins, EDAW, SMS, BAE, and Ebisu. March.

HECO (Hawaiian Electric Company). 2009. www.Heco.com, accessed on December 4, 2009.

Helber, Hastert, and Fee. 1997. Naval Air Station

HIARNG (Hawaii Army National Guard). 2001. Final Hazardous Material and Waste Management Plan. Prepared by HIARNG Environmental Office. November.

HIARNG. 2003a. Environmental Assessment for the Relocation and Consolidation of the Hawaii Army National Guard to Kalaeloa, Oahu, Hawaii: Including Construction and Renovation of New and Existing Buildings and Infrastructure. Prepared by the Hawaii Department of Defense Facilities Management Office. April.

HIARNG. 2003b. Integrated Solid Waste Management Plan. Prepared by Earth Tech, Inc. March.

HIARNG. 2004. Oil and Hazardous Substance Spill Prevention and Response Plan for Hawaii National Guard Facilities on the Islands of Hawaii, Kauai, Maui, and Oahu, Hawaii. Prepared by Environmental Protection Specialist, HIARNG Environmental Office. August.

HIARNG. 2008. Final Integrated Cultural Resources Management Plan: 2008 -2012 (ICRMP). Prepared by Environmental Office, HIARNG. September.

HIARNG. 2007a. Hawaii Army National Guard Storm Water Pollution Control Plan, Oahu. February.

HIARNG. 2007b. Hawaii Army National Guard Statewide Operational Noise Management Plan. Prepared by Operational Noise Program, Directorate of Environmental Health Engineering, U.S. Army Center for Health Promotion and Preventative Medicine. May.

Honolulu Star Bulletin. 2005. Delays prompt review of plans for Kalaeloa. June 26.http://honoluludpp.org/HotIssues/KapoleiRoadways_Feb09.pdf. 2009.

Intergovernmental Panel on Climate Change. 2007. R.B. Alley, et al., Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policy Makers. http://www.project2061.org/events/meetings/climate2010/media/presentations/Stechel-ClimateLiteracy(20100216.0100).pdf

University of Hawaii. 2008. http://tech.honolulu.hawaii.edu/avit/facilities.html Accessed 5 November 2008.

Jacobs. 2007. Project Planning Document Charrette, Readiness Center (RC), Kalaeloa, Oahu, Hawaii. Prepared for the Hawaii Army National Guard. July.

Jacobs. 2008. Project Planning Document Charrette, Army Aviation Support Facility (AASF), Kalaeloa, Oahu, Hawaii. Prepared for the Hawaii Army National Guard. January.

Kawaoka. 2009. Personal communication on December 9, 2009 with Lynette Kawaoka, Hawaii Department of Transportation, Airports Division Planner.

Malama. 2009. Personal communication on December 11, 2009 with Tesha Malama, Kalaeloa Director of Planning and Development, Hawaii Community Development Authority.

Midwest Research Institute. 1996. Improvement of Specific Emission Factors (BACM Project No. 1). Final Report. South Coast AQMD Contract No. 95040, March 29.

Mink, J.F., and L.S. Lau. 1990. Aquifer Identification and Classification for Maui: Groundwater Protection Strategy for Hawaii: Honolulu, Hawaii. University of Hawaii Water Resources Research Center, Technical Report no. 185.

NGB (National Guard Bureau). 2006. Guidance on Preparing Environmental Documentation for Army National Guard Actions in Compliance with the National Environmental Policy Act of 1969. Prepared for Army National Guard by the US Army Corps of Engineers Mobile District. June.

Navy Region Hawaii. 2008. Environmental Assessment, Conveyance of Navy Retained Land and Utility Systems Kalaeloa, Oahu, Hawaii. August.

Newman, J. Steven, Rickley, Edward J., Bland, Tyrone L., Beattie, Kristy R. 1984 Noise Measurement Flight Test for Boeing Vertol 234/CH 47-D Helicopter: Data/Analyses. FAA-EE-84-7.

NPS (National Park Service) 1997. U.S. Department of the Interior, National Park Service. How to Apply the National Register Criteria for Evaluation (National Register Bulletin). Washington, D.C.

Office of Naval Research. 2003. Environmental Assessment, Seafarers Training Center Kalaeloa, Oahu, Hawaii. October.

PB Americas (Parsons Brinkerhoff Americas). 2009. Ewa Roadway Connectivity Study. Prepared for City and County of Honolulu, Department of Planning and Permitting. May.

Ramos. 2009. Personal communication on December 8, 2009 with Bobby Ramos, Kalaeloa Airport Manager.

South Coast Air Quality Management District. 1993. CEQA Air Quality Handbook.

State of Hawaii, Hawaii Community Development Authority (HCDA). 2006. Kalaeloa Master Plan. Prepared by Belt Collins, EDAW, Bay Area Economics, SMS Research and Y. Ebisu & Associates.

TEC (TEC Inc.). 2009. Draft Environmental Condition of Property Environmental Baseline Survey Relocation of Hawaii Army National Guard to Kalaeloa, Oahu, Hawaii. Prepared for the Hawaii Army National Guard. August.

Tolleson, W. 2000. Cultural Resources Manager. Investigation of Limestone Sinkholes on Proposed HIARNG Property. Memorandum to LTC Ron Swafford.

Tuggle, H. D., M. Tomonari-Tuggle, A. Yoklavich, M. O'Hare, C. Denfeld. 1999. Cultural Resources Management Plan: Naval Air station, Barbers Point. Contract N6742-94-D-0006, Amendment 1, Task 3d: Archaeological Research Services for the Proposed Cleanup, Disposal, Reuse of Naval Air Station, Barber's Point, Oahu, Hawaii. Prepared for the Department of the Navy, Pacific Division, Naval Facilities Engineering Command by International Archaeological Research Institute, Inc.

UFC (United Facilities Criteria) 4-010-01. 2007. DoD Minimum Anti-Terrorism Standards for Buildings. January 22.

USCB (U.S. Census Bureau). 2000. http://factfinder.census.gov

U.S. Department of Agriculture. 1972. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, Hawaii.

USEPA (U.S. Environmental Protection Agency). 1971. Noise from Construction Equipment and Home Appliances. Washington, DC.

USEPA. 1972. Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency Report 550/9-74-004. March.

USEPA. 2003. User's Guide to Mobile 6.1 and Mobile 6.2 – Mobile Source Emission Factor Model. EPA420-R-03-010. August.

USEPA. 2007. Basic Information, Lead in Paint, Dust, and Soil. http://www.epa.gov/lead/pubs/leadinfo.htm#facts 2 August.

USFWS. 2008. James Campbell and Pearl Harbor National Wildlife Refuges, Planning Update 1 November, 2008. http://www.fws.gov/pacific/planning/main/docs/HI-PI/docsjcpearl.htm

USFWS. 2009. James Campbell and Pearl Harbor National Wildlife Refuges, Planning Update 2, June 2, 2009. http://www.fws.gov/pacific/planning/main/docs/HI-PI/docsjcpearl.htm.

USEPA. 2009a. Air Data: Access to Air Pollution Data. http://www.epa.gov/air/data/index.html.

USFWS (U.S. Fish and Wildlife Service). 2010a. http://www.fws.gov/pearlharbor/ Accessed April 27, 2010.

USFWS. 2010b. http://www.fws.gov/migratorybirds/RegulationsPolicies/treatlaw.html Accessed May 18, 2010.

US Navy (U.S. Department of the Navy). 1992. Cultural Resources Management Overview Survey (CRMOS), Naval Air Station barbers Point, Oahu. Pacific Division, Naval Facilities Engineering Command (NAVFAC).

US Navy (U.S. Department of the Navy). 1999. Final Environmental Impact Statement for the Disposal and Reuse of Naval Air Station Barbers Point, Hawaii.

Wilbur Smith Associates. 2009. Traffic Impact Analysis for the Hawaii Army National Guard in Kalaeloa, Hawaii. November.

WRCC (Western Region Climate Center). 2009. Climate Data for U.S. Magnetic Observatory, http://www.wrcc.dri.edu/.

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SECTION 8
LIST OF PREPARERS, PERSONS AND AGENCIES CONSULTED

8.1 LIST OF PREPARERS

This report was prepared for HIARNG and under the direction of the HIARNG Environmental Division by TEC Inc. Members of the TEC Inc. professional staff and specialist subconsultants are listed below.

Project Management

- Glenn Metzler, M.S., Biology

Quality Assurance

- George Krasnick, M.S., Biological Oceanography
- Andrea Gall, Editor, B.A., Communications

Technical Analysts

- Rachel Ross, B.S., Conservation and Resource Management
- Carol Zurawski, M.S., Environmental Management
- Bill Wear, M.A., Public Administration
- William Whitman, B.A., Environmental Studies
- Craig Bloxham, M.A. Geography
- Renee Harrington, M.S. Marine Science
- J. Scott Coombs, M.S. Marine Science

Graphic Design

- Kerry Wells, B.S., Physics

Specialty Consultants

- Wilbur Smith Associates, Traffic
- Wyle Laboratories Inc., Noise
- Scientific Resources Associated, Air Quality

8.2 LIST OF PERSONS AND AGENCIES CONTACTED

A draft DOPAA was mailed on August 25, 2009 to agencies and organizations in Table 8.2-1.

Table 8.2-1. List of Agencies and Organizations Receiving the Draft DOPAA

FEDERAL PARTIES		
Manager Honolulu Airports District Office Federal Aviation Administration 300 Ala Moana Blvd, Box 50244 Honolulu, HI 96850-0001	Region 9, Pacific Islands Office U.S. Environmental Protection Agency P.O. Box 50003 Honolulu, HI 96850	Director of Water Programs US Geological Survey 677 Ala Moana Blvd. #415 Honolulu, HI 96813
U.S. Fish and Wildlife Service Pacific Islands Office 300 Ala Moana Blvd. Honolulu, HI 96813	Commander US Coast Guard 14th Coast Guard District 300 Ala Moana Blvd. Honolulu, HI 96850	Commander and Division Engineer US Army Corps of Engineers Pacific Ocean Division, Building 230 Fort Shafter, HI 96858-5440
Commander Naval Facilities Engineering Command Pacific 258 Makalapa Drive, Suite 100 Pearl Harbor, Hawaii 96860-3134		
STATE PARTIES		
Governor Linda Lingle Office of the Governor State Capitol Honolulu, HI 96813	Hawaii Community Development Authority 461 Cooke Street Honolulu, Hawaii 96813	Hawaii State Department of Health Office of Environmental Quality Control 235 S. Beretania St., Suite 702 Honolulu, HI 96813
Department of Land and Natural Resources Land Division 1151 Punchbowl St, Room 220 Honolulu, HI 96813	Department of Transportation Aliiaimoku Building 869 Punchbowl Street Honolulu, HI 96813	State Historic Preservation Division Department of Land & Natural Resources 601 Kamokila Boulevard Kapolei, HI 96707
State of Hawaii Dept. of Business, Economic, Development & Tourism Land Use Commission PO Box 2359 Honolulu, HI 96804	Hawaii Coastal Zone Management Program Office of Planning P.O. Box 2359 Honolulu, HI 96804	State of Hawaii Department of Health Hazard Evaluation and Emergency Response Office (HEER) 919 Ala Moana Blvd, Room 206 Honolulu, HI 96814
State of Hawaii Department of Planning 235 S. Beretania Street, #600 Honolulu, HI 96813	State of Hawaii Department of Transportation 869 Punchbowl Street Honolulu, HI 96813	State of Hawaii Department of Health Environmental Planning Office PO Box 3378 Honolulu, HI 96801
Director UH Manoa Environmental Center 2500 Dole, Krauss Annex 19 Honolulu, HI 96822		
C&C PARTIES		
Mayor Mufi Hannemann 530 S. King St Honolulu, HI 96813	Police Chief City and County of Honolulu Police Department 801 South Beretania St. Honolulu, HI 96813	City & County of Honolulu Department of Planning and Permitting 650 South King Street Honolulu, HI 96813

Department of Parks and Recreation 1000 Uluohia Street, Suite 309 Kapolei, HI 96707		
UTILITIES AND SERVICES		
Honolulu Department of Environmental Services 1000 Uluohia Street, Suite 308 Kapolei, HI 96707	Chief Engineer Board of Water Supply 630 South Beretania St. Honolulu, HI 96813	Hawaiian Electric Company PO Box 2750 Honolulu, HI 96740
LOCAL AND NATIVE HAWAIIAN ORGANIZATIONS		
Historic Hawaii Foundation Dole Cannery Dole Office Building Tower, Suite 690 680 Iwilei Rd Honolulu, HI 96817	Oahu Island Burial Council Department of Land & Natural Resources P.O. Box 621 Honolulu, HI 96809	Ahahui Siwila Hawaii O Kapolei Hawaiian Civic Club PO Box 700007 Kapolei, HI 96709-007
Office of Hawaiian Affairs 711 Kapiolani Blvd., Ste. 500 Honolulu, HI 96813	Hawaiian Homes Commission Department of Hawaiian Home Lands PO Box 1879 Honolulu, HI 96801	
ADDITIONAL ADJACENT LANDOWNERS		
Headquarters Hawaii Air National Guard 3949 Diamond Head Road Honolulu, HI 96816	Housing and Community Development Corporation of Hawaii 1002 North School Street Honolulu, HI 96817	CP Makai LLC 1000 Sansome Suite 180 San Francisco, CA 94111

Other persons contacted in the preparation of this EA include the following:

- Ms. Tesha Malama, Kalaeloa Director of Planning and Development, Hawaii Community Development Authority
- Mr. Bobby Ramos, Kalealoa Airport Manager
- Mr. Norman Simpson, Kalaeloa Air Traffic Control
- Mr. Hank Bruckner, Hawaii State Aviation Officer
- Ms. Lynette Kawaoka, DOT Planning Office
- Mr. John Bigay, Pacific Naval Facilities Engineering Command
- Mr. David Shimokawa, DOT Statewide Transportation Planning Office

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APPENDIX A
PREVIOUS ACTION DECISION DOCUMENTS

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FINDING OF NO SIGNIFICANT IMPACT
ENVIRONMENTAL ASSESSMENT
FOR
THE RELOCATION AND CONSOLIDATION OF THE HAWAII ARMY NATIONAL GUARD TO KALAELOA, OAHU, HAWAII: INCLUDING CONSTRUCTION AND RENOVATION OF NEW AND EXISTING BUILDINGS AND INFRASTRUCTURE

Introduction

The Hawaii Army National Guard (HIARNG) prepared an Environmental Assessment (EA) to identify and evaluate potential environmental effects of the relocation and consolidation of the HIARNG to Kalaeloa. The HIARNG prepared the EA in accordance with the National Environmental Policy Act (NEPA), the National Historic Policy Act (NHPA) of 1966, and Hawaii Revised Statute (HRS) 343.

1. Description of Proposed Action and Alternatives

Proposed Action. The HIARNG proposes to relocate units identified in Section 1.1 to facilities located on a 150-acre site at Kalaeloa. The initial plans divide the improvements at Kalaeloa into three main categories: (1) renovations to buildings, (2) repair or upgrade airfield pavement, landscaping, and infrastructure, and (3) new construction.

The majority of the upgrades to the Kalaeloa facilities are exempt from the EA process. They involve interior improvements and repairs to existing buildings, including plumbing and electrical work. The activities that are not exempt include the use of Federal land and funds, renovations to historic Buildings 117 and 282, widening of the airfield runway, and new construction.

The development plan is now in the conceptual stage, and the Proposed Action will consist of four phases. The first phase involves the renovation of Building 117, a historic structure. Phase two includes construction of a Brigade Headquarters, Aviation facility, Privately Owned Vehicle (POV) parking, and Central Wash-Fuel facility. Phase three includes an addition to Building 1898 with the HIARNG museum. Phase four includes the renovation of Buildings 46, 1786, 1787, 1784, 1785, 1788, and 19. This EA discusses the potential impacts of the first phase only. The potential impacts of later phases will be analyzed in separate EAs.

Alternatives Considered. In addition to the Proposed Action, a No Action Alternative was analyzed. Under the No Action Alternative, no renovation would take place and HIARNG units would remain at current facilities. This is not a viable solution as current facilities do not meet existing needs and there is limited space for expansion at both the Fort Ruger and Wheeler Army Airfield sites. The No Action Alternative would impair HIARNG's ability to fulfill its mission requirements. In addition, HIARNG must vacate the crater facilities in accordance with the Diamond Head Crater State Monument Plan, returning the land to a semi-natural condition.

2. Environmental Analysis

The following potential environmental and socio-economic effects of the Kalaeloa EA were assessed for the Proposed Action and No Action Alternative: land use, air quality, noise, geology and soils, biological and water resources, cultural resources, socio-economics, environmental justice and infrastructure. The HIARNG found no significant impacts on these resources as a result of the Proposed Action. During the short-term, the Proposed Action may

generate increased noise and dust associated with construction and renovation. This activity will be limited to daylight work hours.

Based upon the analysis contained in the EA, it has been determined that the known and potential impacts of the Proposed Action on the socio-economic aspects of the local areas would be beneficial. The No Action Alternative has little or no effect on any of the resources analyzed in this assessment.

3. Regulations

The Proposed Action would not violate NEPA (42 USC § 4321 to 4370e), its regulations promulgated by the Council on Environmental Quality (40 CFR parts 1500-1508), 32 CFR 651, *Environmental Analysis of Army Actions*, or any other Federal, State, or local environmental regulations.

4. Public Review and Comment

The Draft EA was made available for a 30-day public review and comment period from January 8, 2003 to February 7, 2003 and the Final EA and Draft Finding of No Significant Impact (FNSI) were made available for a 15-day public review and comment period from May 18, 2003 to June 1, 2003 at locations listed in *The Environmental Notice*, the bi-monthly bulletin of the Office of Environmental Quality Control. No comments were received.

For further information, contact the Hawaii Army National Guard Environmental Office (HIARNG-ENV), 3949 Diamond Head Road, Honolulu, Hawaii 96816-4495.

5. Finding of No Significant Impact

After careful review of the EA, I have concluded that implementation of the Proposed Action would not generate significant controversy or have a significant impact on the quality of the human or natural environment. The requirements of the National Environmental Policy Act and the Council for Environmental Quality regulations have been met. An Environmental Impact Statement will not be prepared, and the National Guard Bureau is issuing this Finding of No Significant Impact.

16 June 2003
Date

Gerald I. Walter
Lieutenant Colonel, US Army
Chief, Environmental
Programs Division

Janet A. Long,

Air Force Federal Register Liaison Officer.

[FR Doc. 99–16567 Filed 6–29–99; 8:45 am]

BILLING CODE 5001–05–P

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Grant an Exclusive Patent License

Pursuant to the provisions of Part 404 of Title 37, Code of Federal Regulations, which implements Public Law 96–517, the Department of the Air Force announces its intention to grant Hybrid Plastics, LLC, a company doing business in Fountain Valley, CA, an exclusive license in any right, title, and interest the Air Force has in U.S. Patent Application Serial No. 09/003,083 entitled ''METHOD OF FUNCTIONALIZING POLYCYCLIC SILICONES AND THE RESULTING COMPOUNDS'' and Patent Application Serial No. 09/003,084 entitled ''METHOD OF FUNCTIONALIZING POLYCYLIC SILICONES AND THE COMPOUNDS SO FORMED.'' Each invention is a joint invention of Joseph D. Lichtenhan and Joseph J. Schwab, Frank J. Feher, and Daravonge Soulivong.

The two licenses described above will be granted unless an objection thereto, together with a request for an opportunity to be heard, if desired, is received in writing by the addressee set forth below within 60 days from the date of publication of this Notice. Information concerning the application may be obtained, on request, from the same addressee.

All communications concerning this Notice should be sent to Mr. Randy Heald, Associate General Counsel (Acquisition), SAF/GCQ, 1500 Wilson Blvd., Suite 304 Arlington, VA 22209–2310. Mr. Heald can be reached at 703–588–5091 or by fax at 703–588–8037.

Janet A. Long,

Air Force Federal Register Liaison Officer.

[FR Doc. 99–16629 Filed 6–29–99; 8:45 am]

BILLING CODE 5001–05–U

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Grant an Exclusive Patent License

Pursuant to the provisions of Part 404 of Title 37, Code of Federal Regulations, which implements Public Law 96–517, the Department of the Air Force announces its intention to grant R & J Fluidix LLC, a company doing business in Mt. Holly, N.J., an exclusive license in any right, title, and interest the Air Force has in U.S. Patent No. 5,873,500. The invention is a joint invention of Richard W. Homburg and Jay A. Murray both of whom were government employees at the time of the invention. The invention is entitled ''FLUID DELIVERY CART'' and issued on February 23, 1999.

The license described above will be granted unless an objection thereto, together with a request for an opportunity to be heard, if desired, is received in writing by the addressee set forth below within 60 days from the date of publication of this Notice. Information concerning the application may be obtained, on request, from the same addressee.

All communications concerning this Notice should be sent to Mr. Randy Heald, Associate General Counsel (Acquisition), SAF/GCQ, 1500 Wilson Blvd., Suite 304 Arlington, VA 22209–2310. Mr. Heald can be reached at 703–588–5091 or by fax at 703–588–8037.

Janet A. Long,

Air Force Federal Register Liaison Officer.

[FR Doc. 99–16630 Filed 6–29–99; 8:45 am]

BILLING CODE 5001–05–U

DEPARTMENT OF DEFENSE

Department of the Navy

Record of Decision for the Disposal and Reuse of Naval Air Station Barbers Point, Oahu, HI

SUMMARY: The Department of the Navy (Navy), pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4332(2)(C) (1994), and the regulations of the Council on Environmental Quality that implement NEPA procedures, 40 C.F.R. Parts 1500–1508, hereby announces its decision to dispose of Naval Air Station (NAS) Barbers Point, which is located on the island of Oahu in Honolulu County, Hawaii.

Navy analyzed the impacts of the disposal and reuse of NAS Barbers Point in an Environmental Impact Statement (EIS) as required by NEPA. The EIS analyzed four reuse alternatives and identified the Naval Air Station Barbers Point Community Redevelopment Plan dated March 1997 (Redevelopment Plan), described in the EIS as the State-Preferred Alternative, as the Preferred Alternative. The State of Hawaii is the Local Redevelopment Authority (LRA) for NAS Barbers Point. Department of Defense Rule on Revitalizing Base Closure Communities and Community Assistance (DoD Rule), 32 CFR 176.20(a).

The Preferred Alternative proposed a mix of aviation, residential, educational, community service, light industrial, commercial, public, park and recreational uses. These include a general aviation and military airport, housing, a vocational training center, a desalinization plant, an automobile race track complex, an international sports center, a festival center, a marine park, a baseball complex, and a field sports complex.

Navy intends to dispose of NAS Barbers Point in a manner that is consistent with the Redevelopment Plan. Navy has determined that a mixed land use will meet the goals of achieving local economicredevelopment, creating new jobs, and providing additional housing, while limiting adverse environmental impacts and ensuring land uses that are compatible with adjacent property. This Record Of Decision does not mandate a specific mix of land uses. Rather, it leaves selection of the particular means to achieve the proposed redevelopment to the acquiring entities and the local zoning authority.

Background

Under the authority of the Defense Base Closure and Realignment Act of 1990 (DBCRA), Public Law 101–510, 10 U.S.C. § 2687 note (1994), the 1993 Defense Base Closure and Realignment Commission recommended the closure of Naval Air Station Barbers Point. This recommendation was approved by President Clinton and accepted by the One Hundred Third Congress in 1993. The base is scheduled to close on July 2, 1999.

Nearly all of the property associated with NAS Barbers Point is located on the island of Oahu, about 16 miles west of downtown Honolulu. This property covers 3,723 acres. Additionally, there are three non-contiguous parcels that cover 100 acres: two small areas at Iroquois Point on Pearl Harbor and Kaula Island located 55 miles from the Hawaiian island of Kauai.

Navy controls an additional 110 acres near the main base by way of easements for air operations. These easements impose restrictions on 20 acres of private property near the northwestern edge of the base and on 90 acres of private property near the southwest corner of the base. Navy will transfer its interests in these easements to the underlying property owners.

The 3,723-acre main base property is bounded on the north by the City of Kapolei; on the east by the communities of Ewa Villages, Ewa Gentry and Ewa Marina; on the south by the Pacific Ocean; and on the west by Campbell Industrial Park and Kapolei Business Park. There are three runways at NAS Barbers Point: two parallel 8,330-foot runways (Runway 4L–22R and Runway 4R–22L) in a southwest-northeast alignment and one 8,411-foot crosswind runway (Runway 11–29) in a northwest-southeast alignment. There is a drainage channel on the western edge of the base adjacent to Campbell Industrial Park that runs from north to south. Navy owns the northern and southern parts of the drainage channel, and the Estate of James Campbell owns the middle part of the channel. The Estate also maintains easements on those parts owned by Navy.

The Navy property at Iroquois Point on Pearl Harbor covers two acres located about eight miles west of downtown Honolulu. This property contains a community center and a retail store that are situated in a military family housing area associated with Navy activities at the Pearl Harbor Naval Complex. Kaula Island covers 108 acres and is located about 55 miles southwest of Navy's Pacific Missile Range Facility on the island of Kauai.

The 1995 Defense Base Closure and Realignment Commission modified the 1993 Commission's recommendation by directing Navy to retain certain properties at NAS Barbers Point in support of military family housing requirements on the Island of Oahu. The recommendation of the 1995 Commission was approved by President Clinton and accepted by the One Hundred Fourth Congress in 1995.

Navy will retain the 1,090 housing units on the northern edge of the base and 171 community support facilities throughout the base, including the medical and dental clinic (Building 1829) in the center of the base; the child development center (Building 1965) and the golf course in the northeastern part of the base; White Plains Beach in the southeast corner; Nimitz Beach on the southern edge of the base; the landfill in the western part of the base; the two off-base parcels at Iroquois Point; and Kaula Island. Navy made the remaining property available for use by other Federal agencies.

During the Federal screening process, seven Federal agencies requested interagency transfers of base closure property at NAS Barbers Point. These included the Department of Veterans Affairs, the Federal Aviation Administration (FAA), the United States Postal Service, the Department of the Interior's United States Fish and Wildlife Service, the United States Coast Guard, the National Guard Bureau (Hawaii Army National guard), and the Department of the Army. Navy will transfer about 464 acres at Barbers Point to six of these Federal agencies.

Navy will transfer about six acres in the center of the base to the Department of Veterans Affairs for use in programs that serve veterans on Oahu. These will include employment training classes and outpatient substance abuse treatment. Buildings 34, 37, and 1772 will be used for these programs.

Navy will transfer about 18 acres in the northeast corner of the base to the Federal Aviation Administration. The FAA will continue to operate a navigation aid there that serves Honolulu International Airport and will maintain a radio frequency interference zone around this navigation equipment.

Navy will transfer Building 3 and about one acre in the center of the base to the United States Postal Service. The Postal Service will continue to use this building as a post office.

Navy will transfer four non-contiguous parcels covering about 239 acres at Barbers Point to the United States Fish and Wildlife Service to establish the Barbers Point Unit of the Pearl Harbor National Wildlife Refuge. This refuge will protect Federally listed endangered plant and bird species and migratory birds. These four parcels are located in the eastern, southeastern, southern and southwestern parts of the base.

The eastern parcel, covering 136 acres, contains the akoko shrub (*Chamaesyce skottsbergii var. skottsbergii*), a Federally listed and State-listed endangered plant. The southeastern parcel, covering nine acres, contained Ordy Pond and provides habitat for several species of migratory shorebirds protected under the Migratory Bird Treaty Act of 1918, 16 U.S.C. 703–712 (1994), and the Federally listed and State-listed endangered Hawaiian stilt (Himantopus mexicanus knudseni). The southern parcel, covering 45 acres, contains a coastal salt flat and provides habitat for migratory shorebirds and the endangered Hawaiian stilt. The southwestern parcel, covering 49 acres, contains a Federally listed and State-listed endangered plant, the chaff flower shrub. (*Achyranthes splendens var. rotundata*).

Navy will transfer about 44 acres in the southern part of the base to the United States Coast Guard to permit the Coast Guard to continue operating its Barbers Point Air Station. The Coast Guard operates C–130 Hercules aircraft and HH–65 helicopters that conduct search and rescue operations in the Central Pacific Maritime Region.

Navy will transfer about 149 acres in the north-central part of the base to the Hawaii Army National Guard. The Guard will use this property for operational, maintenance and administrative activities, its Youth Challenge Program, and as a parking apron for its CH–47 helicopters. Navy will also transfer to the Guard an additional seven acres in this area where the fuel storage tanks are currently located. The Guard will use this property as a storage area after the tanks are removed.

The Department of the Army initially requested about 17 acres in the southwestern part of the base to establish a soil and sludge reclamation

facility but subsequently withdrew its request. The remaining 2,130 acres of property at NAS Barbers Point are surplus to the needs of the Federal Government.

This Record of Decision addresses the disposal and reuse of these 2,130 acres, which contain about 209 buildings and structures that were used for aviation operations, training, and related administrative activities. The surplus property's undeveloped areas contain wetlands, an endangered plant, and archaeological resources.

On August 31, 1998, the United States Department of the Interior entered into a Memorandum of Agreement with the State of Hawaii providing that about 623 of the 2.130 surplus acres in various parts of NAS Barbars Point would be conveyed to the State through the Department of the Interior under the authority of the Hawaiian Home Lands Recovery Act (HHLRA), Public Law 104–42, 109 Stat. 357 (1995). This statute authorized the conveyance of excess Federal land to settle claims asserted by the State of Hawaii's Department of Hawaiian Home Lands (DHHL) that certain Hawaiian home lands set aside by Congress in 1921 for homesteading by native Hawaiian had been diverted to Federal uses.

The conveyance process may require the withdrawal of this land from surplus status and an interagency transfer from Navy to Interior for subsequent conveyance by Interior to DHHL. Such an action would not affect Navy's NEPA analysis, because DHHL's proposed uses of this property are the same as those set forth in the Redevelopment Plan. Thus, the environmental impacts described in the EIS would not change.

About 1,452 acres of surplus property will be conveyed by way of various kinds of public benefit conveyances. Navy will assign 702 acres in the center of the base to the State of Hawaii after approval by the United States Department of Transportation for use as an airport. Navy will assign nine acres north of the airfield to the United States Department of Education for subsequent conveyance to the State of Hawaii for use as an aviation training school. Navy will assign 42 acres in the southwest corner of the base to the United States Department of Health and Human Services for subsequent conveyance to the City and County of Honolulu for public health use as a seawater desalinization plant. Navy will assign 13 acres in the northwestern part of the base adjacent to the Navy-retained housing to the United States Department of Education for subsequent conveyance to the State of Hawaii for the continuing use of the Barbers Point Elementary School. Navy will assign 686 acres in various locations throughout the base to the United States Department of the Interior for subsequent conveyance to the State of Hawaii and the City and County of Honolulu for use as parks and recreational areas.

Of the remaining 55 acres, Navy will assign 13 acres in the center of the base to the State of Hawaii after approval of a legally binding agreement between the LRA and homeless assistance providers by the United States Department of Housing and Urban Development for the provision of homeless assistance services. About 42 acres consisting of roads and parts of the drainage channel will be conveyed by negotiated sales.

Navy published a Notice Of Intent in the **Federal Register** on March 26, 1997, announcing that Navy and the Federal Aviation Administration as a cooperating agency would prepare an EIS for the disposal and reuse of NAS Barbers Point. Navy held a public scoping meeting at the Washington Intermediate School in Honolulu on April 16, 1997, and at the base's Paradise West Club on April 17, 1997. The scoping period concluded on June 19, 1997.

Navy distributed the Draft EIS (DEIS) to Federal, State, and local governmental agencies, elected officials, community groups and associations, and interested persons on August 28, 1998, and commenced a 45-day public review and comment period. During this period, Federal, State and local agencies, community groups and associations, and interested persons submitted oral and written comments concerning the DEIS. Navy held public hearings to receive comments on the DEIS at the James Campbell Building in Kapolei on October 5, 1998, and at the Washington Intermediate School in Honolulu on October 7, 1998.

Navy's responses to the public comments were incorporated in the Final EIS (FEIS), which was distributed to the public on February 5, 1999, for a review period that concluded on March 8, 1999. Navy received five letters commenting on the FEIS.

Alternatives.

NEPA requires Navy to evaluate a reasonable range of alternatives for the disposal and reuse of this surplus Federal property. In the FEIS, Navy analyzed the environmental impacts of four reuse alternatives. Navy also evaluated a ''No Action'' alternative that would leave the property in caretaker status with Navy maintaining the physical condition of the property, providing a security force, and making repairs essential to safety.

In a letter to the Department of Defense's Office of Economic Adjustment dated September 28, 1993, the State of Hawaii, acting as the LRA, and the City and County of Honolulu jointly established the Barbers Point Naval Air Station Reuse Committee. In Executive Order No. 94–98 dated December 2, 1994, the Governor of Hawaii, John Waihee, established the Barbers Point Naval Air Station Redevelopment Commission to prepare a redevelopment plan for the base. The Redevelopment Commission solicited expressions of interest in the property and received notices of interest from State, City, and County agencies, private businesses, homeless assistance providers, and nonprofit organizations. After the Redevelopment Commission evaluated these notices of interest, it developed three reuse proposals: a Large Airport Alternative, a Small Airport Alternative, and a ''No Airport'' Alternative.

In August 1996, the Redevelopment Commission solicited comments concerning the three reuse proposals at four public hearings held in various places on Oahu. In response to these comments, the Redevelopment Commission developed a fourth alternative that adopted parts of the Large and Small Airport Alternatives. During a public hearing on September 17, 1996, the Redevelopment Commission solicited comments concerning this composite alternative. On October 8, 1996, the Commission adopted the composite alternative as its reuse plan and approved the Naval Air Station Barbers Point Community Redevelopment Plan. In a letter to the Redevelopment Commission dated December 23, 1996, Governor Benjamin Cayetano accepted the Redevelopment Commission's recommendations with certain modifications.

On December 11, 1997, the Redevelopment Commission modified the Redevelopment Plan by making additional property available for residential and commercial uses and by changing the use of 65 acres from homeless assistance services to residential purposes. Additionally, the 5.7-acre parcel of land that contains Building 1 was incorporated in the Redevelopment Plan and designated for commercial and residential uses. In a memorandum to the Governor dated December 17, 1997, the Redevelopment Commission submitted Community Redevelopment Plan Amendment 1 and on December 23, 1997, Governor Cayetano approved this amendment by endorsing the memorandum dated December 17, 1997.

On December 10, 1998, the Redevelopment Commission modified the Redevelopment Plan a second time by changing the use of five acres in the center of the base from a public facility to a park and by making minor changes to the proposed roadway system. In a memorandum received by the State of Hawaii on February 5, 1999, the Redevelopment Commission submitted Community Redevelopment Plan Amendment 2 to Governor Cayetano. On March 17, 1999, Governor Cayetano approved this amendment by endorsing the memorandum received on February 5, 1999.

The Redevelopment Plan, identified in the FEIS as the Preferred Alternative, proposed a mix of land uses. The Preferred Alternative would use the runways, hangars, and related maintenance buildings, covering 702 acres, as an airport that would serve civilian general aviation and aviation operations of the Coast Guard and the Hawaii Army National Guard. This Alternative would use 165 acres for residential purposes; 515 acres for light industrial activities; 33 acres for educational and public facilities; 686 acres for parks and recreational activities; and 29 acres for roads, open space, and utilities. It will be necessary to make extensive utility infrastructure and roadway improvements to support the Redevelopment Plan's proposed development of property at Barbers Point.

In the center of the base, the Preferred Alternative proposed to use 702 acres as an airport serving civilian general aviation and aviation operations of the Coast Guard and the Hawaii Army National Guard. The Preferred Alternative would use parts of the two parallel southwest-northeast 8,300-foot runways, *i.e.*, 4,500 feet of runway 4L–22R and 8,000 feet of runway 4R–22L. The 4,500-foot runway would be used for civilian general aviation operations. The 8,000-foot runway would be used for civilian general aviation and military air operations. It would also provide commercial airliners bound for or departing from Honolulu International Airport with an alternate landing site. This Alternative would use 6,000 feet of the northwest-southwest 8,411-foot crosswind runway (runway 11–29) for civilian general aviation and military air operations.

The new airport at Barbers Point would improve the mix of general aviation and commercial aircraft at Honolulu International Airport by diverting some general aviation operations to Barbers Point. By the year 2020, the new airport at Barbers Point would serve about 60 percent (78,000) of the small single-engine and light twin-engine propeller aircraft operations that would otherwise use Honolulu International Airport. It would also serve about 50 percent (27,900) of those kinds of aircraft operations that would otherwise use Dillingham Airfield, a general aviation facility on Oahu's north shore, and 62,700 general aviation training operations that previously used the Auxiliary Landing Field at Ford Island in Pearl Harbor. These diverted operations would amount to about 168,600 general aviation operations in the year 2020 on Oahu.

In the year 2020, the new airport at Barbers Point would accommodate about 203,600 air operations per year. These operations would be composed of the 168,600 general aviation operations diverted from Honolulu, Dillingham and Ford Island; about 13,100 Coast Guard and Hawaii Army National Guard operations; and about 21,900 general aviation operations that would be generated each year by the Redevelopment Plan's proposed aviation training school.

North of the airfield, the Preferred Alternative would use 14 acres for residential purposes, 13 acres for homeless assistance services, six acres for commercial activities, seven acres for recreational activities, and 13 acres for educational facilities. Just south of this area, the Preferred Alternative would dedicate seven acres for use as public facilities such as an aviation training school.

In the northeastern part of the base, the Preferred Alternative would use about 346 acres adjacent to the FAA navigation aid for commercial and recreational activities. This Alternative would build an international sports center here for athletic training programs, competitive events, in-transit athlete services, and related activities. The Preferred Alternative would also build a baseball complex, a field sports complex, and a festival center in this area.

In the southeastern and southern parts of the base, the Preferred Alternative would use about 516 acres for commercial and recreational activities. This Alternative would develop the area along the shoreline to provide a regional park, facilities for launching canoes and boats with related amenities, camping grounds, athletic fields, and open space. The Preferred Alternative would redevelop the inland area north of the regional park as a marine park. It would also establish a heritage park west of the marine park to preserve inland areas that contain significant archaeological resources.

In the southwestern part of the base, the Preferred Alternative would build an automobile race track complex on about 161 acres between the western ends of the crosswind runway, Runway 11–29, and one of the parallel runways, Runway 4R–22L. On 42 acres in the southwest corner of the base, across the drainage channel, this Alternative would build a seawater desalinization plant.

In the northwest corner of the base, the Preferred Alternative proposed to use 138 acres south and west of the Navy-retained housing for residential purposes and 13 acres in the northwestern part of the Navy housing area for continuing use of the Barbers Point Elementary School. This Alternative would build light industrial facilities on 123 acres south and west of this residential area

It would be necessary to make roadway improvements to implement the Redevelopment Plan. These improvements would link the new development to the surrounding communities of Kapolei and Ewa Marina.

Navy analyzed a second ''action'' alternative, described in the FEIS as the Large Airport Alternative. In the center of the base, the Large Airport Alternative proposed to use 961 acres as an airport that would serve civilian general aviation, the Coast Guard, and the Hawaii Army National Guard. This Alternative would use the entire lengths of the existing parallel and crosswind runways and would support the same volume and kinds of operations as the Preferred Alternative. All three runways would be available as alternative landing sites for commercial airliners.

North of the airfield, the Large Airport Alternative proposed residences, homeless assistance services, commercial facilities, recreational activities, and educational facilities. The locations and configurations would be the same as in the Preferred Alternative.

In the northeastern part of the base, the Large Airport Alternative proposed a mix of residential, commercial, and light industrial uses. This Alternative would provide a residential area outside the perimeter of the FAA navigation aid. It would build light industrial facilities south and west of this residential area. The property west of the residential area adjacent to the FAA navigation aid would also be used for a State correctional facility.

In the southeastern and southern parts of the base, this Alternative proposed to redevelop the area along the shoreline for use as a regional part and beach with camping grounds. Under this Alternative, recreational and athletic

fields would be built north and inland of the shoreline facilities. It would also build a marine park west of the regional park, a heritage park north of the marine park, and an amphitheater north of the regional park and east of the heritage park.

In the southwestern part of the base, between the western ends of the crosswind runway (Runway 11–29) and one of the parallel runways (Runway 4L–22R), the Large Airport Alternative would build an automobile race track complex. On 42 acres in the southwest corner of the base, across the drainage channel, this Alternative would build a seawater desalinization plant.

In the northwest corner of the base, the Large Airport Alternative would use the property adjacent to the Navy-retained housing for residential purposes and would continue to use the Barbers Point Elementary School. This Alternative would build light industrial facilities in the areas south and west of this residential area.

Navy analyzed a third ''action'' alternative described in the FEIS as the Small Airport Alternative. In the center of the base, the Small Airport Alternative proposed to use 701 acres as an airport that would serve civilian general aviation, the Coast Guard, and the Hawaii Army National Guard. This Alternative would use parts of the two parallel 8,330-foot runways, *i.e.,* 8,000 feet of Runway 4L–22R and 3,700 feet of Runway 4R/22L. The 8,000-foot runway would provide an alternative landing site for commercial airlines. The 3,700-foot runway would be used for civilian general aviation operations. This Alternative would not operate the crosswind runway. It would provide airport facilities to accommodate the same kinds and volume of air operations proposed by the Preferred Alternative and the Large Airport Alternative.

North of the airfield, the Small Airport Alternative proposed residences, homeless assistance services, commercial activities, recreational activities, and educational facilities. The locations and configurations would be the same as in the Preferred Alternative.

In the northeastern part of the base adjacent to the FAA navigation aid, the Small Airport Alternative proposed to build an international sports center, a baseball complex, a field sports complex, a festival center, and fairgrounds.

In the southeastern and southern parts of the base, the Small Airport Alternative would redevelop the area along the shoreline for use as a recreational beach with a picnic area and camping grounds. Under this Alternative, a marine park, a rowing regatta facility, and recreational and athletic fields would be built north and inland of the shoreline facilities. This Alternative would develop the inland area west and northwest of the marine park for use as an amphitheater and as a heritage park. It would build athletic fields north of the marine park, adjacent to the eastern parcel of the Pearl Harbor National Wildlife Refuge's Barbers Point Unit.

In the southwestern part of the base, the Small Airport Alternative proposed to use 10 acres west of the Coast Guard property to train fire fighters. This Alternative would use 42 acres at the southwest corner of the base, across the drainage channel, for a seawater desalinization plant and for light industrial facilities. Unlike the Preferred Alternative, the Small Airport Alternative would not build an automobile race track complex.

In the northwest corner of the base, the Small Airport Alternative proposed to use property adjacent to the Navy-retained housing for residential purposes and to continue using the Barbers Point Elementary School. The areas south and west of this residential area would be used to build light industrial facilities. The area north of the Navy-related landfill could be used for a State correctional facility.

Navy analyzed a fourth ''action'' alternative described in the FEIS as the ''No Airport'' Alternative. In the ''No Airport'' Alternative, the acquiring entity would direct and market the redevelopment of NAS Barbers Point for non-aviation uses. All of the aviation facilities on the surplus property would be modified to serve non-aviation purposes or would be demolished. Thus, it would be necessary for the Coast Guard to move its fixed wing and rotary air operations to another site on the island of Oahu. The Hawaii Army National Guard could operate its helicopters on the property previously occupied by the Coast Guard.

In the center of the base, the ''No Airport'' Alternative proposed to build recreational facilities. These facilities would include an international sports center and a baseball complex. North of the baseball complex, the ''No Airport'' Alternative proposed residences, homeless assistance services, commercial facilities, recreational activities, and educational facilities. The locations and configurations would be the same as in the Preferred Alternative.

In the northeastern part of the base, the ''No Airport'' Alternative would use the property adjacent to the FAA navigation aid for residential and recreational purposes. This Alternative would build residential units, a festival center, fairgrounds, a marine park and an amphitheater in this area.

In the southeastern part of the base, the ''No Airport'' Alternative proposed parks, commercial and recreational uses. This Alternative would build a rowing regatta facility, a recreational beach, camping grounds and athletic fields. North and inland of the shoreline facilities, this Alternative would build a heritage park and additional athletic fields.

In the southwestern part of the base, the ''No Airport'' Alternative would use the property for commercial and light industrial activities. These could include an automobile race track complex, an electric power plant, and a State correctional facility. It would build a fire fighter training facility on the same 42-acre parcel in the southwest corner of the base, across the drainage channel, where the Preferred Alternative would build a seawater desalinization plant.

In the western part of the base south of the Navy-retained housing, the ''No Airport'' Alternative proposed to build recreational facilities. This Alternative also proposed to continue using the Barbers Point Elementary School in the northwestern part of the base.

Environmental Impacts

Navy analyzed the direct, indirect, and cumulative impacts of the disposal and reuse of this surplus Federal property. The FEIS addressed the impacts of the Preferred Alternative, the Large Airport Alternative, the Small Airport Alternative, the ''No Airport'' Alternative, and the ''No Action'' Alternative for each alternative's effects on geology, topography and soils, groundwater quality, surface water quality, air quality, noise, visual resources, transportation, biological resources, cultural resources, public health and safety, public services, socioeconomics (including population, employment, income, housing, recreation, and environmental justice), and infrastructure, including potable water, non-potable water, wastewater, drainage, electricity, solid waste, and communications. This Record Of Decision focuses on the impacts that would likely result from implementation of the Redevelopment Plan, identified in the FEIS as the Preferred Alternative.

The Preferred Alternative would not have any significant impact on soils and would not have any impact on local or regional geological resources or topography. The soil at Barbers Point is not susceptible to erosion because it is shallow and highly permeable.

Disturbances to soils such as compaction, rutting, and erosion would be limited to the particular areas that would be redeveloped. These impacts would be temporary and can be minimized during construction by the use of standard soil erosion and sedimentation control measures such as the use of hay bales and silt fences.

The Preferred Alternative would not have any significant impact on the availability or quality of groundwater. The groundwater at NAS Barbers Point is brackish and not suitable for public consumption or irrigation without desalinization. Airport operations and light industrial activities would not affect the groundwater, because operational controls such as containment of chemical and fuel storage areas as well as maintenance activities would be imposed. These controls are specified in existing laws and regulations governing industrial and construction-related runoff.

The Preferred Alternative would not have a significant impact on surface waters. The Pacific Ocean, Ordy Pond, the coastal salt flat, and the seasonal wetland would not be significantly affected by construction activities if standard soil erosion and sedimentation control measures required by existing laws and regulations were implemented.

Stormwater discharge from new light industrial activities, roadways, parking areas, and routine operations and maintenance in developed areas (such as the application of herbicides and pesticides) could have adverse impacts on surface water quality. In accordance with Federal, State, and local laws and regulations, the acquiring entities will implement stormwater management practices to minimize these potential impacts. There could also be significant cumulative impacts on surface water quality arising out of the regional drainage from surrounding communities.

The Preferred Alternative would not have any significant impact on air quality. Compliance with regulatory requirements that control emissions such as the Clean Air Act, 42 U.S.C. § 7401–7671q (1994), and the Hawaii Administrative Rules, Chapter 11–60.1, Air Pollution Control, would prevent significant impacts from stationary sources. Additionally, there would not be any significant regional or local impact on air quality from mobile sources if the roadway improvements described in the FEIS were implemented. Finally, emissions from aircraft operations would be substantially less than when the Naval Air Station was operating.

The Preferred Alternative would not have any significant impact on noise. Exposure to noise from aircraft operations would be substantially less than when the Naval Air Station was operating. This decrease results from the significant reduction in annual jet aircraft operations proposed under the Preferred Alternative. Additionally, aircraft noise levels would not exceed the State of Hawaii's standards for airport operations that affect residential areas.

During reuse there would be an increase in ambient noise levels arising out of the non-aviation activities. These activities, however, must comply with the Hawaii Administrative Rules, Chapter 11–46, Community Noise Control. Moreover, in accordance with Chapter 343 of the Hawaii Revised Statutes (1996), redevelopment projects would be evaluated in either an environmental assessment or an environmental impact statement before development could begin.

The Preferred Alternative would not have any significant impact on visual resources. The development of shoreline parks would increase public access to the coastal area and would not obstruct views of the Pacific Ocean and coastal landmarks from inland areas.

The Preferred Alternative would not have any significant impact on transportation except when special events were held. By the year 2020, this Alternative would generate about 49,1000 average daily trips compared with 27,300 average daily trips that were associated with Navy's use of the property. With the roadway improvements described in the FEIS, this increase in daily traffic could be accommodated. However, traffic generated by events at the automobile race trace complex and at the festival center would have significant impacts even if traffic control measures and parking plans were implemented.

The Preferred Alternative would not have any significant impact on biological resources. Navy held informal consultations with the United States Fish and Wildlife Service and the National Marine Fisheries Service under Section 7 of the Endangered Species Act of 1973 (ESA), 16 U.S.C. 1536 (1994). In a letter dated December 1, 1998, the Fish and Wildlife Service concurred with Navy's determination that the disposal and reuse of NAS Barbers Point is not likely to adversely affect the one Federally listed endangered plant there, the akoko shrub (*Chamaesyce skottsbergii var. skottsbergii*). The Service's concurrence was based upon Navy's assurance that the conveyance of property to the State of Hawaii and the City and County of Honolulu on which the akoko is known to exist will be made through the Department of the Interior. Navy will inform Interior about its responsibility under Section 7 of ESA to consult with the Service regarding the potential effects on the akoko of conveying the property to the State and City and County of Honolulu.

The Preferred Alternative could have construction-related impacts on coastal waters where the Federally listed and State-listed threatened green sea turtle (*Chelonia mydas*) is found. Impacts from surface water runoff generated by construction can be avoided or reduced by the use of stormwater control measures required by existing laws and regulations. In a letter dated November 25, 1998, the National Marine Fisheries Service concurred with Navy's determination that the disposal and reuse of NAS Barbers Point is not likely to adversely affect Federally listed species or critical habitat unless changes or improvements associated with reuse increase the amount of stormwater runoff. Thus, increases in stormwater runoff generated by activities under the Preferred Alternative could require the acquiring entities to build stormwater disposal facilities.

The Preferred Alternative would not have any significant impact on cultural resources. Pursuant to Section 106 of the National Historic Preservation Act of 1966 (NHPA), 16 U.S.C. 470f (1994), Navy conducted a cultural resource assessment and determined that 62 archaeological sites and 64 structures are eligible for listing on the National Register of Historic Places. The archaeological sites and historic structures will be protected by covenants in the deeds conveying the property. These covenants will require prior written approval from the State Historic Preservation Officer (SHPO) before any action may be taken that would affect those properties.

In addition, Hawaii's historic preservation program, set forth in Hawaii Revised Statutes, Chapter 6E, requires a consultative process by State and City agencies with the SHPO similar to that prescribed by Section 106 of the NHPA for Federal agencies. The State Historic Preservation Officer and the Advisory Council on Historic Preservation, in letters dated December 18, 1998 and January 11, 1999, respectively, concurred with Navy's determination that the disposal and reuse of NAS Barbers Point would not have an adverse effect on the archaeological sites and historic structures if the conveyance documents incorporate protective covenants.

The Preferred Alternative would not have any significant impact on public health and safety. Implementation of this Alternative would not have any significant impact on existing environmental contamination at NAS Barbers Point. Navy will inform future property owners about the environmental condition of the property and may, where appropriate, include restrictions, notifications, or covenants in deeds to ensure the protection of human health and the environment in light of the intended use of the property.

In the northwestern part of the base, near Campbell Industrial Park, the Preferred Alternative proposed to build residential units. The operations of the Industrial Park would not pose a significant health and safety risk to residents of this area. However, in the unlikely event of a catastrophic incident at Campbell Industrial Park, such as the release of large quantities of toxic contaminants or flammable material, there could be a significant impact on public health and safety. In a letter to the State of Hawaii's Department of Business, Economic Development and Tourism dated December 20, 1996, the State's Department of Health discouraged planners from locating residential units near Campbell Industrial Park.

The proposed airport operations must conform to Federal Aviation Administration safety standards and design criteria that require adequate safety measures to protect people and property. The proposed air operations would not adversely affect public health and safety.

The Preferred Alternative would not have any significant impact on most public services. Existing police, fire and health care services are sufficient to accommodate the proposed reuse. However, under the Preferred Alternative, the number of elementary school students would nearly double and there would be smaller increases of intermediate and high school students. The acquiring entities can mitigate this significant impact by increasing the capacity of Barbers Point Elementary School; by building an additional elementary school; and by redistricting and reallocating student populations. These measures would also mitigate the cumulative impacts on education arising out of new residential development planned for the nearby Ewa area of Oahu.

The Preferred Alternative would have significant beneficial socioeconomic impacts. The proposed redevelopment would increase employment and provide additional recreational opportunities and housing. The Preferred Alternative would create 3,600 direct jobs and 3,400 indirect jobs that would generate about $197 Million in direct and indirect income. The additional parks and recreational areas would be made available to the public. The proposed residential areas would increase the amount of affordable housing on the island.

The Preferred Alternative would generate a 4,000-person increase in the local population. However, since this increase would represent less than two percent of this area's population, it would not cause any adverse effects.

The Preferred Alternative would not have any significant impact on potable water, non-potable water, wastewater, solid waste, electricity, and communications. Oahu's capacity for these services is adequate to support the Redevelopment Plan.

The Preferred Alternative would not have any significant impact on stormwater drainage. Increases in stormwater runoff could result from the construction of additional impervious surfaces. The acquiring entities can mitigate this impact by building stormwater disposal facilities or a drainage system of pipes that would carry stormwater to the ocean.

Navy analyzed the Redevelopment Plan's proposed regional drainage channel in the FEIS and concluded that additional studies and comments from affected parties would be required to resolve the regional drainage issue. The drainage channel proposed in the Preferred Alternative would redirect off-base stormwater runoff to the base property. This drainage channel has not been formally considered or approved by Navy, the City and County of Honolulu, or affected Ewa landowners. Directing off-base runoff to the base, as proposed in the Preferred Alternative, may restrict certain proposed reuse activities and adversely affect military activities on property retained by Navy. These restrictions could reduce the amount of property designated for residential, commercial, and light industrial purposes. Additionally, if upstream contaminants were carried in the stormwater runoff to Navy-owned property, responsibility for remediation could become an issue. These impacts could be avoided by allowing runoff from the upstream area to follow its natural drainage pattern and flow down to the Ewa Marina area, rather than by redirecting the flow as proposed in the Preferred Alternative.

Executive Order 12898, Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations, 3 C.F.R. 859 (1995), requires that Navy determine whether any low-income and minority populations will experience disproportionately high and adverse human health or environmental effects from the proposed action. Navy analyzed the impacts on low-income and minority populations pursuant to Executive Order 12898. The FEIS addressed the potential environmental, social, and economic impacts associated with the disposal of NAS Barbers Point and subsequent reuse of the property under the various proposed alternatives. Minority and low-income populations residing within the region will not be disproportionately affected. Indeed, the employment opportunities, housing and public services created by implementing the Preferred Alternative would have beneficial effects.

Navy also analyzed the impacts on children pursuant to Executive order 13045, Protection of Children from Environmental Health Risks and Safety Risks, 3 CFR 198 (1998). Under the Preferred Alternative, the largest concentration of children would be present in the residential and recreational areas. The Preferred Alternative would not impose any disproportionate environmental health or safety risks on children. However, in the unlikely event of a catastrophic incident at Campbell Industrial Park, such as the release of large quantities of toxic contaminants or flammable material, there could be disproportionate health and safety risks to children living in the nearby residential area.

Mitigation

Implementation of Navy's decision to dispose of NAS Barbers Point does not require Navy to implement any mitigation measures. Navy will take certain actions to implement existing agreements and regulations. These actions were treated in the FEIS as agreements or regulatory requirements rather than as mitigation.

The FEIS identified and discussed those actions that will be necessary to mitigate the impacts associated with the reuse and redevelopment of Naval Air Station Barbers Point. The acquiring entities, under the direction of Federal, State, and local agencies with regulatory authority over protected resources, will be responsible for implementing necessary mitigation measures.

Comments Received on the Final EIS

Navy received comments on the Final EIS from the United States Coast Guard, the State Historic Preservation Officer, the City and County of Honolulu Fire Department, the Barbers Point Naval Air Station Redevelopment Commission,

and one individual. These comments concerned issues already discussed in the FEIS and do not require further clarification.

Regulations Governing the Disposal Decision

Since the proposed action contemplates a disposal under the Defense Base Closure and Realignment Act of 1990 (DBCRA), Public Law 101–510, 10 U.S.C. 2687 note (1994), Navy's decision was based upon the environmental analysis in the FEIS and application of the standards set forth in the DBCRA, the Federal Property Management Regulations (FPMR), 41 CFR Part 101–47, and the Department of Defense Rule on Revitalizing Base Closure Communities and Community Assistance (DoD Rule), 32 CFR Parts 174 and 175.

Section 101–47.303–1 of the FPMR requires that disposals of Federal property benefit the Federal Government and constitute the ''highest and best use'' of the property. Section 101–47.4909 of the FPMR defines the ''highest and best use'' as that use to which a property can be put that produces the highest monetary return from the property, promotes its maximum value, or serves a public or institutional purpose. The ''highest and best use'' determination must be based upon the property's economic potential, qualitative values inherent in the property, and utilization factors affecting land use such as zoning, physical characteristics, other private and public uses in the vicinity, neighboring improvements, utility services, access, roads, location, and environmental and historic considerations.

After Federal property has been conveyed to non-Federal entities, the property is subject to local land use regulations, including zoning and subdivision regulations, and building codes. Unless expressly authorized by statute, the disposing Federal agency cannot restrict the future use of surplus Government property. As a result, the local community exercises substantial control over future use of the property. For this reason, local land use plans and zoning affect determination of the ''highest and best use'' of surplus Government property.

The DBCRA directed the Administrator of the General Services Administration (GSA) to delegate to the Secretary of Defense authority to transfer and dispose of base closure property. Section 2905(b) of the DBCRA directs the Secretary of Defense to exercise this authority in accordance with GSA's property disposal regulations, set forth in Part 101–47 of the FPMR. By letter dated December 20, 1991, the Secretary of Defense delegated the authority to transfer and dispose of base closure property closed under the DBCRA to the Secretaries of the Military Departments. Under this delegation of authority, the Secretary of the Navy must follow FPMR procedures for screening and disposing of real property when implementing base closures. Only where Congress has expressly provided additional authority for disposing of base closure property, *e.g.*, the economic development conveyance authority established in 1993 by Section 2905(b)(4) of the DBCRA, may Navy apply disposal procedures other than those in the FPMR.

In Section 2901 of the National Defense Authorization Act for Fiscal Year 1994, Pub. L. 103–160, Congress recognized the economic hardship occasioned by base closures, the Federal interest in facilitating economic recovery of base closure communities, and the need to identify and implement reuse and redevelopment of property at closing installations. In Section 2903(c) of Public Law 103–160, Congress directed the Military Departments to consider each base closure community's economic needs and priorities in the property disposal process. Under Section 2905(b)(2)(E) of the DBCRA, Navy must consult with local communities before it disposes of base closure property and must consider local plans developed for reuse and redevelopment of the surplus Federal property.

The Department of Defense's goal, as set forth in Section 174.4 of the DoD Rule, is to help base closure communities achieve rapid economic recovery through expeditious reuse and redevelopment of the assets at closing bases, taking into consideration local market conditions and locally developed reuse plans. Thus, the Department has adopted a consultative approach with each community to ensure that property disposal decisions consider the LRA's reuse plan and encourage job creation. As a part of this cooperative approach, the base closure community's interests, as reflected in its zoning for the area, play a significant role in determining the range of alternatives considered in the environmental analysis for property disposal. Furthermore, Section 175.7(d)(3) of the DoD Rule provides that the LRA's plan generally will be used as the basis for the proposed disposal action.

The Federal Property and Administrative Services Act of 1949, 40 U.S.C. 484 (1994), as implemented by the FPMR, identifies several mechanisms for disposing of surplus base closure property: by public benefit conveyances (FPMR Sec. 101–47.303–2); by negotiated sale (FPMR Sec. 101–47.304–9); and by competitive sale (FPMR Sec. 101–47.304–7). Additionally, in Section 2905(b)(4), the DBCRA established economic development conveyance as a means of disposing of surplus base closure property. The selection of any particular method of conveyance merely implements the Federal agency's decision to dispose of the property. Decisions concerning whether to undertake a public benefit conveyance or an economic development conveyance, or to sell property by negotiation or by competitive bid, are left to the Federal agency's discretion. Selecting a method of disposal implicates a broad range of factors and rests solely within the Secretary of the Navy's discretion.

Conclusion

The LRA's proposed reuse of NAS Barbers Point, reflected in the Redevelopment Plan, is consistent with the prescriptions of the FPMR and Section 174.4 of the DoD Rule. The LRA has determined in its Redevelopment Plan that the property should be used for various purposes including aviation, residential, community, industrial, commercial, public, park and recreational uses. The property's location, physical characteristics, and existing infrastructure as well as the current uses of adjacent property make it appropriate for the proposed uses.

The Preferred Alternative responds to local economic conditions, promotes rapid economic recovery from the impact of the Naval Air Station's closure, and is consistent with President Clinton's Five-Part Plan for Revitalizing Base closure Communities, which emphasizes local economic redevelopment and creation of new jobs as the means to revitalize these communities. 32 CFR Parts 174 and 175, 59 FR 16,123 (1994).

Although the ''No Action'' Alternative has less potential for causing adverse environmental impacts, this Alternative would not take advantage of the property's location, physical characteristics, and infrastructure or the current uses of adjacent property. Additionally, it would not foster local economic redevelopment of the Barbers Point property.

The acquiring entities, under the direction of Federal, State, and local agencies with regulatory authority over protected resources, will be responsible for adopting practicable means to avoid

or minimize environmental harm that may result from implementing the Redevelopment Plan.

Accordingly, Navy will dispose of the surplus Federal property at Naval Air Station Barbers Point in a manner that is consistent with the State of Hawaii's Redevelopment Plan for the property.

Dated: June 17, 1999.

William J. Cassidy, Jr.,

Deputy Assistant Secretary of the Navy (Conversion And Redevelopment).

Dated: June 25, 1999.

Ralph W. Corey,

CDR, JAGC, USN, Alternate Federal Register Liaison Officer.

[FR Doc. 99–16691 Filed 6–29–99; 8:45 am]

BILLING CODE 3810–FF–M

DEPARTMENT OF ENERGY

Record of Decision for the Construction and Operation of the Spallation Neutron Source

AGENCY: Department of Energy.

ACTION: Record of decision.

SUMMARY: The Department of Energy (DOE) is issuing this Record of Decision (ROD) regarding DOE's proposal to construct and operate the Spallation Neutron Source (SNS). DOE has decided to proceed with construction and operation of a state-of-the-art Spallation Neutron Source facility at the preferred location, the Oak Ridge National Laboratory, Oak Ridge, Tennessee. This decision is based on the analysis contained in the ''Final Environmental Impact Statement for the Construction and Operation of the Spallation Neutron Source'' (SNS FEIS, DOE/EIS–0247, April 23, 1999).

ADDRESSES: Requests for copies of the Final EIS and this ROD should be directed to: Mr. David Wilfert, EIS Document Manager, U.S. Department of Energy, Oak Ridge Operations Office, 200 Administration Road, 146/SNS, Oak Ridge, TN 37831. Alternately, Mr. Wilfert may be contacted by telephone at (800) 927–9964, by fax at (423) 576–4542, or by email at NSNSEIS@ornl.gov.

FOR FURTHER INFORMATION CONTACT: For general information on the Spallation Neutron Source, contact: Mr. Jeff Hoy, SNS Program Manager, Office of Basic Energy Sciences (SC–13), Germantown, MD 20874–1290, telephone: (301) 903–4924, fax: (301) 903–9513, or email: Jeff.Hoy@science.doe.gov.

For general information on DOE's National Environmental Policy Act (NEPA) process, contact: Ms. Carol Borgstrom, Director, Office of NEPA Policy and Assistance (EH–42), U.S. Department of Energy, 1000 Independence Ave., S.W., Washington, D.C. 20585, telephone: (202) 586–4600, fax: (202) 586–7031.

SUPPLEMENTARY INFORMATION: The U.S. Environmental Protection Agency (EPA) issued a Notice of Availability for DOE's Final Environmental Impact Statement on the Construction and Operation of the Spallation Neutron Source (Final EIS, DOE/EIS–0247) on April 23, 1999, (64 FR 19999). In the Final EIS, DOE considered the potential environmental impacts of its proposed action, the construction and operation of the SNS at four alternative sites: Oak Ridge National Laboratory (ORNL), Los Alamos National Laboratory (LANL), Argonne National Laboratory (ANL), and Brookhaven National Laboratory (BNL). The Department identified Oak Ridge as its preferred alternative site. DOE also considered a no action alternative under which the SNS would not be built. DOE has considered all of the comments it received during the public comment period. The Final EIS analyzed environmental impacts over the projected life of the facility, both operating at an initial power level of 1 megawatt (MW) and at the maximum potential upgrade power level of 4 MW.

Background

Scientific discoveries and the new technologies derived from neutron scattering research have contributed significantly to the development of new products in the international marketplace, such as: better magnetic materials for information storage media and for electric generators and motors; improved engine parts; better lubricants; strong, but light-weight structural materials; durable plastics; metallic glasses; semiconductors; adhesives; improved detergents; and new drugs. Neutron research and the associated scientific, engineering, and technological advances provide the catalyst for the development of commercial applications and support U.S. economic progress and competitiveness among the industrialized nations of the world. Construction of a next-generation spallation neutron source in the U.S. will provide a competitive edge for the nation in the physical, chemical, materials, biological, and medical sciences.

The U.S. needs a high-flux, short-pulsed neutron source to provide its scientific and industrial research communities with a much more intense source of pulsed neutrons for neutron scattering research than is currently available. The neutron science community has long recognized the need for both high-intensity, pulsed (accelerator-based) neutron sources and continuous (reactor-based) neutron sources. There are approximately 20 major neutron sources worldwide that produce neutron beams for materials research. The Organization for Economic Cooperation and Development (OECD) Neutron Science Working Group has identified a growing disparity between the worldwide need for neutron scattering research and the availability of facilities. The OECD Working Group estimated that as the oldest neutron sources continue to age, only about one-third of the present sources would remain available by 2010. For nearly a decade, the research community has regarded U.S. facilities as inferior to the newer and more extensively upgraded foreign facilities. The current generation of neutron sources in the United States has lower neutron beam intensities, lower operating powers, and less advanced measuring instruments, when compared to the current ''state-of-the-science'' (currently technologically feasible and desirable). Thus, next-generation neutron sources are needed not only to create new scientific and engineering opportunities, but also to replace out-dated capacity. Access to European and Japanese neutron sources by U.S. researchers and manufacturers is difficult, unreliable, and costly. The logistics of scheduling time and configuring instrumentation to conduct specialized experiments are prohibitive because of the commuting distances to these facilities. In addition, given the proprietary nature of much of the research desired by U.S. industry, its research cannot be carried out at foreign facilities. A 1 MW state-of-the-art facility like SNS would produce pulses five times more intense than the best spallation source in operation today, the ISIS facility in Great Britain.

Alternatives Considered and Evaluated

In the Final EIS, DOE proposed to construct and operate the SNS. DOE evaluated five alternatives for this proposed action:

1. Construct and operate the SNS at ORNL;
2. Construct and operate the SNS at LANL;
3. Construct and operate the SNS at ANL;
4. Construct and operate the SNS at BNL; and
5. No Action Alternative: Do not construct the SNS. The United States would continue to use existing neutron science facilities.

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APPENDIX B
LAND USE MAP FOR KALAELOA

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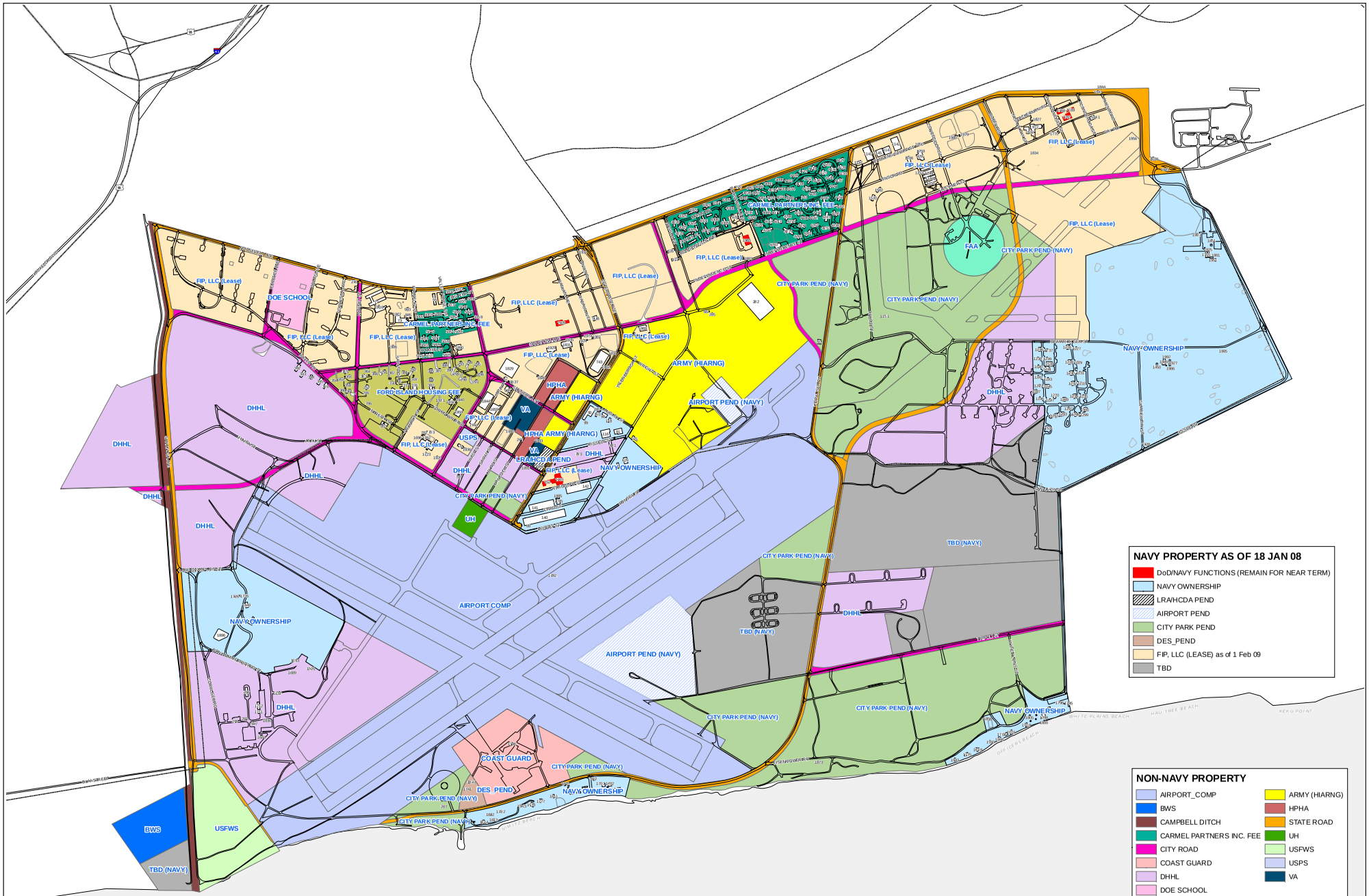

REGIONAL BASE MAP MAINTENANCE BY NAVFAC HAWAII. SUBMIT UPDATES TO OPS ENGINEERING SYSTEMS (808) 471-4646. http://www.rsims.navy.mil

IF SHEET IS LESS THAN 36" X 48" IT IS A REDUCED PRINT AND THE SCALE IS REDUCED ACCORDINGLY.

SIZE E

NAVFAC DRAWING NO

Plot Date: April 11, 2008

DEPARTMENT OF THE NAVY

COMMANDER, NAVY REGION HAWAII

REGIONAL BASE MAP

NAVY REGION HAWAII MANAGED AREAS

AREA

Kalaeloa (formerly NAS Barbers Pt) - Ownership

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APPENDIX C
AIR EMISSIONS INFORMATION

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Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2011

Working Hours/week 48
Total weeks of construction 52

Equipment List	No.	Equip-Months	Equip-Months Year 2	Equip-Months Year3	Total Usage Equip-Months	Total Usage Equip-Weeks	Total Usage Equip-Hours	Horse power <hp>	Utilization	Load Factor	Emission Factor NOx grams/bhp-hr	CO grams/bhp-hr	PM grams/bhp-hr	VOC grams/bhp-hr	SOx grams/bhp-hr	CO2 grams/bhp-hr	CH4 grams/bhp-hr
Phase 1B																	
Concrete/Industrial Saws	2	**24**	8	8	64	208	9,984	10	100%	73%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Forklifts	2	**24**	-	-	20	65	3,120	145	100%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Air Compressors	3	**36**						106	100%	48%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**						45	100%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80
Excavator	1	**12**						168	25%	57%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Grader	1	**12**						174	25%	61%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Crane	1	**12**						399	75%	43%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Aerial Lifts	2	**24**						60	75%	46%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Forklifts	3	**36**						145	75%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**						45	75%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80
Concrete/Mortar Mixer	1	**12**						10	75%	56%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Pavers	2	**24**						100	75%	62%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Phase 2																	
Concrete/Industrial Saws	2	**24**	8	8	64	208	9,984	10	100%	73%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Forklifts	2	**24**	-	-	20	65	3,120	145	100%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Air Compressors	3	**36**						106	100%	48%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**						45	100%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80

Vehicle Emissions
Construction Delivery Vehicles (from Table A-3)
Construction Worker Commutes (from Table A-2)

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2011

Working Hours/week
Total weeks of construction

Total Emissions, Year 2011

Equipment List	NOx <tons>	CO <tons>	PM <tons>	VOC <tons>	SOx <tons>	PM2.5 <tons>	CO2 <tons>	CH4 <tons>	N2O <tons>
Phase 1B									
Concrete/Industrial Saws	0.28	0.24	0.03	0.03	0.04	0.03	21	0.07	0.03
Forklifts	1.65	2.03	0.10	0.08	0.24	0.09	125	0.43	0.16
Air Compressors	2.90	3.57	0.17	0.14	0.42	0.15	219	0.76	0.28
Welders	1.15	0.69	0.10	0.05	0.17	0.09	87	0.30	0.11
Excavator	0.45	0.56	0.03	0.02	0.07	0.02	34	0.12	0.04
Grader	0.50	0.62	0.03	0.02	0.07	0.03	38	0.13	0.05
Crane	2.44	3.01	0.14	0.07	0.35	0.13	185	0.64	0.23
Aerial Lifts	0.79	0.97	0.05	0.06	0.11	0.04	59	0.21	0.07
Forklifts	1.86	2.29	0.11	0.09	0.27	0.10	140	0.48	0.18
Welders	0.86	0.51	0.08	0.04	0.12	0.07	65	0.23	0.08
Concrete/Mortar Mixer	0.08	0.07	0.01	0.01	0.01	0.01	6	0.02	0.01
Pavers	1.77	2.17	0.10	0.14	0.25	0.09	133	0.46	0.17
Phase 2									
Concrete/Industrial Saws	0.28	0.24	0.03	0.03	0.04	0.03	21	0.07	0.03
Forklifts	1.65	2.03	0.10	0.08	0.24	0.09	125	0.43	0.16
Air Compressors	2.90	3.57	0.17	0.14	0.42	0.15	219	0.76	0.28
Welders	1.15	0.69	0.10	0.05	0.17	0.09	87	0.30	0.11
Phase 1B Total Heavy Construction Equipment Emissions <tons>	**20.73**	**23.27**	**1.32**	**1.06**	**2.99**	**1.18**	**1421**	**5**	**2**
Total <lbs/hr>	**16.61**	**18.64**	**1.06**	**0.85**	**2.40**	**0.94**	**1138**	**3.93**	**1.43**
Vehicle Emissions									
Construction Delivery Vehicles	1.21	0.27	0.03	0.08	0.00	0.03	270	0.00	0.10
Construction Worker Commutes	0.76	9.94	0.03	0.77	0.01	0.03	478	0.00	0.07
Total Construction Emissions <tons>	**22.70**	**33.48**	**1.39**	**1.91**	**3.00**	**1.24**	**2169**	**4.90**	**1.96**

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2012

Working Hours/week 48
Total weeks of construction 52

Equipment List	No.	Equipm Equipm Year 2	Year3	Equipment-Months Total Usage ent-Months	ent-Weeks	ent-Hours	Horsepowe <hp>	Utilization	Load Facto	Emission Factor NOx grams/bhp-	CO ams/bhp-	PM ams/bhp-	VOC ams/bhp-	SOx ams/bhp-	CO2 rams/bhp-h	CH4 ams/bhp-
Phase 2																
Excavator	1	**12**					168	25%	57%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Grader	1	**12**					174	25%	61%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Crane	1	**12**					399	75%	43%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Aerial Lifts	2	**24**					60	75%	46%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Forklifts	3	**36**					145	75%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**					45	75%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80
Concrete/Mortar Mixer	1	**12**					10	75%	56%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Pavers	2	**24**					100	75%	62%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Phase 3																
Grader	1	**12**					174	25%	61%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Roller	1	**12**					95	25%	56%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Pavers	2	**24**					100	75%	62%	6.90	8.50	0.40	0.53	1.00	521.63	1.80

Vehicle Emissions
Construction Worker Commutes (from Table A-3)
Construction Delivery Vehicles (from Table A-2)

Total Construction Emissions <tons>

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2012

Working Hours/week
Total weeks of construction

Total Emissions, Year 2012

Equipment List	NOx <tons>	CO <tons>	PM <tons>	VOC <tons>	SOx <tons>	PM2.5 <tons>	CO2 <tons>	CH4 <tons>	N2O <tons>
Phase 2									
Excavator	0.45	0.56	0.03	0.02	0.07	0.02	34	0.12	0.04
Grader	0.50	0.62	0.03	0.02	0.07	0.03	38	0.13	0.05
Crane	2.44	3.01	0.14	0.07	0.35	0.13	185	0.64	0.23
Aerial Lifts	0.79	0.97	0.05	0.06	0.11	0.04	59	0.21	0.07
Forklifts	1.86	2.29	0.11	0.09	0.27	0.10	140	0.48	0.18
Welders	0.86	0.51	0.08	0.04	0.12	0.07	65	0.23	0.08
Concrete/Mortar Mixer	0.08	0.07	0.01	0.01	0.01	0.01	6	0.02	0.01
Pavers	1.77	2.17	0.10	0.14	0.25	0.09	133	0.46	0.17
Phase 3									
Grader	0.50	0.62	0.03	0.02	0.07	0.03	38	0.13	0.05
Roller	0.25	0.31	0.01	0.02	0.04	0.01	19	0.07	0.02
Pavers	1.77	2.17	0.10	0.14	0.25	0.09	133	0.46	0.17
Total Heavy Construction Equipment Emissions <tons>	**8.76**	**10.21**	**0.54**	**0.45**	**1.26**	**0.48**	**662**	**2.28**	**0.83**
Total <lbs/hr>	**7.02**	**8.18**	**0.43**	**0.36**	**1.01**	**0.38**	**530**	**1.83**	**0.67**
Vehicle Emissions									
Construction Worker Commutes	1.04	0.22	0.03	0.08	0.00	0.03	270	0.00	0.09
Construction Delivery Vehicles	0.69	9.35	0.03	0.71	0.01	0.03	478	0.00	0.06
Total Construction Emissions <tons>	**10.49**	**19.78**	**0.59**	**1.24**	**1.28**	**0.53**	**1411**	**2.28**	**0.98**

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2013

Working Hours/week 48
Total weeks of construction 52

Equipment List	No.	Equipm Year 1	Equipm Year 2	Equipment-Months Year3	Total Usage ent-Months	ent-Weeks	ent-Hours	Horsepowe <hp>	Utilization	Load Factor	Emission Factor NOx grams/bhp-	CO ams/bhp-	PM ams/bhp-	VOC ams/bhp-	SOx ams/bhp-	CO2 rams/bhp-	CH4 ams/bhp-
Phase 2																	
Excavator	1	**12**						168	25%	57%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Grader	1	**12**						174	25%	61%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Crane	1	**12**						399	75%	43%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Aerial Lifts	2	**24**						60	75%	46%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Forklifts	3	**36**						145	75%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**						45	75%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80
Concrete/Mortar Mixer	1	**12**						10	75%	56%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Pavers	2	**24**						100	75%	62%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Phase 3																	
Grader	1	**12**						174	25%	61%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Roller	1	**12**						95	25%	56%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Pavers	2	**24**						100	75%	62%	6.90	8.50	0.40	0.53	1.00	521.63	1.80

Vehicle Emissions
Construction Worker Commutes (from Table A-3)
Construction Delivery Vehicles (from Table A-2)

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2013

Working Hours/week
Total weeks of construction

Total Emissions, Year 2013

Equipment List	NOx <tons>	CO <tons>	PM <tons>	VOC <tons>	SOx <tons>	PM2.5 <tons>	CO2 <tons>	CH4 <tons>	N2O <tons>
Phase 2									
Excavator	0.45	0.56	0.03	0.02	0.07	0.02	34	0.12	0.04
Grader	0.50	0.62	0.03	0.02	0.07	0.03	38	0.13	0.05
Crane	2.44	3.01	0.14	0.07	0.35	0.13	185	0.64	0.23
Aerial Lifts	0.79	0.97	0.05	0.06	0.11	0.04	59	0.21	0.07
Forklifts	1.86	2.29	0.11	0.09	0.27	0.10	140	0.48	0.18
Welders	0.86	0.51	0.08	0.04	0.12	0.07	65	0.23	0.08
Concrete/Mortar Mixer	0.08	0.07	0.01	0.01	0.01	0.01	6	0.02	0.01
Pavers	1.77	2.17	0.10	0.14	0.25	0.09	133	0.46	0.17
Phase 3									
Grader	0.50	0.62	0.03	0.02	0.07	0.03	38	0.13	0.05
Roller	0.25	0.31	0.01	0.02	0.04	0.01	19	0.07	0.02
Pavers	1.77	2.17	0.10	0.14	0.25	0.09	133	0.46	0.17
Total Heavy Construction Equipment Emissions <tons>	**11.28**	**13.31**	**0.68**	**0.63**	**1.63**	**0.61**	**853**	**2.94**	**1.07**
Total <lbs/hr>	**9.04**	**10.67**	**0.55**	**0.51**	**1.30**	**0.49**	**683**	**2.36**	**0.86**
Vehicle Emissions									
Construction Worker Commutes	0.89	0.19	0.03	0.07	0.00	0.03	270	0.00	0.08
Construction Delivery Vehicles	0.63	8.92	0.03	0.66	0.01	0.03	479	0.00	0.05
Total Construction Emissions <tons>	**12.80**	**22.43**	**0.74**	**1.37**	**1.64**	**0.66**	**1602**	**2.94**	**1.20**

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2014

Working Hours/week 48
Total weeks of construction 52

Equipment List	No.	Equipm Equipm	Equipment-Months Year 2	Year3	Total Usage ent-Months	ent-Weeks	Equipmen t-Hours	Horsepowe <hp>	Utilization	Load Facto	Emission Factor NOx grams/bhp-	CO ams/bhp-	PM ams/bhp-	VOC ams/bhp-	SOx ams/bhp-	CO2 rams/bhp-	CH4 ams/bhp-
Phase 2	2	**24**	8	8	64	208	9,984	350	100%	59%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Excavator	1	**12**						168	25%	57%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Grader	1	**12**						174	25%	61%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Crane	1	**12**						399	75%	43%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Aerial Lifts	2	**24**						60	75%	46%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Forklifts	3	**36**						145	75%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**						45	75%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80
Concrete/Mortar Mixer	1	**12**						10	75%	56%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Pavers	2	**24**						100	75%	62%	6.90	8.50	0.40	0.53	1.00	521.63	1.80
Dozer	1	**12**						357	25%	59%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Tractor/Loader/Backhoe	1	**12**						108	25%	55%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Dump Truck - 12/14	4	**48**	200	179	759	2,467	118,404	340	100%	59%	6.90	8.50	0.40	0.21	1.00	521.63	1.80
Phase 4																	
Concrete/Industrial Saws	2	**24**	8	8	64	208	9,984	10	100%	73%	7.03	6.00	0.75	0.77	1.00	521.63	1.80
Forklifts	2	**24**	-	-	20	65	3,120	145	100%	30%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Air Compressors	3	**36**						106	100%	48%	6.90	8.50	0.40	0.34	1.00	521.63	1.80
Welders	3	**36**						45	100%	45%	6.90	4.10	0.60	0.28	1.00	521.63	1.80

Vehicle Emissions
Construction Worker Commutes (from Table A-3)
Construction Delivery Vehicles (from Table A-2)

Table A-1
Kalaeloa HIARNG Relocation
Heavy Equipment

Construction Emissions - 2014

Working Hours/week
Total weeks of construction

Total Emissions, Year 2014

Equipment List	NOx <tons>	CO <tons>	PM <tons>	VOC <tons>	SOx <tons>	PM2.5 <tons>	CO2 <tons>	CH4 <tons>	N2O <tons>
Phase 2	7.84	9.66	0.45	0.24	1.13	0.40	593	2.05	
Excavator	0.45	0.56	0.03	0.02	0.07	0.02	34	0.12	0.04
Grader	0.50	0.62	0.03	0.02	0.07	0.03	38	0.13	0.05
Crane	2.44	3.01	0.14	0.07	0.35	0.13	185	0.64	0.23
Aerial Lifts	0.79	0.97	0.05	0.06	0.11	0.04	59	0.21	0.07
Forklifts	1.86	2.29	0.11	0.09	0.27	0.10	140	0.48	0.18
Welders	0.86	0.51	0.08	0.04	0.12	0.07	65	0.23	0.08
Concrete/Mortar Mixer	0.08	0.07	0.01	0.01	0.01	0.01	6	0.02	0.01
Pavers	1.77	2.17	0.10	0.14	0.25	0.09	133	0.46	0.17
Dozer	1.00	1.23	0.06	0.03	0.14	0.05	76	0.26	0.09
Tractor/Loader/Backhoe	0.28	0.35	0.02	0.01	0.04	0.01	21	0.07	0.03
Dump Truck - 12/14	15.23	18.77	0.88	0.46	2.20	0.79	1152	3.97	1.45
Phase 4									
Concrete/Industrial Saws	0.28	0.24	0.03	0.03	0.04	0.03	21	0.07	0.03
Forklifts	1.65	2.03	0.10	0.08	0.24	0.09	125	0.43	0.16
Air Compressors	2.90	3.57	0.17	0.14	0.42	0.15	219	0.76	0.28
Welders	1.15	0.69	0.10	0.05	0.17	0.09	87	0.30	0.11
Total Heavy Construction Equipment Emissions <tons>	**39.10**	**46.74**	**2.34**	**1.50**	**5.64**	**2.09**	**2955**	**10.20**	**2.97**
Total <lbs/hr>	**31.33**	**37.45**	**1.88**	**1.20**	**4.52**	**1.67**	**2368**	**8.17**	**2.38**
Vehicle Emissions									
Construction Worker Commutes	0.76	0.17	0.02	0.07	0.00	0.02	270	0.00	0.07
Construction Delivery Vehicles	0.57	8.57	0.03	0.63	0.01	0.03	479	0.00	0.05
Total Construction Emissions <tons>	**40.43**	**55.48**	**2.39**	**2.20**	**5.66**	**2.13**	**3705**	**10.20**	**3.08**

Table A-2
Halaeloa HIARNG Relocation
Construction Truck Emissions

2011 Truck Emissions

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days	Truck Emissions, Total Tons: CO	NOx	VOCs	SOx	PM10	CO2
All	Heavy-duty truck	20	40	1.222	5.501	0.376	0.0126	0.1552	1352.3	250	***0.27***	***1.21***	***0.08***	***0.00***	***0.03***	***298.13***
Total																

Emission factors - 2011 MOBILE6.2 emission factors.

2012 Truck Emissions

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days	Truck Emissions, Total Tons: CO	NOx	VOCs	SOx	PM10	CO2
All	Heavy-duty truck	20	40	0.996	4.705	0.349	0.0126	0.1313	1352.2	250	***0.22***	***1.04***	***0.08***	***0.00***	***0.03***	***298.11***
Total																

Emission factors - 2012 MOBILE6.2 emission factors.

2013 Truck Emissions

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days	Truck Emissions, Total Tons: CO	NOx	VOCs	SOx	PM10	CO2
All	Heavy-duty truck	20	40	0.879	4.054	0.331	0.0126	0.1164	1352.1	250	***0.19***	***0.89***	***0.07***	***0.00***	***0.03***	***298.09***
Total																

Emission factors - 2013 MOBILE6.2 emission factors.

2014 Truck Emissions

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days	Truck Emissions, Total Tons: CO	NOx	VOCs	SOx	PM10	CO2
All	Heavy-duty truck	20	40	0.773	3.454	0.312	0.0126	0.0993	1352	250	***0.17***	***0.76***	***0.07***	***0.00***	***0.02***	***298.07***
Total																

Emission factors - 2014 MOBILE6.2 emission factors.

Table A-3
Halaeoloa HIARNG Relocation
Worker Travel Emissions

2011 Worker Trips

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days
All	LGT2	100	40	9.021	0.686	0.703	0.0088	0.0244	478.1	250
Total										

Worker Emissions, Total Tons

CO	NOx	VOCs	SOx	PM10	CO2
9.94	***0.76***	***0.77***	***0.01***	***0.03***	***527.02***

Emission factors - 2011 MOBILE6.2 emission factors.

2012 Worker Trips

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days
All	LGT2	100	40	8.484	0.628	0.644	0.0088	0.0244	478.4	250
Total										

Worker Emissions, Total Tons

CO	NOx	VOCs	SOx	PM10	CO2
9.35	***0.69***	***0.71***	***0.01***	***0.03***	***527.35***

Emission factors - 2012 MOBILE6.2 emission factors.

2013 Worker Trips

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days
All	LGT2	100	40	8.095	0.569	0.602	0.0088	0.0243	478.7	250
Total										

Worker Emissions, Total Tons

CO	NOx	VOCs	SOx	PM10	CO2
8.92	***0.63***	***0.66***	***0.01***	***0.03***	***527.68***

Emission factors - 2013 MOBILE6.2 emission factors.

2014 Worker Trips

Construction Phase	Vehicle Class	Total No. of Trucks Per Construction Phase	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	Construction Work Days
All	LGT2	100	40	7.779	0.519	0.568	0.0088	0.0243	478.9	250
Total										

Worker Emissions, Total Tons

CO	NOx	VOCs	SOx	PM10	CO2
8.57	***0.57***	***0.63***	***0.01***	***0.03***	***527.90***

Emission factors - 2014 MOBILE6.2 emission factors.

Table A-4
Kalaeloa HIARNG
Heavy Equipment Emission Factors

Construction Equipment Emission Factors

Fuel Oil Sulfur Content 0.3 %

Engine Power (hp)			Emission Factor (g/hp-hr) [1]							
			NOx + HC	NOx	HC [2]	CO [3]	PM [3]	SO_2 [4]	CO_2 [4]	CH_4 [4]
0	to	11	7.80	7.03	0.77	6.00	0.75	1.00	521.63	1.80
11	to	25	7.10	6.66	0.44	4.90	0.60	1.00	521.63	1.80
25	to	50		6.90	0.28	4.10	0.60	1.00	521.63	1.80
50	to	100		6.90	0.53	8.50	0.40	1.00	521.63	1.80
100	to	175		6.90	0.34	8.50	0.40	1.00	521.63	1.80
175	to	300		6.90	0.31	8.50	0.40	1.00	521.63	1.80
300	to	600		6.90	0.21	8.50	0.40	1.00	521.63	1.80
600	to	750		6.90	0.15	8.50	0.40	1.10	526.16	1.80
750	to			6.90	0.29	8.50	0.40	1.10	526.16	1.80

1 - Assume Tier 1 emission factors as a conservative estimate
2 - Not specified for Tier 1. Values are the greater of data from EPA 420-P-04-009 page 9 for Tier 1, rounded up to nearest 0.01, and Tier 2.
3 - Data in Bold not specified for Tier 1. Values are the greater of data from EPA 420-P-04-009 pages 10 and 12 for Tier 1, rounded up to nearest 0.01, and Tier 2.
4 - AP-42 Table 3.3-1 (≤600 hp), Table 3.4-1 (>600 hp); CH4 from Table 3.4-1.

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APPENDIX D
NOISE MODEL REPORT

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Prepared for:

The Environmental Company, Inc.
1001 Bishop
Suite 1400, ASB Tower
Honolulu, HI 96813

DRAFT

Wyle Report

WR 09-25

Aircraft Noise Study for Kalaeloa Airport, Hawaii

Contract No. 57591; PO 6601-25017
Job No. T56985

December 14, 2009

Prepared by:

Joseph J. Czech
Patrick H. Kester

Integrity
Reliability
Innovation
Service

WYLE LABORATORIES, INC.
128 MARYLAND STREET
EL SEGUNDO, CA 90245
TEL: 310 322 1763
FAX: 310 322 9799
WWW.WYLE.COM

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Submitting Organization

Wyle Laboratories, Inc.
Research and Consulting
128 Maryland Street
El Segundo, CA 90245-4115

Phone: 310-563-6660
Fax: 310-322-9799

Contracts

128 Maryland Street
El Segundo, CA 90245-4115

Phone: 310-563-6660
Fax: 310-322-9799

Corporate Headquarters

Wyle Laboratories, Inc.
Corporate Offices
1960 East Grand Avenue, Suite 900
El Segundo, CA 90245-5023

Phone: 310-563-6800 E-Mail: service@wyle.com
Fax: 310-563-6850 Web Site: www.wyle.com

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1.0 Introduction

To support the Hawaii Army National Guard's (HIARNG) Environmental Assessment (EA) for the Relocation of Units and Construction Projects at Kalaeloa Airport, Hawaii, The Environmental Company (TEC) contracted the acoustic consulting services of Wyle Laboratories, Inc. (Wyle) to prepare an aircraft noise study of the airport. Through computer modeling, this noise study determines, defines and evaluates the aircraft noise environment at Kalaeloa Airport resulting from nominal yearly flight and maintenance (run-up) operations of current and proposed based and transient military and civilian aircraft. Noise measurements were not conducted.

The study will consider two (2) aircraft noise environments (scenarios):

- Existing and
- Prospective.

The existing noise environment is based on a recent study conducted to install a new Instrument Landing System (ILS) at Kalaeloa Airport (USDoT, 2005). This study is referred to herein as the "ILS study".

The Prospective noise environment will be the Existing condition plus flight and runup operations from the following HIARNG aircraft:

- CH-47D Chinook helicopters (12)
- UH-60L/UH-60M Blackhawk helicopters (5)
- OH-58/UH-72A helicopters (2)
- C-26E fixed-wing twin turboprop transport airplane (1).

This report is organized into six primary sections, followed by three appendices. Section 2 presents an overview of the noise metrics and the technical tools used to conduct this analysis. Section 3 provides a brief background on Kalaeloa Airport and a description of the operating environment. Sections 4 and 5 describe the Existing and Prospective scenarios' operations data and noise exposure, respectively. Appendix A contains a discussion of noise and its effects on the environment. Appendix B presents the runway and flight track utilization percentages for baseline aircraft and Appendix C contains the representative flight profiles for all modeled HIARNG aircraft.

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2.0 Noise Metrics and Analysis Tools

Sections 2.1 and 2.2 provide an overview of the noise metrics and computerized noise analysis tools.

2.1 Noise Metrics

As used in environmental noise analyses, a metric refers to the unit that quantitatively measures the effect of noise on the environment. The noise metrics for individual, single events are Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}). SEL is associated with flight events. L_{max} is associated with flight and run-up events.

The cumulative energy long-term (24-hour) noise metric typically used in the US and at Kalaeloa Airport is the Day-Night Average Sound Level (DNL).

2.1.1 Maximum Sound Level (L_{max})

The highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level (L_{max}). The integration time is typically one-eighth of a second.

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. L_{max} indicates the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally one-eighth second (ANSI, 1988). The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

2.1.2 Sound Exposure Level (SEL)

SEL (or L_{AE}) is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL would include both the maximum noise level and the lower noise levels produced during onset and recess periods of the overflight.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the A-weighted sound level of a constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For sound from aircraft overflights, which typically lasts more than one second, the SEL is usually greater than the L_{max} because an individual overflight takes seconds and the L_{max} occurs instantaneously. SEL represents the best metric to compare noise levels from overflights.

2.1.3 Day-Night Average Sound Level (DNL)

DNL is a composite metric that accounts for the SEL of all noise events in a 24-hour period. A 10 decibel (dB) penalty is applied to nighttime events (2200-0700 hours). No penalties are applied during daytime hours (0700-2200). DNL is a logarithmic average quantity, mathematically representing the continuous A-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. DNL accounts for the maximum noise levels, the duration of the events, and the number of events that occurs over a 24-hour period. Like SEL, DNL does not represent the sound level heard at any particular time, but quantifies the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure. The nighttime penalty of the DNL metric, accounts for the added intrusiveness of sounds during nighttime hours when people are typically sleeping. The penalty also accounts for people's increased sensitivity to noise during that period and for ambient sound levels being between 5 and 10 dB lower than during daytime hours.

The inclusion of daytime and nighttime periods in the computation of the DNL reflects its basic 24-hour definition. It can, however, be derived from operations over periods of multiple days. To be consistent with the FAA ILS study, noise contours are developed based on Annual Average Daily (AAD[1]) operations. For the purposes of the Kalaeloa Airport study, the AAD approach is appropriate. The number of AAD operations is determined by the arithmetic average of the total operations at the airfield over a period of one year or 365 days.

2.1.4 Noise Zones

The community response to aircraft noise has long been a concern in the vicinity of airfields from which high levels of operations are experienced. In an effort to manage airport and community growth, noise has been considered in land-use planning on and in the vicinity of airfields. On- and off-facility noise exposure zones are divided into three categories, as follows:

- *Noise Zone I*: Defined as an area of minimal impact, refers to A-weighted DNL values less than 65 dB. This area is suitable for all types of land use activities.
- *Noise Zone II*: Defined as an area of moderate impact, refers to A-weighted DNL values from 65 dB up to, but not including 75 dB. Land use does not preclude residential and should normally be limited to activities such as industrial, manufacturing, transportation and resource production. Residential structures should have noise level reduction features incorporated their design and construction. This is the area where some land use controls are needed.
- *Noise Zone III*: Defined as an area of most severe impact, refers to A-weighted DNL values of 75 dB and greater. This is the area which requires the greatest degree of compatible use controls. Noise-sensitive land uses should not be considered therein.

In addition to the noise zones, areas of concern may be defined where noise levels are not normally considered to be objectionable (less than 65 dB DNL/CNEL), but land use controls are recommended in that particular area (DoA, 2007).

[1] Equivalent to the AICUZ Instruction's "Annual Average Day" terminology.

2.2 Analysis Tools

This section describes the analysis tools used to calculate the noise levels contained in this report, namely, the NOISEMAP, Rotorcraft Noise Model (RNM) and Integrated Noise Model (INM) computer programs.

The programs described below are most accurate and useful for comparing "before-and-after" noise levels that would result from alternative scenarios when calculations are made in a consistent manner. The programs allow noise exposure prediction of such proposed actions without actual implementation and/or noise monitoring of those actions. The programs also have the flexibility of calculating sound levels at specified points on the ground allowing the analysis of noise-sensitive receptors.

2.2.1 NOISEMAP, RNM and INM

Analyses of aircraft noise exposure and compatible land uses around Department of Defense (DoD) facilities are normally accomplished using a group of computer-based programs, collectively called NOISEMAP (Czech and Plotkin, 1998; Wasmer Consulting, 2006a; Page, et. al., 2008; Wasmer Consulting, 2006b). The NOISEMAP suite of computer programs was primarily developed by the Air Force, which serves as the lead DoD agency for aircraft noise modeling. The NOISEMAP suite of computer programs includes BaseOps, OMEGA10, OMEGA11, NOISEMAP, RNM and NMPlot. The suite also includes the NOISEFILE and NCFiles databases.

The BaseOps program allows entry of runway coordinates, airfield information, flight tracks, flight profiles (engine thrust settings, altitudes, and speeds) along each flight track for each aircraft, numbers of daily flight operations, run-up coordinates, run-up profiles, and run-up operations. At this stage, closed-pattern operations, which are counted by Air Traffic Control (ATC) as two operations (one departure and one arrival), are entered in the program as one noise event (one departure followed by one arrival with the aircraft remaining in the vicinity of the airfield). The OMEGA10 program then calculates the SEL for each model of aircraft from the NOISEFILE database, taking into consideration the specified speeds, engine thrust settings, and environmental conditions appropriate to each type of flight operation. The OMEGA11 program calculates maximum A-weighted sound levels from the NOISEFILE database for each model of aircraft taking into consideration the engine thrust settings and environmental conditions appropriate to run-up operations. In this report, NOISEMAP Version 7 was used to analyze all fixed-wing aircraft/operations.

RNM is a computer program developed by Wyle Laboratories, Inc. for the National Aeronautics and Space Administration (NASA)-Langley Research Center (LaRC). RNM, as part of LaRC's Tilt Rotor Aeroacoustic Code (TRAC) suite of computer programs, is aimed at the prediction of far-field sound levels from tilt rotor aircraft and helicopters. DoD and the North Atlantic Treaty Organization (NATO) have adopted RNM for the environmental impact assessment of rotorcraft noise (NATO, 2000).

RNM simulates vehicle flight in a time-based manner along a prescribed flight track and the sound is analytically propagated through the atmosphere to specified receiver locations. RNM accounts for spherical spreading, atmospheric absorption, ground reflection and attenuation, Doppler shifts, the difference in phase between direct and reflected rays, varying terrain and ground impedance between the vehicle and the receiver. RNM has the ability to account for horizontally stratified atmospheres

with winds and curved ray paths but this particular ability was not utilized for this study. RNM's acoustic algorithms are more robust than NOISEMAP's algorithms, partially due to RNM's more detailed noise database (NCFiles) of one-third octave band sound hemispheres for each vehicle in its inventory. In addition to altitude and speed, RNM accounts for roll, angle of attack (similar to pitch), yaw, and nacelle angles, if applicable, along each flight track for each aircraft. In this report, RNM Version 7 was used to analyze all of the modeled rotary-wing aircraft operations.

The FAA's INM is widely used by the civilian aviation community for determining aircraft noise exposure in the vicinity of airports and is similar to NOISEMAP in capability and basic computational methodology. Like NOISEMAP, INM has a database of measured acoustic noise data for its aircraft and also uses NMPlot for depiction of noise contours. Although the related ILS study utilized INM Version 6.1, noise for this study was re-computed using Version 7.0b of INM.

2.2.2 Topography, Noise Contours and Points of Interest

The NOISEMAP and RNM programs include the ability to account for atmospheric sound propagation effects over varying terrain, including hills and mountainous regions, as well as regions of varying acoustical impedance—for example, water around coastal regions. Even for flat terrain, the propagation algorithms are more robust than in terrain is modeled. This feature is used in computing the noise levels presented in this analysis. Elevation and impedance grid files were created from 1-arc-second U.S. Geological Survey data for the land in the vicinity of Kalaeloa Airport. For NOISEMAP and RNM the grid spacing of the topography data was 500 ft (61m). For INM, the grid is recursively subdivided so grid spacing is not relevant.

All areas on the island were modeled with "soft" acoustical impedance and the sea surface was modeled with "hard" acoustical impedance. INM includes the ability to account for effects of varying terrain but assumes "soft" impedance everywhere.

Each of these programs can incorporate the number of day and night operations, flight paths, and profiles of the aircraft to calculate DNL at many points on the ground around the facility. For NOISEMAP and RNM, this process results in a "grid" file containing noise levels at different points of a user-specified rectangular area. The grid point spacing used to compute the NOISEMAP and RNM noise grids for this study was 500 feet (61 m). INM typically computes a recursively subdivided irregularly-shaped grid based on user-specified refinement and tolerance parameters. The refinement and tolerance parameters for this study were 10 and 0.25 dB, respectively.

The NMPlot program uses the grid file to draw contours of equal DNL for overlay onto maps. The NMPlot program is also capable of adding multiple grid files logarithmically and arithmetically subtracting grids.

NOISEMAP, RNM and INM can also compute DNL for specific points of interest, e.g., noise sensitive receptors and determine the primary contributors to the overall DNL at each point.

3.0 Kalaeloa Airport

The following five sections discuss the historical context, the regional and vicinity areas, the aviation users, climatic conditions, data collection efforts and historical flight operations.

3.1 Regional and Local Settings

As shown in Figure 3-1, Kalaeloa Airport lies on the island of Oahu, Hawaii, two miles south of Kapolei and 14 miles west of Honolulu. Kalaeloa Airport used to be Naval Air Station Barbers Point. Figure 3-2 shows the Kalaeloa Airport vicinity. Kalaeloa Airport is located on the southerly edge of a peninsula with the City of Kapolei bordering the airport to the north. The Pacific Ocean borders the airport to the south. The surrounding land is a mixture of medium-density urban and residential lands and industrial areas.

As shown in Figure 3-2, the airfield portion of Kalaeloa Airport includes three bi-directional runways. Runway 04L/22R is 4,500 feet in length, Runway 04R/22L is 8,000 ft in length and the crosswind runway, Runway 11/29, is 6,000 ft in length. All three runways are 200 ft in width.

Field elevation is 30 feet MSL. The magnetic declination is 11 degrees east. All maps in this report depict a north arrow pointing to true north.

3.2 Aviation Users

Currently modeled aircraft for Kalaeloa Airport include the following categories (with representative aircraft types shown in parenthesis):

- Civilian twin-engine turboprop (DeHavilland DHC6, Beech Baron 58);
- Civilian General Aviation aircraft (Cessna 172);
- Civilian helicopters (many types);
- Military four-engine turboprop aircraft (C-130 Hercules, P-3 Orion); and
- Military helicopters (Coast Guard HH-65 Dauphin, others).

3.3 Climatic Data

Weather is an important factor in the propagation of noise and the computer model requires input of the average daily temperatures in degrees Fahrenheit (degrees F), percent relative humidity (percent RH) and station pressure in inches of mercury (in Hg) for each month of a year. Climatic data was obtained from the ILS study modeling. The modeled conditions are 75 degrees F and 70 percent RH.

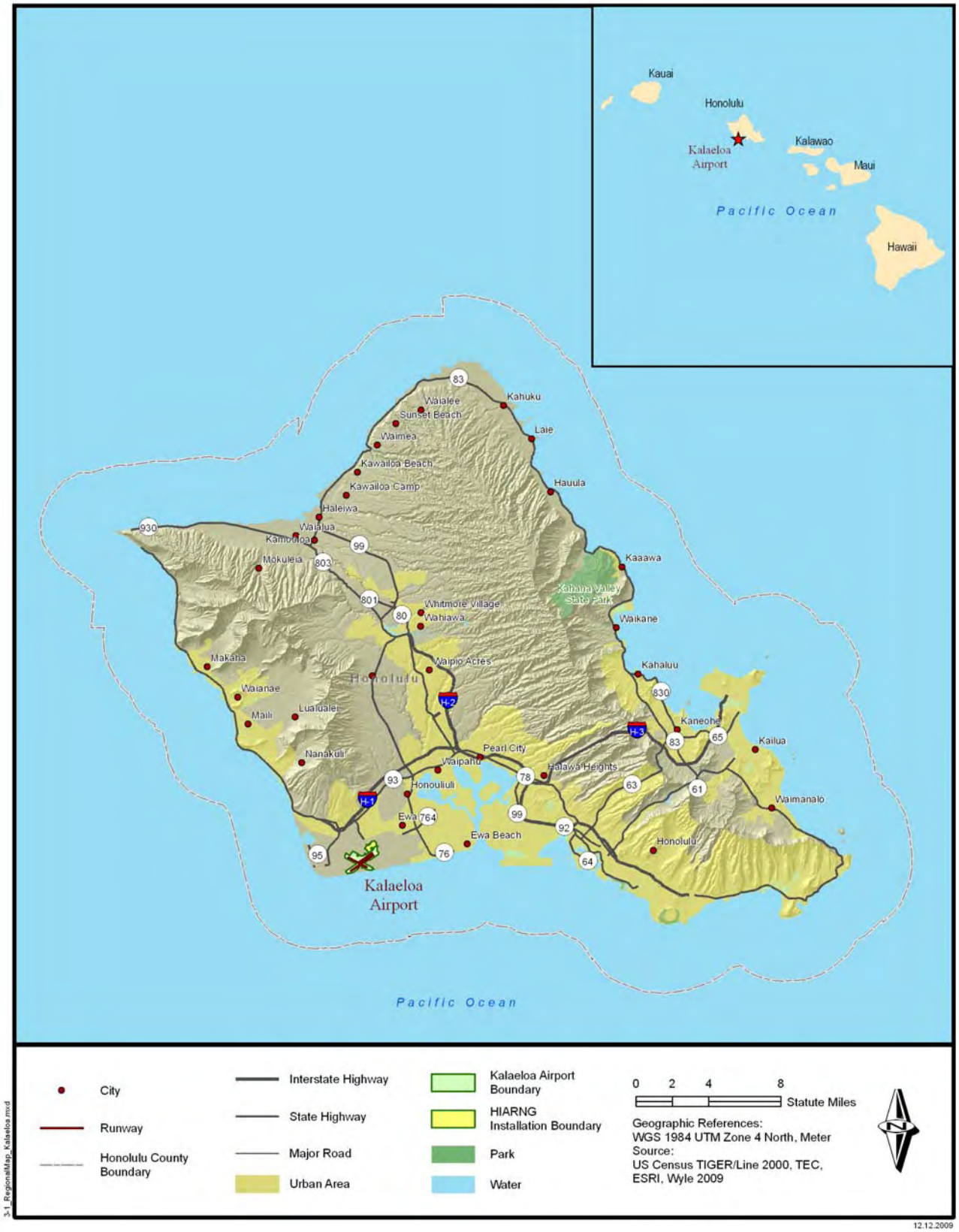

Figure 3-1 Regional Setting of Kalaeloa Airport

Figure 3-2 Vicinity of Kalaeloa Airport

3.4 Data Collection

The primary purpose of this effort is to estimate noise exposure for the time when HIARNG aircraft would be based at Kalaeloa Airport. At the direction of HIARNG, it was decided to consider flight and runup operations by the following aircraft types for the Prospective scenario (as stated in Section 1): CH-47D, UH-60, OH-58/UH-72 and C-26.

In September of 2009, Wyle began the data collection phase and supplied an initial data collection package in electronic format to Kalaeloa Airport personnel. This tool was used to gather and/or confirm airfield information (e.g., weather data, geographic coordinates of navigational aids, runways, etc.), numbers of prospective flight operations (including aircraft distribution), flight tracks, runway and flight track utilization, flight profiles and run-up operations. Specific contact information is shown in Table 3-1. The data package also requested collection and/or confirmation of flight profiles for the HIARNG aircraft types. A site visit to Kalaeloa Airport was not conducted.

To help define the baseline noise environment, INM files from the ILS study were provided.

Table 3-1 List of Contacts

Name	Position	Organization	Phone	Email
Mr. Glenn Metzler	Project Manager	TEC, Inc.	(808) 528-1445 x8930	GMMetzler@tecinc.com
Mr. Joseph Czech	Project Manager	Wyle Laboratories, Inc.	(310) 322-1763	joseph.czech@wyle.com
LtCol Roger Pukahi	Commanding Officer	NGHI	(808) 672-1551	roger.pukahi@us.army.mil
Mr. Robert Ramos	Asst Airport Superintendent	Kalaeloa Airport	(808) 682-6422	
Mr. Norman R. Simpson Jr.	Air Traffic Manager	297 ATCS	(808) 474-0667	norman.simpson@hihick.ang.af.mil
Mr. Yoichi Ebisu	Owner	Y. Ebisu & Associates	(808) 735-1634	EBISUYASSOC@aol.com

3.5 Historical Flight Operations

A flight operation is defined as a takeoff or landing of one aircraft with patterns counted as two operations. The counts under this and subsequent sections of this report do not include transitions through the airspace above the airport.

Table 3-2 and Figure 3-4 show a historical perspective of aircraft operations at Kalaeloa Airport for CY2004 through CY2008 from the airport's Air Traffic Activity Reports (ATARs). The ATAR is maintained by the airport's air traffic control tower which logs traffic daily between the hours of 6 a.m. and midnight. Over the past 5 years, the peak year of operation was CY2005 with approximately 163,000 aircraft operations. The year with the least amount of activity over the past 5 years is CY2007 with approximately 133,000 operations. General aviation aircraft account for approximately 80 percent of the flight operations. Military aircraft account for approximately 19 percent of the flight operations.

Table 3-2 Annual Flight Operations at Kalaeloa Airport

Calendar Year	Military	Air Carrier/ Air Taxi	GA	Other	TOTAL (excluding "Other)
2004		*unknown*			155,520
2005	20,580	2,288	140,424	-	163,292
2006	21,320	3,328	132,414	-	157,062
2007	20,513	1,788	110,711	158	133,012
2008	27,759	720	114,085	2	142,564

Source: Kalaeloa Airport, 2009.

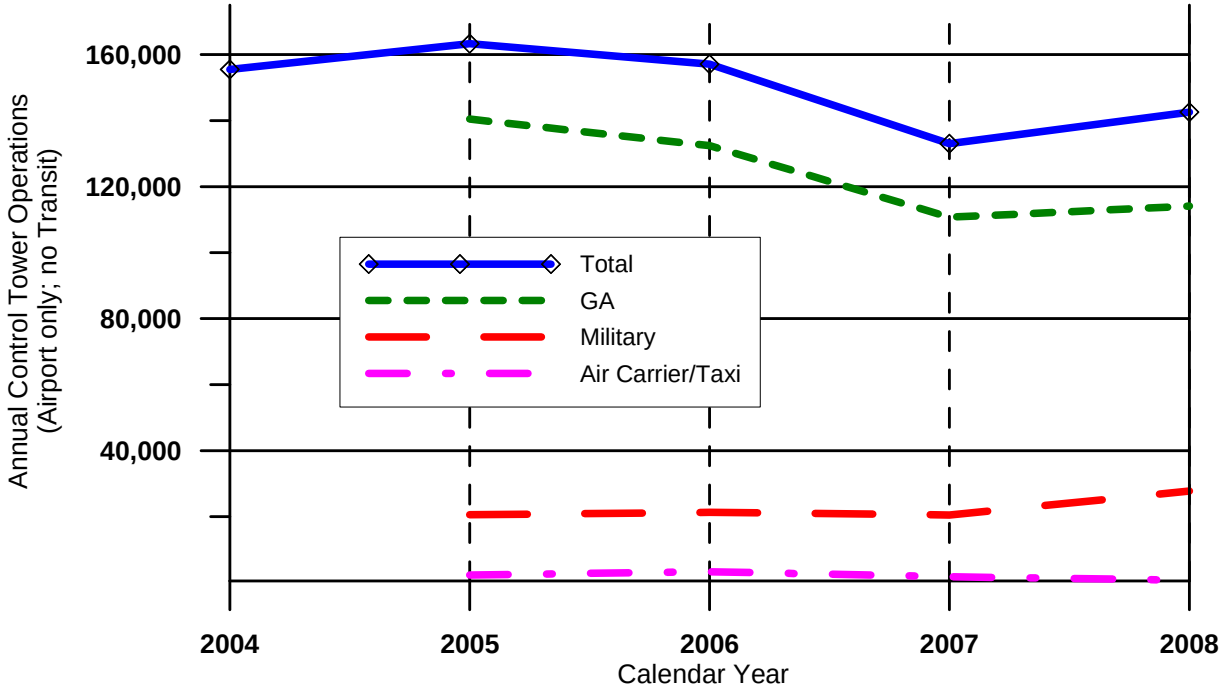

Figure 3-4 Annual Flight Operations at Kalaeloa Airport

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4.0 Baseline

The Baseline scenario for Kalaeloa Airport is defined as airfield operations for CY2008. Section 4.1 discusses flight operations by aircraft type. Section 4.2 discusses runway/helipad utilization, flight track utilization, flight profiles and AAD operations by aircraft type. Section 4.3 describes maintenance run-up operations and Section 4.4 discusses the resultant AAD noise exposure.

4.1 Flight Operations

The first step in the noise analysis process is to determine the number of annual flight operations for the year studied. A flight operation is defined as a takeoff or landing of one aircraft with patterns counted as two operations. The counts under this and subsequent sections of this report do not include transitions through the airspace above or near Kalaeloa Airport. The computer noise model requires input of flight operations by aircraft type, operation type, and temporal period (daytime hours of 0700-2200 and nighttime hours of 2200-0700). The ATAR for CY2008 shown in Section 3 formed the basis of the Baseline operations. Distribution of operations by aircraft type for each of the ATAR categories (i.e., military, general aviation, air carrier/taxi) were derived from the ILS study noise modeling for the 2010 projected case without Honolulu International Airport (HIA) traffic. The ILS study projected nearly 363,000 total flight operations for 2010. These were factored down to approximately 143,000 to match the total from the CY2008 ATAR.

Table 4-1 shows the resultant set of flight operations by category, aircraft type and period of day. Total annual flight operations are 142,515. Operation types include departures, instrument straight-in arrivals, visual arrivals, and touch and go patterns. The top user category of the airfield is General Aviation (GA), particularly the single-engine propeller-driven aircraft (e.g., Cessna 172) with 62 percent of the total flight operations followed by the GA twin-engine turboprop (Beech Baron 58) with 20 percent of the total flight operations. The 9-hour nighttime period from 10 p.m. to 7 a.m. accounts for 3 percent of total flight operations.

1

Table 4-1 Baseline (CY2008) Annual Flight Operations

		Departure			Arrival			Touch and Go (1)			Grand Total		
Category	**Aircraft ID**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**
Civilian 2ETP	DHC6	168	5	173	173	5	178	712	24	736	1,053	34	1,087
Civilian GA	BEC58P	6,440	198	6,638	6,440	200	6,640	17,084	527	17,611	29,964	925	30,889
Civilian GA	CNA172	9,117	280	9,397	9,120	280	9,400	63,199	1,956	65,155	81,436	2,516	83,952
Civilian Helo	CIVHEL	741	22	763	741	22	763	3,867	122	3,989	5,349	166	5,515
Civilian Helo	HH65	1,505	41	1,546	1,505	44	1,549	3,550	117	3,667	6,560	202	6,762
Military 4ETP	C130	1,502	46	1,548	1,502	46	1,548	3,550	107	3,657	6,554	199	6,753
Military 4ETP	P3C	1,019	32	1,051	1,017	34	1,051	4,257	132	4,389	6,293	198	6,491
Military Helo	MILHEL	168	2	170	168	2	170	702	24	726	1,038	28	1,066
Civilian 2ETP		168	5	173	173	5	178	712	24	736	1,053	34	1,087
Civilian GA		15,557	478	16,035	15,560	480	16,040	80,283	2,483	82,766	111,400	3,441	114,841
Civilian Helo		2,246	63	2,309	2,246	66	2,312	7,417	239	7,656	11,909	368	12,277
Military 4ETP		2,521	78	2,599	2,519	80	2,599	7,807	239	8,046	12,847	397	13,244
Military Helo		168	2	170	168	2	170	702	24	726	1,038	28	1,066
Civilian		17,971	546	18,517	17,979	551	18,530	88,412	2,746	91,158	124,362	3,843	128,205
Military		2,689	80	2,769	2,687	82	2,769	8,509	263	8,772	13,885	425	14,310
Total		20,660	626	21,286	20,666	633	21,299	96,921	3,009	99,930	138,247	4,268	142,515

(1) Touch and Go counted here as two operations (1 takeoff and 1 landing)

2ETP = two-engined turboprop

GA = general aviation

4ETP = four-engined turboprop

2 Day = 0700-2200; Night = 2200-0700

3

4.2 Runway and Flight Track Utilization, Flight Profiles and Annual Average Daily Operations

The next step in the noise modeling process is assignment of runway operations to flight track via flight track utilization percentages for each aircraft type, operation type, and DNL time period. Tables in Appendix B show the modeled runway and flight track utilization percentages from the ILS study for each modeled aircraft type. The track IDs are identical to the ones modeled in the ILS study. Note the percentages for each period sum vertically to 100 for each runway and operation type combination. For example from Table B-1, 86 percent of the daytime DHC-6 departures fly runway 04R, 96 percent of which use track T4R5 (to the southwest) and 4 percent use track T4R8 (to the west).

Figures 4-1 through 4-4 depict the modeled AAD flight tracks listed in the tables in Appendix B. The tracks were taken directly from the ILS study noise modeling with one exception: a departure track (T11D) from Runway 29 was corrected to depart from Runway 11. These flight tracks were reviewed and approved by ATC at Kalaeloa Airport. The departure tracks from Runways 04/22 can be grouped into departures to the north, to the west, and to the southwest. Arrival tracks to these runways are approximately opposite to the departure tracks. The departure track from Runway 11 and the arrival track from Runway 29 are to/from the east-southeast. Coast Guard flight tracks from their pad south of Runway 04R/22L are to/from the southeast. Patterns on Runway 04R/22L are primarily over the ocean while the smaller patterns on Runway 04L/22R are over airport land to the north of the runways.

As the baseline was modeled with the INM, flight profiles consist of a combination of power settings, airspeeds and altitudes along each modeled flight track. Flight profiles for all modeled baseline aircraft types were taken directly from the ILS study's INM modeling.

The next step in the noise modeling process is the computation of the AAD day and night events for each profile. This is accomplished by dividing the track operations by 365 and further dividing closed-pattern operations (e.g., touch-and-go, FCLP and GCA Box) by 2[2]. The resultant numbers of events are presented in Table 4-4. There are approximately 254 AAD flight events modeled.

[2] The closed-pattern operations are divided by two for noise modeling purposes only. ATC counts closed patterns as two distinct operations: one departure and one arrival. In NOISEMAP and RNM, the departure and arrival are represented by one event because both operations are connected (i.e., on a single flight track).

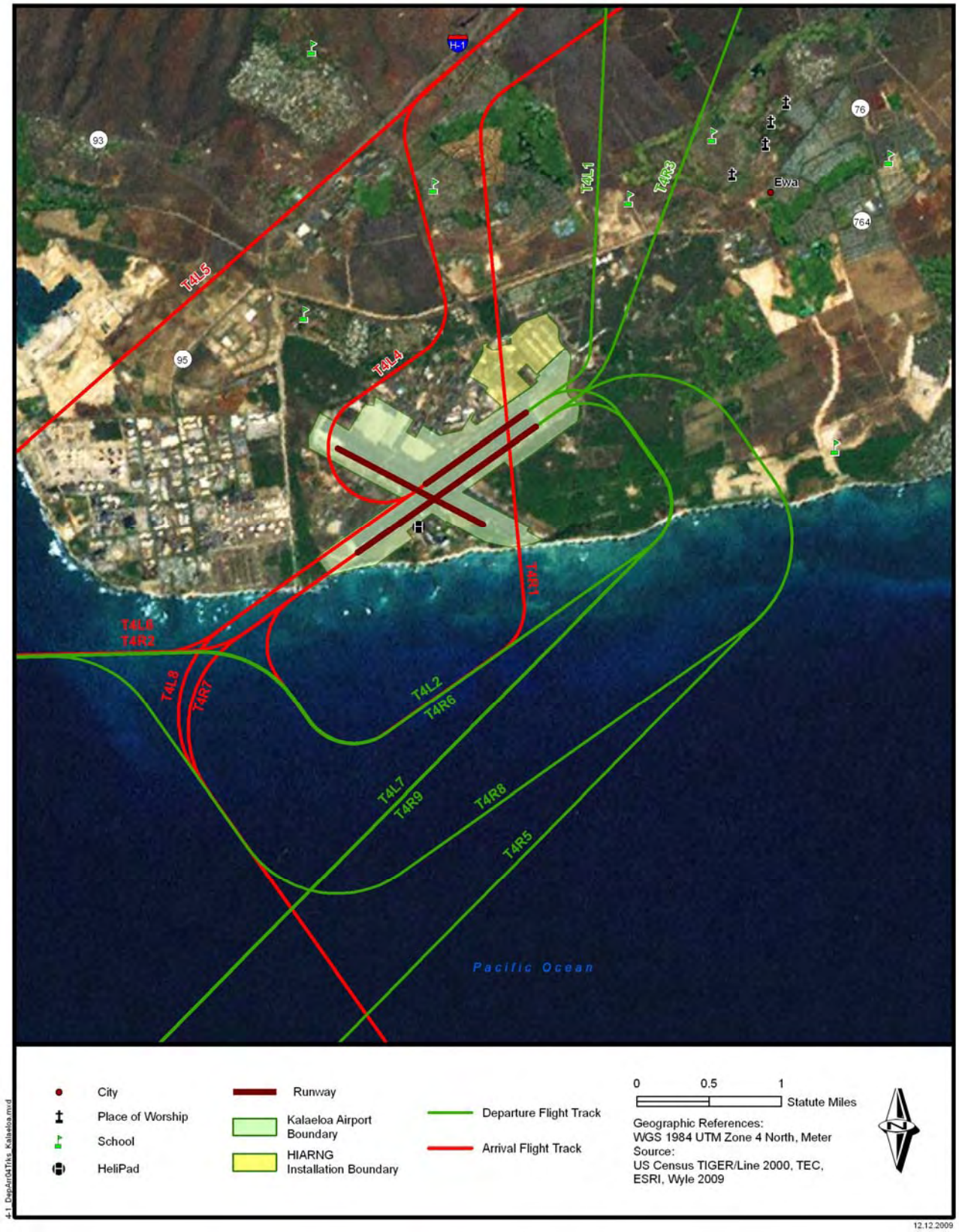

Figure 4-1 Modeled Average Daily Departure and Arrival Flight Tracks for Runway 04

Figure 4-2 Modeled Average Daily Departure and Arrival Flight Tracks for Runway 22

Figure 4-3 Modeled Average Daily Departure and Arrival Flight Tracks for Other Runways

Figure 4-4 Modeled Average Daily Touch and Go Flight Tracks for Runways 04 and 22

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Table 4-4 Modeled Average Daily Flight Events for the Baseline Scenario

Operation Type	Run-way	Flight Track ID	DHC6			BEC58P			CNA172			CIVHEL			HH65			C130			P3C			MILHEL			TOTAL		
			Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Departure	04L	T4L1	-	-	-	0.2338	0.0067	0.2405	6.4668	0.2004	6.6672	0.4476	0.0134	0.4610	0.0200	-	0.0200	-	-	-	-	-	-	0.0200	-	0.0200	7.1882	0.2205	7.4087
		T4L2	-	-	-	0.1804	0.0067	0.1871	1.1223	0.0334	1.1557	0.0534	-	0.0534	0.0601	-	0.0601	-	-	-	-	-	-	0.0134	-	0.0134	1.4296	0.0401	1.4697
		T4L7	-	-	-	0.3474	0.0134	0.3608	0.8618	0.0267	0.8885	0.0534	-	0.0534	0.1069	-	0.1069	-	-	-	-	-	-	0.0067	-	0.0067	1.3762	0.0401	1.4163
	04R	T4R0	0.2405	0.0067	0.2472	-	-	-	-	-	-	-	-	-	-	-	-	2.9929	0.0935	3.0864	1.4362	0.0469	1.4831	-	-	-	4.6696	0.1471	4.8167
		T4R3	-	-	-	0.7015	0.0200	0.7215	2.1578	0.0668	2.2246	-	-	-	0.0735	-	0.0735	-	-	-	-	-	-	0.0735	-	0.0735	3.0063	0.0868	3.0931
		T4R5	0.1804	0.0067	0.1871	1.0489	0.0334	1.0823	0.2873	0.0067	0.2940	0.0134	-	0.0134	0.4209	0.0134	0.4343	0.8418	0.0267	0.8685	1.0889	0.0335	1.1224	0.0200	-	0.0200	3.9016	0.1204	4.0220
		T4R6	-	-	-	0.5344	0.0134	0.5478	0.3741	0.0134	0.3875	0.0134	-	0.0134	0.2271	0.0067	0.2338	-	-	-	-	-	-	0.0534	-	0.0534	1.2024	0.0335	1.2359
		T4R8	0.0067	-	0.0067	-	-	-	-	-	-	-	-	-	-	-	-	0.0935	-	0.0935	0.0601	-	0.0601	-	-	-	0.1603	-	0.1603
		T4R9	-	-	-	13.9892	0.4342	14.4234	11.4439	0.3541	11.7980	1.2226	0.0401	1.2627	2.9929	0.0935	3.0864	-	-	-	-	-	-	0.2405	0.0067	0.2472	29.8891	0.9286	30.8177
	22L	T2L3	0.0334	-	0.0334	0.1871	0.0067	0.1938	0.0534	-	0.0534	-	-	-	0.0735	-	0.0735	0.1470	0.0067	0.1537	0.1937	0.0067	0.2004	0.0067	-	0.0067	0.6948	0.0201	0.7149
		T2L6	-	-	-	0.1203	0.0067	0.1270	0.3808	0.0134	0.3942	0.0200	-	0.0200	0.0134	-	0.0134	-	-	-	-	-	-	0.0134	-	0.0134	0.5479	0.0201	0.5680
		T31	-	-	-	0.0935	-	0.0935	0.0668	-	0.0668	-	-	-	0.0401	-	0.0401	0.0200	-	0.0200	0.0134	-	0.0134	0.0067	-	0.0067	0.2405	-	0.2405
	22R	T2R1	-	-	-	0.0334	-	0.0334	0.2004	0.0067	0.2071	0.0067	-	0.0067	0.0134	-	0.0134	-	-	-	-	-	-	-	-	-	0.2539	0.0067	0.2606
		T2R2	-	-	-	0.0401	-	0.0401	1.1424	0.0334	1.1758	0.0802	-	0.0802	0.0067	-	0.0067	-	-	-	-	-	-	0.0067	-	0.0067	1.2761	0.0334	1.3095
		T2R9	-	-	-	0.0601	-	0.0601	0.1537	0.0067	0.1604	0.0067	-	0.0067	0.0200	-	0.0200	-	-	-	-	-	-	-	-	-	0.2405	0.0067	0.2472
	11	T11D	-	-	-	0.0735	-	0.0735	0.2672	0.0067	0.2739	-	-	-	-	-	-	0.0200	-	0.0200	-	-	-	-	-	-	0.3607	0.0067	0.3674
	19 (Pad)	H6B	-	-	-	-	-	-	-	-	-	-	-	-	0.0534	-	0.0534	-	-	-	-	-	-	-	-	-	0.0534	-	0.0534
Non-break Arrival	04L	T4L4	-	-	-	0.1871	0.0067	0.1938	6.0393	0.1871	6.2264	0.4209	0.0134	0.4343	0.0134	-	0.0134	-	-	-	-	-	-	0.0134	-	0.0134	6.6741	0.2072	6.8813
		T4L5	-	-	-	0.0468	-	0.0468	0.4342	0.0134	0.4476	0.0267	-	0.0267	0.0067	-	0.0067	-	-	-	-	-	-	0.0067	-	0.0067	0.5211	0.0134	0.5345
		T4L6	-	-	-	0.2539	0.0067	0.2606	1.1223	0.0334	1.1557	0.0534	-	0.0534	0.0601	-	0.0601	-	-	-	-	-	-	0.0134	-	0.0134	1.5031	0.0401	1.5432
		T4L8	-	-	-	0.2739	0.0067	0.2806	0.8618	0.0267	0.8885	0.0534	-	0.0534	0.0868	-	0.0868	-	-	-	-	-	-	0.0067	-	0.0067	1.2826	0.0334	1.3160
	04R	T4R1	-	-	-	0.7015	0.0200	0.7215	2.1578	0.0668	2.2246	0.1136	0.0067	0.1203	0.0735	-	0.0735	-	-	-	-	-	-	0.0735	-	0.0735	3.1199	0.0935	3.2134
		T4R2	0.0200	-	0.0200	0.7683	0.0267	0.7950	0.3741	0.0134	0.3875	0.0134	-	0.0134	0.2271	0.0067	0.2338	0.0935	-	0.0935	0.1136	0.0067	0.1203	0.0534	-	0.0534	1.6634	0.0535	1.7169
		T4R7	0.1737	0.0067	0.1804	0.8150	0.0267	0.8417	0.2873	0.0067	0.2940	0.0134	-	0.0134	0.3474	0.0134	0.3608	0.8418	0.0267	0.8685	1.0354	0.0335	1.0689	0.0200	-	0.0200	3.5340	0.1137	3.6477
		T4RI	0.2405	0.0067	0.2472	13.9892	0.4342	14.4234	11.4439	0.3541	11.7980	1.2226	0.0401	1.2627	2.9929	0.0935	3.0864	2.9929	0.0935	3.0864	1.4362	0.0469	1.4831	0.2405	0.0067	0.2472	34.5587	1.0757	35.6344
	22L	T2L1	-	-	-	0.1203	0.0067	0.1270	0.3808	0.0134	0.3942	0.0200	-	0.0200	0.0134	-	0.0134	-	-	-	-	-	-	0.0134	-	0.0134	0.5479	0.0201	0.5680
		T2L2	0.0334	-	0.0334	0.1470	0.0067	0.1537	0.0534	-	0.0534	-	-	-	0.0601	-	0.0601	0.1470	0.0067	0.1537	0.1803	0.0067	0.1870	0.0067	-	0.0067	0.6279	0.0201	0.6480
		T2L5	0.0067	-	0.0067	-	-	-	-	-	-	-	-	-	-	-	-	0.0200	-	0.0200	0.0200	-	0.0200	-	-	-	0.0467	-	0.0467
		T2L9	-	-	-	0.1336	0.0067	0.1403	0.0668	-	0.0668	-	-	-	0.0401	-	0.0401	-	-	-	-	-	-	0.0067	-	0.0067	0.2472	0.0067	0.2539
	22R	T2R4	-	-	-	0.0468	-	0.0468	0.1537	0.0067	0.1604	0.0067	-	0.0067	0.0134	-	0.0134	-	-	-	-	-	-	-	-	-	0.2206	0.0067	0.2273
		T2R6	-	-	-	0.0401	-	0.0401	1.1424	0.0334	1.1758	0.0802	-	0.0802	0.0067	-	0.0067	-	-	-	-	-	-	0.0067	-	0.0067	1.2761	0.0334	1.3095
		T2R8	-	-	-	0.0468	-	0.0468	0.2004	0.0067	0.2071	0.0067	-	0.0067	0.0134	-	0.0134	-	-	-	-	-	-	-	-	-	0.2673	0.0067	0.2740
	01	H6A	-	-	-	-	-	-	-	-	-	-	-	-	0.1670	0.0067	0.1737	-	-	-	-	-	-	-	-	-	0.1670	0.0067	0.1737
	29	T29A	-	-	-	0.0735	-	0.0735	0.2672	0.0067	0.2739	-	-	-	-	-	-	0.0200	-	0.0200	-	-	-	-	-	-	0.3607	0.0067	0.3674
Touch and Go	04L	T4L3	-	-	-	8.7048	0.2672	8.9720	59.7914	1.8505	61.6419	3.7740	0.1203	3.8943	1.6568	0.0534	1.7102	-	-	-	-	-	-	0.3273	0.0134	0.3407	74.2543	2.3048	76.5591
	04R	T44R	0.8284	0.0267	0.8551	-	-	-	-	-	-	0.1136	0.0067	0.1203	-	-	-	4.1353	0.1269	4.2622	4.9566	0.1540	5.1106	-	-	-	10.0339	0.3143	10.3482
		T4R4	-	-	-	11.1900	0.3474	11.5374	13.7954	0.4276	14.2230	0.6747	0.0200	0.6947	2.4785	0.0802	2.5587	-	-	-	-	-	-	0.4944	0.0134	0.5078	28.6330	0.8886	29.5216
	22L	T2L4	-	-	-	2.6322	0.0802	2.7124	3.2468	0.1002	3.3470	0.1603	0.0067	0.1670	0.5812	0.0200	0.6012	-	-	-	-	-	-	0.1136	0.0067	0.1203	6.7341	0.2138	6.9479
		T34	0.1470	0.0067	0.1537	-	-	-	-	-	-	-	-	-	-	-	-	0.7282	0.0200	0.7482	0.8751	0.0268	0.9019	-	-	-	1.7503	0.0535	1.8038
	22R	T2R3	-	-	-	0.8752	0.0267	0.9019	9.7403	0.3006	10.0409	0.6347	0.0200	0.6547	0.1470	0.0067	0.1537	-	-	-	-	-	-	0.0267	-	0.0267	11.4239	0.3540	11.7779
Departure			0.4610	0.0134	0.4744	17.6436	0.5412	18.1848	24.9787	0.7684	25.7471	1.9174	0.0535	1.9709	4.1219	0.1136	4.2355	4.1152	0.1269	4.2421	2.7923	0.0871	2.8794	0.4610	0.0067	0.4677	56.4911	1.7108	58.2019
Non-break Arrival			0.4743	0.0134	0.4877	17.6438	0.5478	18.1916	24.9854	0.7685	25.7539	2.0310	0.0602	2.0912	4.1220	0.1203	4.2423	4.1152	0.1269	4.2421	2.7855	0.0938	2.8793	0.4611	0.0067	0.4678	56.6183	1.7376	58.3559
Touch and Go			0.9754	0.0334	1.0088	23.4022	0.7215	24.1237	86.5739	2.6789	89.2528	5.3573	0.1737	5.5310	4.8635	0.1603	5.0238	4.8635	0.1469	5.0104	5.8317	0.1808	6.0125	0.9620	0.0335	0.9955	132.8295	4.1290	136.9585
Total			1.9107	0.0602	1.9709	58.6896	1.8105	60.5001	136.5380	4.2158	140.7538	9.3057	0.2874	9.5931	13.1074	0.3942	13.5016	13.0939	0.4007	13.4946	11.4095	0.3617	11.7712	1.8841	0.0469	1.9310	245.9389	7.5774	253.5163

Note: Day=0700-2200; Night=2200-0659 local

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4.3 Maintenance Run-Up Operations

Squadron and maintenance personnel conduct various types of tests on aircraft engines at one or more power settings for certain lengths of time. These tests are termed maintenance 'run-ups'. During these operations, engines remain in the airframe of the aircraft (i.e., "in-frame" run-up) or are removed from the airframe (i.e., "out-of-frame" run-up). Only out-of-frame run-ups can be conducted on apparatus designed for the engines (called "test stands").

Consistent with the ILS study, no runups were modeled for the baseline scenario.

4.4 Aircraft Noise Exposure

Using the data described in Sections 4.1 through 4.3, INM was used to calculate and plot the 55 dB through 85 dB DNL contours for Baseline AAD operations at Kalaeloa Airport. Figure 4-5 shows the resulting DNL contours.

Off-station exposure would range from less than 55 dB DNL to greater than 65 dB DNL. The 55 dB DNL contour would exhibit a hook to the north extending less than 1000 feet beyond the station boundary due to departures to the north off of runway 04. The 55 dB DNL contour also extends approximately 1.5 miles east of the station boundary and curves south toward the ocean. The 60 dB DNL contour extends approximately 0.7 miles east of the station boundary curving slightly south. The 55 and 60 dB DNL contour to the east are driven by the departure and touch and go pattern operations off of runway 04. The 65 dB DNL contour extends less than 0.4 miles to the southwest of the station boundary and less than 500 feet to the west.

Figure 4-5 Aircraft DNL Contours for Baseline Scenario AAD Operations

5.0 Proposed Scenario

The proposed scenario for Kalaeloa Airport is identical to the Baseline scenario airfield operations with the addition of the HIARNG aircraft. Section 5.1 discusses flight operations by aircraft type. Section 5.2 discusses runway/helipad utilization, flight track utilization, flight profiles and daily operations by aircraft type. Section 5.3 describes maintenance run-up operations and Section 5.4 discusses the resultant average daily noise exposure.

5.1 Flight Operations

The proposed scenario is composed of the baseline operations plus the HIARNG operations. Table 5-1 shows the resultant set of flight operations by category, aircraft type and period of day. Total annual flight operations would be 157,290. HIARNG operation types include departures, instrument straight-in and visual arrivals, and touch and go patterns. HIARNG aircraft would contribute approximately 14,775 flight operations or approximately 9 percent of the total flight operations. The top users of the airfield would continue to be GA aircraft. The 9-hour nighttime period would account for 3 percent of total operations.

5.2 Runway and Flight Track Utilization, Flight Profiles and Annual Average Daily Operations

Tables 5-2 and 5-3 show the runway and flight track utilization percentages for the HIARNG aircraft as provided by the HIARNG for each operation type. Runway use would vary between day and nighttime periods. For example, during the nighttime, HIARNG helicopter departures would use Runway 04R for 90 percent of the operations and Runway 22L for 10 percent of the operations. During the daytime, 65 percent would use Runway 04R, 10 percent on Runway 22L, 10 percent on Runway 04L, 10 percent on Runway 22R and 5 percent on Runway 11. Track use would not vary significantly between day and nighttime periods. All other aircraft and flight tracks remain unchanged from the baseline scenario explained in Section 4.

Fixed-wing flight profiles consist of a combination of power settings, airspeeds and altitudes along each modeled flight track. Most rotary-wing flight profiles consist of a combination of airspeeds, altitudes and attitude along each modeled flight track. Attitude consists of roll, angle of attack and yaw angles (and nacelle angle for tilt rotor aircraft). This data defines the vertical profile (altitude) and performance profile (power setting and/or airspeed) and orientation for each modeled aircraft.

NOISEMAP was used to model the HIARNG CH-47 and C-26 flight operations. RNM was used to model the HIARNG H-60 and H-58/H-72 flight operations. As RNM does not contain reference acoustic data for the UH-60L/UH-60M, the SH-60B was used as a surrogate for this type. As RNM does not contain reference acoustic data for the OH-58/UH-72A, the TH-57 was used as a surrogate for these types. NOISEMAP and RNM were used instead of INM because of this primarily being a military noise study and because RNM is more accurate than INM in modeling rotary-wing aircraft.

Representative flight profiles were reviewed and approved by Kalaeloa ATC and HIARNG personnel for the CH-47, H-60, H-58/H-72 and C-26 aircraft. Representative flight profiles of all modeled aircraft types are graphically depicted in Appendix C.

Fixed-wing departure profiles can also be automatically modeled with a pre-flight run-up, conducted at the runway threshold prior to brake release. A 5-second max-power pre-flight run-up was modeled for the C-26 departures.

The next step in the noise modeling process is the computation of the AAD day and night events for each profile. This is accomplished by dividing the track operations by 365 and further dividing closed-pattern operations (e.g., touch-and-go, and GCA Box) by 2[3]. The resultant numbers of events are presented in Table 5-4. The proposed scenario models approximately 28 AAD HIARNG flight events in addition to the 254 from baseline aircraft.

5.3 Maintenance Run-Up Operations

HIARNG provided proposed maintenance run-up activity for their aircraft. Table 5-5 shows the HIARNG run-up operations and profiles, all of which would occur on the HIARNG ramps next to their hangars. This is north and near the approach end of Runway 22R. The proposed runups are primarily at idle power and would occur during the daytime period. None would occur during the nighttime (10 p.m. to 7 a.m.).

5.4 Aircraft Noise Exposure

Using the data described in Sections 5.1 through 5.3, output from NOISEMAP and RNM was combined with the (baseline) output of INM were used to plot the 55 dB through 85 dB DNL contours for the Prospective AAD operations at Kalaeloa Airport. Figure 5-1 shows the resulting DNL contours.

Off-station exposure would range from less than 55 dB DNL to greater than 65 dB DNL. The 55 dB DNL contour exhibits two hooks to the north extending less than 0.6 miles beyond the station boundary due primarily to touch and go pattern operations off of runway 04. The 55 dB DNL contour also extends approximately 1.5 miles east of the station boundary and curves south toward the ocean. The 60 dB DNL contour extends approximately 0.7 miles east of the station boundary curving slightly south. The 55 and 60 dB DNL contour to the east are driven by the departure and Touch and Go pattern operations off of runway 04. The 65 dB DNL contour extends less than 0.4 miles to the southwest of the station boundary and less than 500 feet to the west. That addition of the HIARNG runups at the ramp to the north of the airfield causes increased on station noise but only slightly increases the extent of the 55 and 60 dB DNL contours off station.

Figure 5-2 compares 65 dB and 75 dB DNL contours from the Prospective and Baseline scenarios. The Prospective scenario 65 and 75 dB DNL contours increase less than 500 feet to the north and south relative to the Baseline scenario contours due to the addition of the HIARNG flight operations. The most significant change is the increase in the both the 65 and 75 dB contours to the north due to the HIARNG maintenance runups however this increase is contained within the station boundary.

[3] The closed-pattern operations are divided by two for noise modeling purposes only. ATC counts closed patterns as two distinct operations: one departure and one arrival. In NOISEMAP and RNM, the departure and arrival are represented by one event because both operations are connected (i.e., on a single flight track).

Table 5-1 Prospective Annual Flight Operations

			Departure			Arrival			Touch and Go [1]			Grand Total		
Cat1	**cats combined**	**ACFT_ID**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**
Civilian	Civilian 2ETP	DHC6	168	5	173	173	5	178	712	24	736	1,053	34	1,087
Civilian	Civilian GA	BEC58P	6,440	198	6,638	6,440	200	6,640	17,084	527	17,611	29,964	925	30,889
Civilian	Civilian GA	CNA172	9,117	280	9,397	9,120	280	9,400	63,199	1,956	65,155	81,436	2,516	83,952
Civilian	Civilian Helo	CIVHEL	741	22	763	741	22	763	3,867	122	3,989	5,349	166	5,515
Civilian	Civilian Helo	HH65	1,505	41	1,546	1,505	44	1,549	3,550	117	3,667	6,560	202	6,762
Military	Military 4ETP	C130	1,502	46	1,548	1,502	46	1,548	3,550	107	3,657	6,554	199	6,753
Military	Military 4ETP	P3C	1,019	32	1,051	1,017	34	1,051	4,257	132	4,389	6,293	198	6,491
Military	Military Helo	MILHEL	168	2	170	168	2	170	702	24	726	1,038	28	1,066
HIARNG	HIARNG Helo	CH-47D	1,045	55	1,100	1,045	55	1,100	5,225	275	5,500	7,315	385	7,700
HIARNG	HIARNG Helo	UH-60L / UH-60M	520	28	548	520	28	548	2,602	143	2,745	3,642	199	3,841
HIARNG	HIARNG Helo	OH58 / UH72A	277	15	292	277	15	292	554	30	584	1,108	60	1,168
HIARNG	HIARNG FW	C-26E	978	-	978	978	-	978	110	-	110	2,066	-	2,066
	Subtotal													
	Civilian 2ETP		168	5	173	173	5	178	712	24	736	1,053	34	1,087
	Civilian GA		15,557	478	16,035	15,560	480	16,040	80,283	2,483	82,766	111,400	3,441	114,841
	Civilian Helo		2,246	63	2,309	2,246	66	2,312	7,417	239	7,656	11,909	368	12,277
	Military 4ETP		2,521	78	2,599	2,519	80	2,599	7,807	239	8,046	12,847	397	13,244
	Military Helo		168	2	170	168	2	170	702	24	726	1,038	28	1,066
	HIARNG FW		978	-	978	978	-	978	110	-	110	2,066	-	2,066
	HIARNG Helo		1,842	98	1,940	1,842	98	1,940	8,381	448	8,829	12,065	644	12,709
	Civilian		17,971	546	18,517	17,979	551	18,530	88,412	2,746	91,158	124,362	3,843	128,205
	Military		2,689	80	2,769	2,687	82	2,769	8,509	263	8,772	13,885	425	14,310
	HIARNG		2,820	98	2,918	2,820	98	2,918	8,491	448	8,939	14,131	644	14,775
	Total		23,480	724	24,204	23,486	731	24,217	105,412	3,457	108,869	152,378	4,912	157,290

Notes: (1) Touch and Go counted here as two operations (1 takeoff and 1 landing)

2ETP = two-engined turboprop

GA = general aviation

4ETP = four-engined turboprop

Day = 7am to 10pm; Night = 10pm - 7am

Table 5-2 Runway and Track Utilization for CH-47D, UH-60 and OH58

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Departure	04L	10%	0%	T4L1	75%	75%
				T4L2	15%	15%
				T4L7	10%	10%
	04L Total				100%	100%
	04R	65%	90%	T4R3	75%	75%
				T4R5		
				T4R6	25%	25%
				T4R8		
	04R Total				100%	100%
	22L	10%	10%	T2L3		
				T2L6	65%	65%
				T31	35%	35%
	22L Total				100%	100%
	22R	10%	0%	T2R1	35%	35%
				T2R2	65%	65%
				T2R9		
	22R Total				100%	100%
	11	5%	0%	T11D	100%	100%
	19 (pad)	0%	0%	H6B		
Arrival	04L	10%	0%	T4L4	65%	15%
				T4L5	15%	10%
				T4L6	15%	75%
				T4L8	5%	
	04L Total				100%	100%
	04R	60%	85%	T4R1	50%	30%
				T4R2	45%	70%
				T4R7	5%	
	04R Total				100%	100%
	22L	10%	10%	T2L1	60%	40%
				T2L2	10%	20%
				T2L5	15%	
				T2L9	15%	40%
	22L Total				100%	100%
	22R	10%	0%	T2R4	5%	20%
				T2R6	65%	40%
				T2R8	30%	40%
	22R Total				100%	100%
	01 (pad)	0%	0%	H6A		
	29	10%	5%	T29A	100%	100%
Touch and Go	04L	25%	0%	T4L3	100%	
	04R	45%	75%	T4R4	100%	100%
				T44R		
	04R Total				100%	100%
	22L	20%	25%	T2L4	100%	100%
				T34		
	22L Total				100%	100%
	22R	10%	0%	T2R3	100%	

Day = 7am to 10pm; Night = 10pm - 7am

Table 5-3 Runway and Track Utilization for C-26E

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Departure	04L	0%	0%	T4L1		
				T4L2		
				T4L7		
	04L Total					
	04R	83%	75%	T4R3		
				T4R5	90%	100%
				T4R6		
				T4R8	10%	
	04R Total				100%	100%
	22L	15%	15%	T2L3	91%	100%
				T2L6		
				T31	9%	
	22L Total				100%	100%
	22R	0%	0%	T2R1		
				T2R2		
				T2R9		
	22R Total					
	11	2%	0%	T11D	100%	100%
	19 (pad)	0%	0%	H6B		
Arrival	04L	0%	0%	T4L4		
				T4L5		
				T4L6		
				T4L8		
	04L Total					
	04R	83%	75%	T4R1		
				T4R2	10%	
				T4R7	90%	100%
	04R Total				100%	100%
	22L	15%	25%	T2L1		
				T2L2		
				T2L5	91%	100%
				T2L9	9%	
	22L Total				100%	100%
	22R	0%	0%	T2R4		
				T2R6		
				T2R8		
	22R Total				0%	0%
	01 (pad)	0%	0%	H6A	0%	0%
	29	2%	0%	T29A	100%	100%
Touch and Go	04L	0%	0%	T4L3	100%	
	04R	85%	85%	T4R4		
				T44R	100%	100%
	04R Total				100%	100%
	22L	15%	15%	T2L4		
				T34	100%	100%
	22L Total				100%	100%
	22R	0%	0%	T2R3		

Day = 7am to 10pm; Night = 10pm - 7am

Table 5-4 Modeled Annual Average Daily Flight Events for Proposed HIARNG Aircraft

Operation Type	Run-way	Flight Track ID	CH-47D			UH-60			OH58			C-26E			TOTAL		
			Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Departure	04L	T4L1	0.2147	-	0.2147	0.1068	-	0.1068	0.0569	-	0.0569	-	-	-	0.3784	-	0.3784
		T4L2	0.0429	-	0.0429	0.0214	-	0.0214	0.0114	-	0.0114	-	-	-	0.0757	-	0.0757
		T4L7	0.0286	-	0.0286	0.0142	-	0.0142	0.0076	-	0.0076	-	-	-	0.0504	-	0.0504
	04R	T4R3	1.3957	0.1017	1.4974	0.6945	0.0518	0.7463	0.3700	0.0277	0.3977	-	-	-	2.4602	0.1812	2.6414
		T4R5	-	-	-	-	-	-	-	-	-	2.0016	-	2.0016	2.0016	-	2.0016
		T4R6	0.4652	0.0339	0.4991	0.2315	0.0173	0.2488	0.1233	0.0092	0.1325	-	-	-	0.8200	0.0604	0.8804
		T4R8	-	-	-	-	-	-	-	-	-	0.2224	-	0.2224	0.2224	-	0.2224
	22L	T2L3	-	-	-	-	-	-	-	-	-	0.3657	-	0.3657	0.3657	-	0.3657
		T2L6	0.1861	0.0098	0.1959	0.0926	0.0050	0.0976	0.0493	0.0027	0.0520	-	-	-	0.3280	0.0175	0.3455
		T31	0.1002	0.0053	0.1055	0.0499	0.0027	0.0526	0.0266	0.0014	0.0280	0.0362	-	0.0362	0.2129	0.0094	0.2223
	22R	T2R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		T2R2	0.1002	-	0.1002	0.0499	-	0.0499	0.0266	-	0.0266	-	-	-	0.1767	-	0.1767
		T2R9	0.1861	-	0.1861	0.0926	-	0.0926	0.0493	-	0.0493	-	-	-	0.3280	-	0.3280
	11	T11D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19 (pad)	H6B	0.1432	-	0.1432	0.0712	-	0.0712	0.0379	-	0.0379	0.0536	-	0.0536	0.3059	-	0.3059
Non-break Arrival	04L	T4L4	0.1861	-	0.1861	0.0926	-	0.0926	0.0493	-	0.0493	-	-	-	0.3280	-	0.3280
		T4L5	0.0429	-	0.0429	0.0214	-	0.0214	0.0114	-	0.0114	-	-	-	0.0757	-	0.0757
		T4L6	0.0429	-	0.0429	0.0214	-	0.0214	0.0114	-	0.0114	-	-	-	0.0757	-	0.0757
		T4L8	0.0143	-	0.0143	0.0071	-	0.0071	0.0038	-	0.0038	-	-	-	0.0252	-	0.0252
	04R	T4R1	0.8589	0.0384	0.8973	0.4274	0.0196	0.4470	0.2277	0.0105	0.2382	-	-	-	1.5140	0.0685	1.5825
		T4R2	0.7730	0.0897	0.8627	0.3847	0.0456	0.4303	0.2049	0.0245	0.2294	0.2224	-	0.2224	1.5850	0.1598	1.7448
		T4R7	0.0859	-	0.0859	0.0427	-	0.0427	0.0228	-	0.0228	2.0016	-	2.0016	2.1530	-	2.1530
	22L	T2L1	0.1718	0.0060	0.1778	0.0855	0.0031	0.0886	0.0455	0.0016	0.0471	-	-	-	0.3028	0.0107	0.3135
		T2L2	0.0286	0.0030	0.0316	0.0142	0.0015	0.0157	0.0076	0.0008	0.0084	-	-	-	0.0504	0.0053	0.0557
		T2L5	0.0429	-	0.0429	0.0214	-	0.0214	0.0114	-	0.0114	0.3657	-	0.3657	0.4414	-	0.4414
		T2L9	0.0429	0.0060	0.0489	0.0214	0.0031	0.0245	0.0114	0.0016	0.0130	0.0362	-	0.0362	0.1119	0.0107	0.1226
	22R	T2R4	0.0143	-	0.0143	0.0071	-	0.0071	0.0038	-	0.0038	-	-	-	0.0252	-	0.0252
		T2R6	0.1861	-	0.1861	0.0926	-	0.0926	0.0493	-	0.0493	-	-	-	0.3280	-	0.3280
		T2R8	0.0859	-	0.0859	0.0427	-	0.0427	0.0228	-	0.0228	-	-	-	0.1514	-	0.1514
	01 (pad)	H6A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	29	T29A	0.2863	0.0075	0.2938	0.1425	0.0038	0.1463	0.0759	0.0021	0.0780	0.0536	-	0.0536	0.5583	0.0134	0.5717
Touch and Go	04L	T4L3	1.7894	-	1.7894	0.8911	-	0.8911	0.1897	-	0.1897	-	-	-	2.8702	-	2.8702
	04R	T4R4	3.2209	0.2825	3.5034	1.6040	0.1469	1.7509	0.3415	0.0308	0.3723	-	-	-	5.1664	0.4602	5.6266
		T44R	-	-	-	-	-	-	-	-	-	0.1281	-	0.1281	0.1281	-	0.1281
	22L	T2L4	1.4315	0.0942	1.5257	0.7129	0.0490	0.7619	0.1518	0.0103	0.1621	-	-	-	2.2962	0.1535	2.4497
		T34	-	-	-	-	-	-	-	-	-	0.0226	-	0.0226	0.0226	-	0.0226
	22R	T2R3	0.7158	-	0.7158	0.3564	-	0.3564	0.0759	-	0.0759	-	-	-	1.1481	-	1.1481
Departure			2.8629	0.1507	3.0136	1.4246	0.0768	1.5014	0.7589	0.0410	0.7999	2.6795	-	2.6795	7.7259	0.2685	7.9944
Non-break Arrival			2.8628	0.1506	3.0134	1.4247	0.0767	1.5014	0.7590	0.0411	0.8001	2.6795	-	2.6795	7.7260	0.2684	7.9944
Touch and Go			7.1576	0.3767	7.5343	3.5644	0.1959	3.7603	0.7589	0.0411	0.8000	0.1507	-	0.1507	11.6316	0.6137	12.2453
Total			12.8833	0.6780	13.5613	6.4137	0.3494	6.7631	2.2768	0.1232	2.4000	5.5097	-	5.5097	27.0835	1.1506	28.2341

Note: Day=0700-2200; Night=2200-0659 local

Table 5-5 Modeled Proposed Runup Operations

Aircraft Type	Engine Type	Number of Aircraft	Location	Heading (Degrees)	Runup Profile			Annual Operations (6)		
					Power Condition (1)	Duration (Minutes)	# of Engines Running	Total	Day	Night
CH47D	GA 714	10	Park Pad	315 true	Ground Idle	45	2	6189	100%	0%
					Flight Idle	30	2	5631	100%	0%
	APU (2)				Full	30	1	2522	100%	0%
UH60M (3)	Turbine	5			Ground Idle	25	2	3067	100%	0%
					Flight Idle	30	2	2693	100%	0%
	APU (4)				Full	25	1	1166	100%	0%
OH58	Turbine	2			Ground Idle	15	1	167	100%	0%
					Flight Idle	15	1	114	100%	0%
C26 (5)	Turbine	1			Flight Idle	25	2	55	100%	0%

(1) For CH47, UH60 and OH58, Ground Idle modeled as idle LITE (i.e., lightly loaded); Flight Idle modeled as idle LITE (i.e., lightly loaded)

(2) modeled as OH-58 idle LITE (i.e., lightly loaded) runup noise source

(3) modeled with UH-60A

(4) modeled as OH58 idle LITE (i.e., lightly loaded) runup noise source but with operations halved to approximate the UH60 APU being anecdotally "half as loud" as the CH47 APU (per the HIARNG)

(5) modeled as E-2C

(6) Day = 0700 - 2200; Night = 2200 - 0700

Figure 5-1 Aircraft DNL Contours for Prospective Scenario AAD Operations

Figure 5-2 Comparison of Selected Baseline and Prospective Aircraft DNL Contours for Average Daily Operations at Kalaeloa Airport

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6.0 Alternative Scenario

The alternative scenario for Kalaeloa Airport is identical to the Proposed scenario except for a change in the HIARNG maintenance run-up location. Figure 3-2 shows the Alternative location being southwest of the Proposed scenario's location. Table 6-1 is identical to Table 5-5 except that it denotes the HIARNG run-ups at the Alternative's location.

Using the data described in Sections 5.1 through 5.3 but with the Alternative run-up location shown in Figure 3-2, output from NOISEMAP and RNM was combined with the (baseline) output of INM were used to plot the 55 dB through 85 dB DNL contours for the Alternative AAD operations at Kalaeloa Airport. Figure 6-1 shows the resulting DNL contours.

Off-station exposure would range from less than 55 dB DNL to greater than 65 dB DNL. The 55 dB DNL contour exhibits two hooks to the north extending less than 0.6 miles beyond the station boundary due primarily to touch and go pattern operations off of runway 04. The 55 dB DNL contour also extends approximately 1.5 miles east of the station boundary and curves south toward the ocean. The 60 dB DNL contour extends approximately 0.7 miles east of the station boundary curving slightly south. The 55 and 60 dB DNL contour to the east are driven by the departure and Touch and Go pattern operations off of runway 04. The 65 dB DNL contour extends less than 0.4 miles to the southwest of the station boundary and less than 500 feet to the west. The addition of the HIARNG runups at the ramp to the north of the airfield causes increased on station noise but only slightly increases the extent of the 55 and 60 dB DNL contours off station. The Alternative scenario DNL contours would differ from the Proposed scenario contours only in the area around the maintenance runups. The Alternative scenario shifts the modeled HIARNG maintenance runups approximately 2,000 feet to the west of the Proposed scenario location and causes a slight shift to the west of the 55 and 60 dB DNL contours off station.

Figure 6-1 Alternative DNL at Kalaeloa Airport

References

ANSI (American National Standards Institute). 1988. "*Quantities and Procedures for Description and Measurement of Environmental Sound, Part 1*". ANSI Standard S12.9-1988.

Czech, J.J., K.J. Plotkin. 1988. "*NMAP 7.0 User's Manual*. Wyle Research Report WR 98-13. Wyle Laboratories, Inc. November 1988.

Department of the Army (DoA). 2007. Hawaii Army National Guard Statewide Operational Noise Management Plan, prepared by Operational Noise Program, Directorate of Environmental Health Engineering, US Army Center for Health Promotion and Preventive Medicine (Aberdeen, MD), May.

Department of Transportation (DoT). 2005. Final Environmental Assessment and Finding of No Significant Impact / Record of Decision (FONSI/ROD), Proposed Construction and Operation of an Instrument Landing System for Runway 04R at Kalaeloa Airport, Kapolei, Island of Oahu, Hawaii. US Department of Transportation, Federal Aviation Administration, Western Pacific Region. August.

Edge and Cawthorn. 1976. Edge, P.M., Jr., and Cawthorn, J.M., "*Selected Methods for Quantification of Community Exposure to Aircraft Noise*", NASA TN D-7977. February 1976.

Kryter, K.D. 1959. "*Scaling Human Reactions to the Sound From Aircraft*", J. Acoust. Soc. Am., 31, 1959, 1415-1429.

Kalaeloa Airport. 2009. Air Traffic Control Activity Reports for CY2008, CY2007 and CY2006. CY2005 input from Norman Simpson, Air Traffic Manager. September.

NATO. 2000. TBD.

Page, J.A., C. Wilmer, and K.J. Plotkin. 2008. *Rotorcraft Noise Model Technical Reference and User Manual (Version 7.1)*. Wyle Report WR 08-04, Wyle Laboratories, Inc. February 2008.

Wasmer Consulting. 2006a. "*BaseOps 7.3 User's Guide*". Fred Wasmer and Fiona Maunsell. Wasmer Consulting. 2006.

Wasmer Consulting. 2006b. "*NMPlot 4.955 User's Guide*". Fred Wasmer and Fiona Maunsell. Wasmer Consulting. 2006.

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APPENDIX A

Discussion of Noise and Its Effect on the Environment

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A.1 Basics of Sound

Noise is unwanted sound. Sound is all around us; sound becomes noise when it interferes with normal activities, such as sleep or conversation.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant (e.g., music) or unpleasant (e.g., jackhammers) depends largely on the listener's current activity, past experience, and attitude toward the source of that sound.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration. First, intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound. The second important physical characteristic of sound is frequency, which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. The third important characteristic of sound is duration or the length of time the sound can be detected.

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. Because of this vast range, using a linear scale to represent the intensity of sound becomes very unwieldy. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995).

Because of the logarithmic nature of the decibel unit, sound levels cannot be arithmetically added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

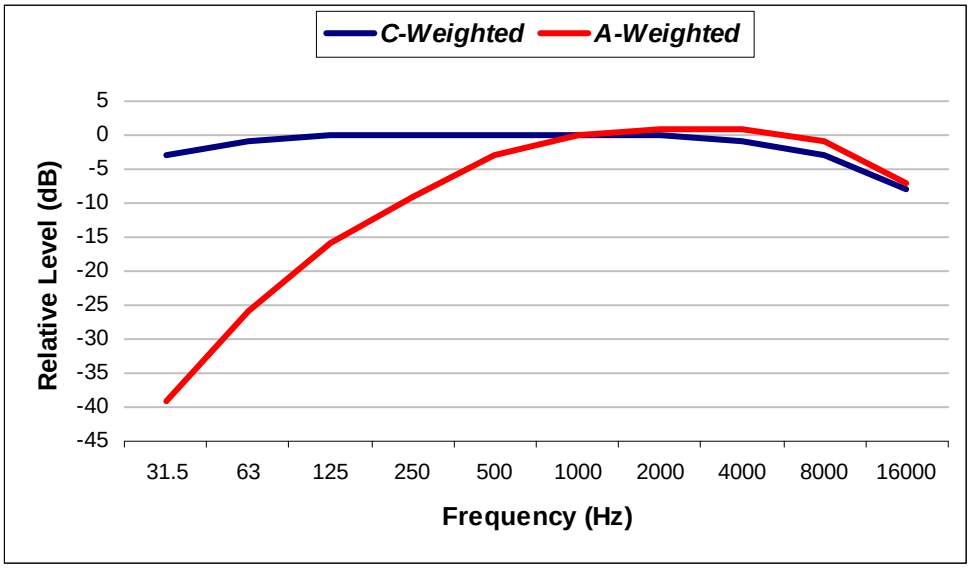
Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels is different than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness, and this relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90% decrease in sound intensity but only a 50% decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses).

Sound frequency is measured in terms of cycles per second (cps), or hertz (Hz), which is the standard unit for cps. The normal human ear can detect sounds that range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. A-weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear's lower sensitivities to those frequencies. C-weighting is nearly flat throughout the range of audible frequencies, hardly de-emphasizing the low frequency sound while approximating the human ear's sensitivity to higher intensity sounds. The two curves shown in Figure A-1 are also the most adequate to quantify environmental noises.



Source: ANSI S1.4 -1983 "Specification of Sound Level Meters"

Figure A-1. Frequency Response Characteristics of A and C Weighting Networks

A.1.1 A-weighted Sound Level

Sound levels that are measured using A-weighting, called A-weighted sound levels, are often denoted by the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the adjective "A-weighted" is often omitted and the measurements are expressed as dB. In this report (as in most environmental impact documents), dB units refer to A-weighted sound levels.

Noise potentially becomes an issue when its intensity exceeds the ambient or background sound pressures. Ambient background noise in metropolitan, urbanized areas typically varies from 60 to 70 B and can be as high as 80 dB or greater; quiet suburban neighborhoods experience ambient noise levels of approximately 45-50 dB (U.S. Environmental Protection Agency 1978).

Figure A-2 is a chart of A-weighted sound levels from typical sounds. Some noise sources (air conditioner, vacuum cleaner) are continuous sounds which levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle pass-by. Some (urban daytime, urban nighttime) are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods, as discussed below.

Aircraft noise consists of two major types of sound events: aircraft takeoffs and landings, and engine maintenance operations. The former can be described as intermittent sounds and the latter as continuous. Noise levels from flight operations exceeding background noise typically occur beneath main approach and departure corridors, in local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower levels, often becoming indistinguishable from the background.

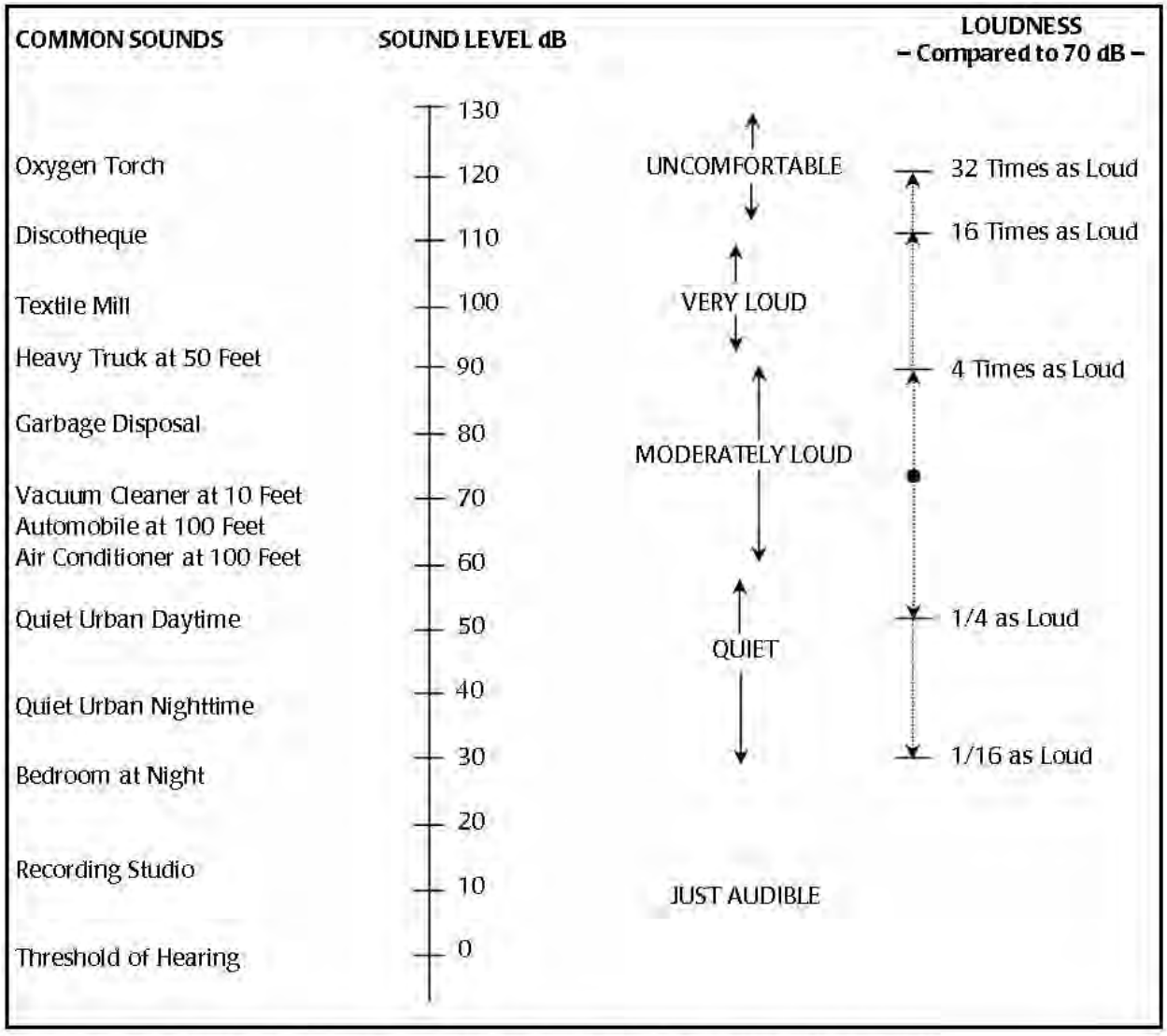
C-weighted Sound Level

Sound levels measured using a C-weighting are most appropriately called C-weighted sound levels (and denoted dBC). C-weighting is nearly flat throughout the audible frequency range, hardly de-mphasizing the low frequency. This weighting scale is generally used to describe impulsive sounds. Sounds that are characterized as impulsive generally contain low frequencies. Impulsive sounds may induce secondary effects, such as shaking of a structure, rattling of windows, inducing vibrations. These secondary effects can cause additional annoyance and complaints.

The following definitions in the American National Standard Institute (ANSI) Report S12.9, Part 4 provide general concepts helpful in understanding impulsive sounds (American National Standards Institute 1996).

Impulsive Sound: Sound characterized by brief excursions of sound pressure (acoustic impulses) that significantly exceeds the ambient environmental sound pressure. The duration of a single impulsive sound is usually less than one second (American National Standards Institute 1996).

Highly Impulsive Sound: Sound from one of the following enumerated categories of sound sources: small-arms gunfire, metal hammering, wood hammering, drop hammering, pile driving, drop forging, pneumatic hammering, pavement breaking, metal impacts during rail-yard shunting operation, and riveting.



Source: *Handbook of Noise Control*, C.M. Harris, Editor, McGraw-Hill Book Co., 1979, and FICAN 1992.

Figure A-2. Typical A-weighted Sound Levels of Common Sounds

High-energy Impulsive Sound: Sound from one of the following enumerated categories of sound sources: quarry and mining explosions, sonic booms, demolition and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, explosive industrial circuit breakers, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams.

A.2 Noise Metrics

As used in environmental noise analyses, a metric refers to the unit or quantity that quantitatively measures the effect of noise on the environment. To quantify these effects, the Department of Defense and the Federal Aviation Administration use three noise-measuring techniques, or metrics: first, a measure of the highest sound level occurring during an individual aircraft overflight (single event); second, a combination of the maximum level of that single event with its duration; and third, a description of the noise environment based on the cumulative flight and engine maintenance activity. Single noise events can be described with Sound Exposure Level or Maximum Sound Level. Another measure of instantaneous level is the Peak Sound Pressure Level. The cumulative energy noise metric used is the Day/Night Average Sound Level. Metrics related to DNL include the Onset-Rate Adjusted Day/Night Average Sound Level, and the Equivalent Sound Level. In the state of California, it is mandated that average noise be described in terms of Community Noise Equivalent Level (State of California 1990). CNEL represents the Day/Evening/Night average noise exposure, calculated over a 24-hour period. Metrics and their uses are described below.

A.2.1 Maximum Sound Level (L_{max})

The highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level.

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. The maximum sound level indicates the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally 1/8 second, and is denoted as "fast" response (American National Standards Institute 1988). Slowly varying or steady sounds are generally measured over a period of one second, denoted "slow" response. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

A.2.2 Peak Sound Pressure Level (L_{pk})

The peak sound pressure level, is the highest instantaneous level obtained by a sound level measurement device. The peak sound pressure level is typically measured using a 20 microseconds or faster sampling rate, and is typically based on unweighted or linear response of the meter.

A.2.3 Sound Exposure Level (SEL)

Sound exposure level is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL would

include both the maximum noise level and the lower noise levels produced during onset and recess periods of the overflight.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of a constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For sound from aircraft overflights, which typically lasts more than one second, the SEL is usually greater than the L_{max} because an individual overflight takes seconds and the maximum sound level (L_{max}) occurs instantaneously. SEL represents the best metric to compare noise levels from overflights.

A.2.4 Day-Night Average Sound Level (DNL) and Community Noise Equivalent Level (CNEL)

Day-Night Average Sound Level and Community Noise Equivalent Level are composite metrics that account for SEL of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to nighttime events (10:00 p.m. to 7:00 a.m. time period). A variant of the DNL, the CNEL level includes a 5-decibel penalty on noise during the 7:00 p.m. to 10:00 p.m. time period, and a 10-decibel penalty on noise during the 10:00 p.m. to 7:00 a.m. time period.

The above-described metrics are average quantities, mathematically representing the continuous A-weighted or C-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. These composite metrics account for the maximum noise levels, the duration of the events (sorties or operations), and the number of events that occur over a 24-hour period. Like SEL, neither DNL nor CNEL represent the sound level heard at any particular time, but quantifies the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure.

The penalties added to both the DNL and CNEL metrics account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

The inclusion of daytime and nighttime periods in the computation of the DNL and CNEL reflects their basic 24-hour definition. It can, however, be applied over periods of multiple days. For application to civil airports, where operations are consistent from day to day, DNL and CNEL are usually applied as an annual average. For some military airbases, where operations are not necessarily consistent from day to day, a common practice is to compute a 24-hour DNL or CNEL based on an average busy day, so that the calculated noise is not diluted by periods of low activity.

Although DNL and CNEL provide a single measure of overall noise impact, they do not provide specific information on the number of noise events or the individual sound levels that occur during the 24-hour day. For example, a daily average sound level of 65 dB could result from a very few noisy events or a large number of quieter events.

Daily average sound levels are typically used for the evaluation of community noise effects (i.e., long-term annoyance), and particularly aircraft noise effects. In general, scientific studies and social surveys have found a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (U.S. Environmental Protection Agency 1978 and Schultz 1978). The correlation from Schultz's original 1978 study is shown in Figure A-3. It represents the results of a large number of social surveys relating community responses to various types of noises, measured in day-night average sound level.

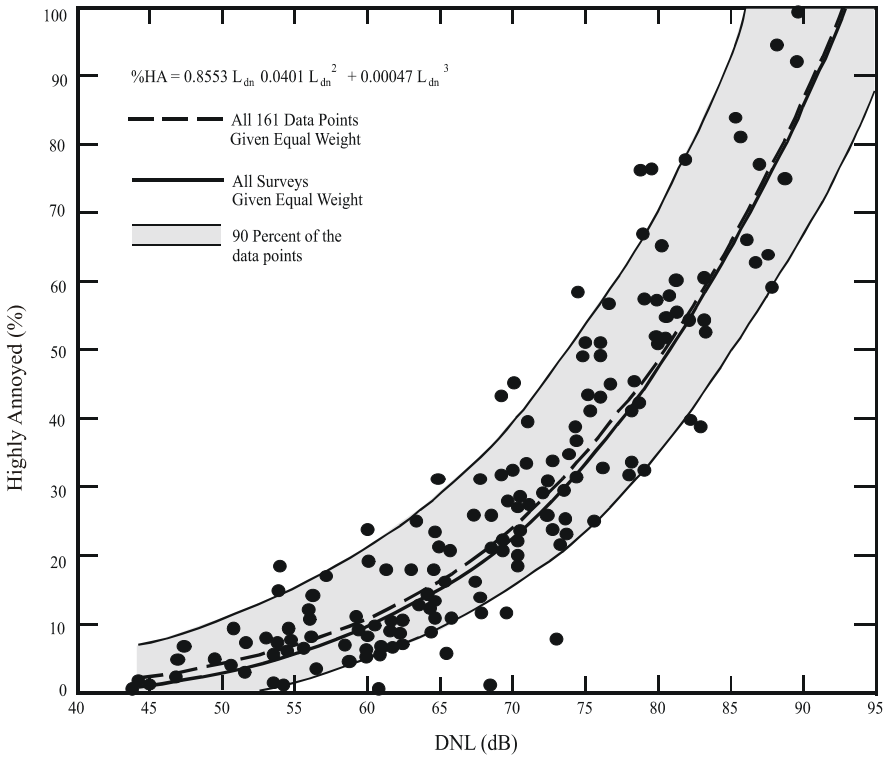


Figure A-3. Community Surveys of Noise Annoyance

A more recent study has reaffirmed this relationship (Fidell, et al. 1991). Figure A-4 (Federal Interagency Committee On Noise 1992) shows an updated form of the curve fit (Finegold, et al. 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. However, for the evaluation of community noise impacts, the scientific community has endorsed the use of DNL (American National Standards Institute 1980; American National Standards Institute 1988; U.S. Environmental Protection Agency 1974; Federal Interagency Committee On Urban Noise 1980 and Federal Interagency Committee On Noise 1992).

The use of DNL (CNEL in California) has been criticized as not accurately representing community annoyance and land-use compatibility with aircraft noise. Much of that criticism stems from a lack of understanding of the basis for the measurement or calculation of DNL. One frequent criticism is based

on the inherent feeling that people react more to single noise events and not as much to "meaningless" time-average sound levels.

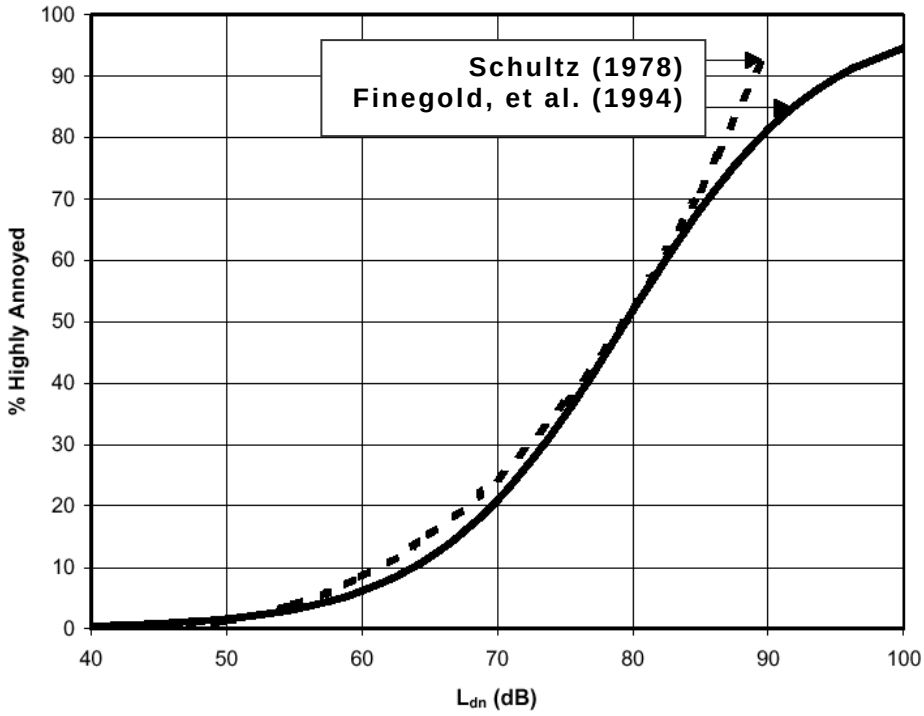


Figure A-4. Response of Communities to Noise; Comparison of Original (Schultz, 1978) and Current (Finegold, et al. 1994) Curve Fits

In fact, a time-average noise metric, such as DNL and CNEL, takes into account both the noise levels of all individual events that occur during a 24-hour period and the number of times those events occur. The logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The day-night average sound level for this 24-hour period is 65.9 dB. Assume, as a second example, that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The day-night average sound level for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

A.2.5 Equivalent Sound Level (L_{eq})

Another cumulative noise metric that is useful in describing noise is the equivalent sound level. L_{eq} is calculated to determine the steady-state noise level over a specified time period. The L_{eq} metric can provide a more accurate quantification of noise exposure for a specific period, particularly for daytime periods when the nighttime penalty under the DNL metric is inappropriate.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while L_{eq} is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise. For example, the sum of all noise-generating events during the period of 7 a.m. to 4 p.m. could provide the relative impact of noise generating events for a school day.

A.2.6 Rate Adjusted Day-Night Average Sound Level (L_{dnr})

Military aircraft flying on Military Training Routes (MTRs) and in Restricted Areas/Ranges generate a noise environment that is somewhat different from that associated with airfield operations. As opposed to patterned or continuous noise environments associated with airfields, overflights along MTRs are highly sporadic, ranging from 10 per hour to less than one per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, exhibiting a rate of increase in sound level (onset rate) of up to 150 dB per second.

To represent these differences, the conventional SEL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans with an adjustment ranging up to 11 dB above the normal Sound Exposure Level (Stusnick, et al. 1992). Onset rates between 15 to 150 dB per second require an adjustment of 0 to 11 dB, while onset rates below 15 dB per second require no adjustment. The adjusted SEL is designated as the onset-rate adjusted sound exposure level (SEL_r).

Because of the sporadic, often seasonal, occurrences of aircraft overflights along MTRs and in Restricted Areas/Ranges, the number of daily operations is determined from the number of flying days in the calendar month with the highest number of operations in the affected airspace or MTR. This avoids dilution of the exposure from periods of low activity, much the way that the average busy day is used around military airbases. The cumulative exposure to noise in these areas is computed by DNL over the busy month, but using SEL_r instead of SEL. This monthly average is denoted L_{dnmr}. If onset rate adjusted DNL is computed over a period other than a month, it would be designated L_{dnr} and the period must be specified. In the state of California, a variant of the L_{dnmr} includes a penalty for evening operations (7 p.m. to 10 p.m) and is denoted $CNEL_{mr}$.

A.3 Noise Effects

A.3.1 Annoyance

The primary effect of aircraft noise on exposed communities is one of long-term annoyance. Noise annoyance is defined by the EPA as any negative subjective reaction on the part of an individual or group (U.S. Environmental Protection Agency 1974). As noted in the discussion of DNL above, community annoyance is best measured by that metric.

The results of attitudinal surveys, conducted to find percentages of people who express various degrees of annoyance when exposed to different levels of DNL, are very consistent. The most useful metric for assessing people's responses to noise impacts is the percentage of the exposed population expected to be "highly annoyed." A wide variety of responses have been used to determine intrusiveness of noise and disturbances of speech, sleep, television or radio listening, and outdoor

living. The concept of "percent highly annoyed" has provided the most consistent response of a community to a particular noise environment. The response is remarkably complex, and when considered on an individual basis, widely varies for any given noise level (Federal Interagency Committee On Noise 1992).

A number of nonacoustic factors have been identified that may influence the annoyance response of an individual. Newman and Beattie (1985) divided these factors into emotional and physical variables:

Emotional Variables

- Feelings about the necessity or preventability of the noise;
- Judgment of the importance and value of the activity that is producing the noise;
- Activity at the time an individual hears the noise;
- Attitude about the environment;
- General sensitivity to noise;
- Belief about the effect of noise on health; and
- Feeling of fear associated with the noise.

Physical Variables

- Type of neighborhood;
- Time of day;
- Season;
- Predictability of noise;
- Control over the noise source; and
- Length of time an individual is exposed to a noise.

A.3.2 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Speech is an acoustic signal characterized by rapid fluctuations in sound level and frequency pattern. It is essential for optimum speech intelligibility to recognize these continually shifting sound patterns. Not only does noise diminish the ability to perceive the auditory signal, but it also reduces a listener's ability to follow the pattern of signal fluctuation. In general, interference with speech communication occurs when intrusive noise exceeds about 60 dB (Federal Interagency Committee On Noise 1992).

Indoor speech interference can be expressed as a percentage of sentence intelligibility among two people speaking in relaxed conversation approximately 3 feet apart in a typical living room or bedroom (U.S. Environmental Protection Agency 1974). The percentage of sentence intelligibility is a non-linear function of the (steady) indoor background A-weighted sound level. Such a curve-fit yields 100 percent sentence intelligibility for background levels below 57 dB and yields less than 10 percent intelligibility for background levels above 73 dB. The function is especially sensitive to changes in sound level between 65 dB and 75 dB. As an example of the sensitivity, a 1 dB increase in background sound level from 70 dB to 71 dB yields a 14 percent decrease in sentence intelligibility. The sensitivity of speech interference to noise at 65 dB and above is consistent with the criterion of DNL 65 dB

generally taken from the Schultz curve. This is consistent with the observation that speech interference is the primary cause of annoyance.

A.3.3 Sleep Interference

Sleep interference is another source of annoyance and potential health concern associated with aircraft noise. Because of the intermittent nature and content of aircraft noise, it is more disturbing than continuous noise of equal energy. Given that quality sleep is requisite for good health, repeated occurrences of sleep interference could have an effect on overall health.

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors that include age, sex, sleep stage, noise level, frequency of noise occurrences, noise quality, and pre-sleep activity. Because individuals differ in their physiology, behavior, habitation, and ability to adapt to noise, few studies have attempted to establish noise criterion levels for sleep disturbance.

Lukas (1978) concluded the following with regard to human sleep response to noise:

- Children 5 to 8 years of age are generally unaffected by noise during sleep.
- Older people are more sensitive to sleep disturbance than younger people.
- Women are more sensitive to noise than men, in general.
- There is a wide variation in the sensitivity of individuals to noise even within the same age group.
- Sleep arousal is directly proportional to the sound intensity of aircraft flyover. While there have been several studies conducted to assess the effect of aircraft noise on sleep, none have produced quantitative dose-response relationships in terms of noise exposure level, DNL, and sleep disturbance. Noise-sleep disturbance relationships have been developed based on single-event noise exposure.

An analysis sponsored by the U.S. Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons, et al. 1989). The analysis concluded that a lack of reliable studies in homes, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced in the home. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur under normal community conditions.

A study of the effects of nighttime noise exposure on the in-home sleep of residents near one military airbase, near one civil airport, and in several households with negligible nighttime aircraft noise exposure, revealed SEL as the best noise metric predicting noise-related awakenings. It also determined that out of 930 subject nights, the average spontaneous (not noise-related) awakenings per

night was 2.07 compared to the average number of noise-related awakenings per night of 0.24 (Fidell, et al. 1994). Additionally, a 1995 analysis of sleep disturbance studies conducted both in the laboratory environment and in the field (in the sleeping quarters of homes) showed that when measuring awakening to noise, a 10 dB increase in SEL was associated with only an 8 percent increase in the probability of awakening in the laboratory studies, but only a 1 percent increase in the field (Pearsons, et al. 1995). Pearsons, et al. (1995), reported that even SEL values as high as 85 dB produced no awakenings or arousals in at least one study. This observation suggests a strong influence of habituation on susceptibility to noise-induced sleep disturbance. A 1984 study (Kryter 1984) indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of exposed individuals.

Nevertheless, some guidance is available in judging sleep interference. The EPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (U.S. Environmental Protection Agency 1978). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor day-night average sound level of 65 dB to minimize sleep interference.

In 1997, the Federal Interagency Committee on Aviation Noise (FICAN) adopted an interim guideline for sleep awakening prediction. The new curve, based on studies in England (Ollerhead, et al. 1992) and at two U.S. airports (Los Angeles International and Denver International), concluded that the incidence of sleep awakening from aircraft noise was less than identified in a 1992 study (Federal Interagency Committee On Noise 1992). Using indoor single-event noise levels represented by SEL, potential sleep awakening can be predicted using the curve presented in Figure A-5. Typically, homes in the United States provide 15 dB of sound attenuation with windows open and 25 dB with windows closed and air conditioning operating. Hence, the outdoor SEL of 107 dB would be 92 dB indoors with windows open and 82 dB indoors with windows closed and air conditioning operating.

Using Figure A-5, the potential sleep awakening would be 15% with windows open and 10% with windows closed in the above example.

The new FICAN curve does not address habituation over time by sleeping subjects and is applicable only to adult populations. Nevertheless, this curve provides a reasonable guideline for assessing sleep awakening. It is conservative, representing the upper envelope of field study results.

The FICAN curve shown in Figure A-5 represents awakenings from single events. To date, no exact quantitative dose-response relationship exists for noise-related sleep interference from multiple events; yet, based on studies conducted to date and the USEPA guideline of a 45 DNL to protect sleep interference, useful ways to assess sleep interference have emerged. If homes are conservatively estimated to have a 20-dB noise insulation, an average of 65 DNL would produce an indoor level of 45 DNL and would form a reasonable guideline for evaluating sleep interference. This also corresponds well to the general guideline for assessing speech interference. Annoyance that may result from sleep disturbance is accounted for in the calculation of DNL, which includes a 10-dB penalty for each sortie occurring after 10 pm or before 7 am.

A.3.4 Hearing Loss

Considerable data on hearing loss have been collected and analyzed. It has been well established that continuous exposure to high noise levels will damage human hearing (U.S. Environmental Protection Agency 1978). People are normally capable of hearing up to 120 dB over a wide frequency range. Hearing loss is generally interpreted as the shifting of a higher sound level of the ear's sensitivity or

acuity to perceive sound. This change can either be temporary, called a temporary threshold shift (TTS), or permanent, called a permanent threshold shift (PTS) (Berger, et al. 1995).

The EPA has established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96% of the population from greater than a 5 dB PTS (U.S. Environmental Protection Agency 1978). Similarly, the National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) identified 75 dB as the minimum level at which hearing loss may occur (Committee on Hearing, Bioacoustics, and Biomechanics 1977). However, it is important to note that continuous, long-term (40 years) exposure is assumed by both EPA and CHABA before hearing loss may occur.

Federal workplace standards for protection from hearing loss allow a time-average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period. Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is a time-average sound level of 70 dB over a 24-hour period.

Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985).

A laboratory study measured changes in human hearing from noise representative of low-flying aircraft on MTRs. (Nixon, et al. 1993). In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. One-half of the subjects showed no change in hearing levels, one-fourth had a temporary 5-dB increase in sensitivity (the people could hear a 5-dB wider range of sound than before exposure), and one-fourth had a temporary 5-dB decrease in sensitivity (the people could hear a 5-dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts resulted in the participants hearing a wider range of sound, but within 10 dB of their original range.

In another study of 115 test subjects between 18 and 50 years old, temporary threshold shifts were measured after laboratory exposure to military low-altitude flight (MLAF) noise (Ising, et al. 1999). According to the authors, the results indicate that repeated exposure to MLAF noise with L_{max} greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise induced hearing loss in humans.

Because it is unlikely that airport neighbors will remain outside their homes 24 hours per day for extended periods of time, there is little possibility of hearing loss below a day-night average sound level of 75 dB, and this level is extremely conservative.

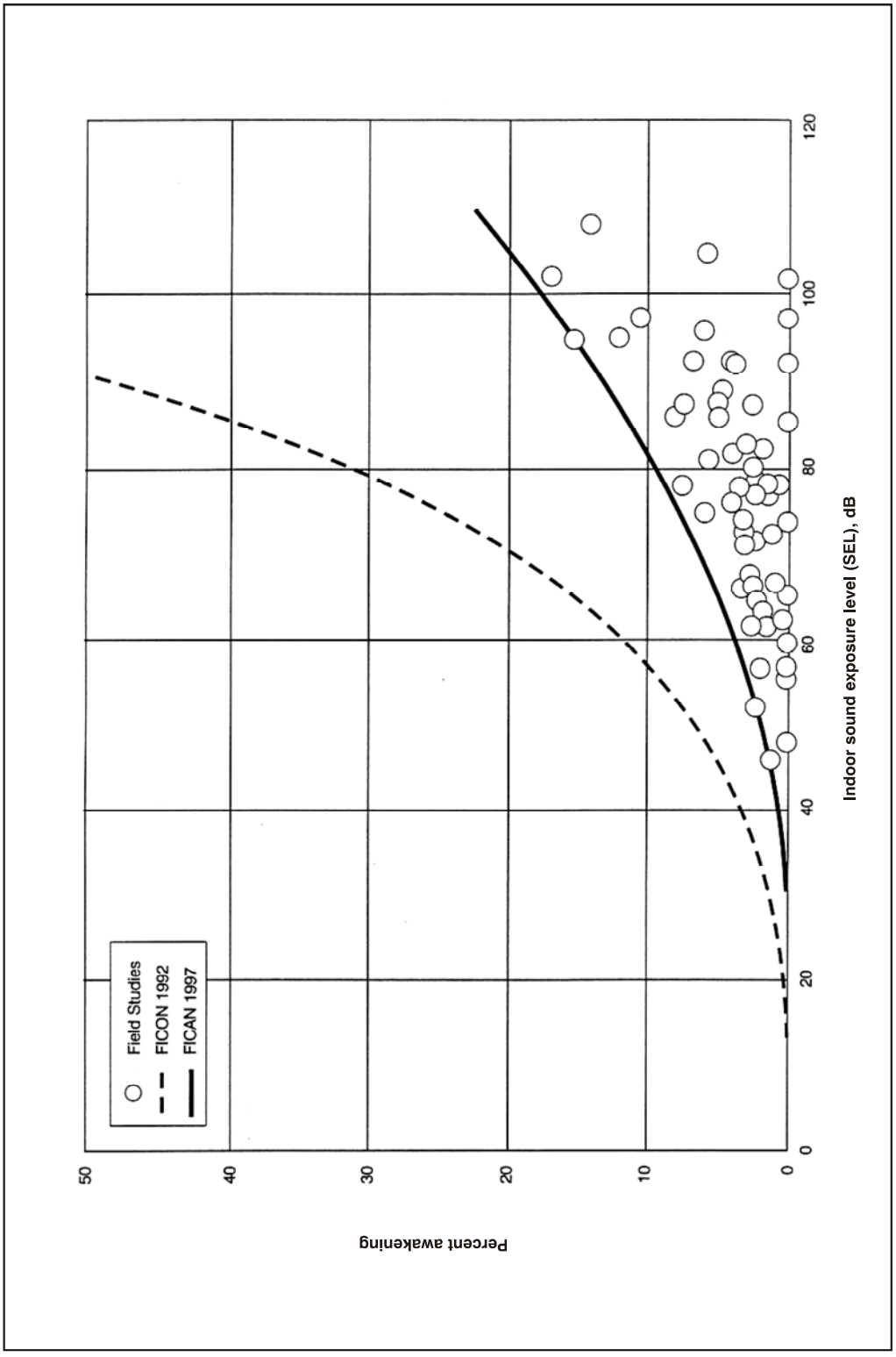


Figure A-5. Recommended Sleep Disturbance Dose-Response Relationship

A.3.5 Nonauditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. The results of studies conducted in the United States, primarily concentrating on cardiovascular response to noise, have been contradictory (Cantrell 1974). Cantrell (1974) concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body." Psychological stresses may cause a physiological stress reaction that could result in impaired health.

The National Institute for Occupational Safety and Health and EPA commissioned CHABA in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that:

Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been more recent studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older subjects and those not reporting impaired hearing ability (Rosenlund, et al. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak, et al. 1990). Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles, et al. 1990).

The U.S. Department of the Navy prepared a programmatic Environmental Assessment (EA) for the continued use of non-explosive ordnance on the Vieques Inner Range. Following the preparation of the EA, it was learned that research conducted by the University of Puerto Rico, Ponce School of Medicine, suggested that Vieques fishermen and their families were experiencing symptoms associated with vibroacoustic disease (VAD) (U.S. Department of the Navy 2002). The study alleged that exposure to noise and sound waves of large pressure amplitudes within lower frequency bands, associated with Navy training activities—specifically, air-to-ground bombing or naval fire support—was related to a larger prevalence of heart anomalies within the Vieques fishermen and their families. The Ponce School of Medicine study compared the Vieques group with a group from Ponce Playa. A 1999 study conducted on Portuguese aircraft-manufacturing workers from a single factory reported effects of jet aircraft noise exposure that involved a wide range of symptoms and disorders, including

the cardiac issues on which the Ponce School of Medicine study focused. The 1999 study identified these effects as VAD.

Johns Hopkins University (JHU) conducted an independent review of the Ponce School of Medicine study, as well as the Portuguese aircraft workers study and other relevant scientific literature. Their findings concluded that VAD should not be accepted as a syndrome, given that exhaustive research across a number of populations has not yet been conducted. JHU also pointed out that the evidence supporting the existence of VAD comes largely from one group of investigators and that similar results would have to be replicated by other investigators. In short, JHU concluded that it had not been established that noise was the causal agent for the symptoms reported and no inference can be made as to the role of noise from naval gunfire in producing echocardiographic abnormalities (U.S. Department of the Navy 2002).

Most studies of nonauditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day). At the recent (1988) International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential nonauditory health effects in the work place" (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two UCLA researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs, et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Center for Disease

Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport (ATL) for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds, et al. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus (Harris 1997).

A.3.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

A.3.7 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

A.3.7.1 Effects on Learning and Cognitive Abilities

In 2002 release of the "Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools," the American National Standards Institute refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children. ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to, surrounding land uses and the shielding of outdoor noise from the indoor environment. ANSI has approved a new standard for acoustical performance criteria in schools. The new criteria include the requirement that the one-hour-average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic-feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic-feet. This would require schools be constructed such that, in quiet neighborhoods indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (American National Standards Institute 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (American National Standards Institute 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (American National Standards Institute 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in recent years. Several studies suggest that aircraft noise can affect the academic performance of schoolchildren. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning.

Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green, et al. 1982). Researchers have found that tasks involving central processing and language comprehension (such as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993; Hygge 1994; and Evans, et al. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997; Cohen, et al. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines, et al. 2001a, and 2001b). Similarly, a study conducted by Hygge (1994) found that students exposed to aircraft noise (76 dBA) scored 20% lower on recall ability tests than students exposed to ambient noise (42-44 dBA). Similar studies involving the testing of attention, memory, and reading comprehension of schoolchildren located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans, et al. 1998; Haines, et al. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as one-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines, et al. 2001a, and 2001b). In contrast, a study conducted by Hygge, et al. (2002) found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests was equal to that of the control group once the airport was closed.

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the World Health Organization and a North Atlantic Treaty Organization working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (World Health Organization 2000; North Atlantic Treaty Organization 2000).

A.3.7.2 Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, authors have looked at blood pressure readings to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans, et al. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 mm for children attending schools located in noisier environments compared to 86.77 mm for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 mm and 45.16 for the control group (Cohen, et al. 1980).

Although the literature appears limited, relatively recent studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, Haines, et al. (2001b and 2001c) analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise. In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport, as compared to children at another school far away (Chen, et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Fisch 1977; Andrus, et al. 1975; Wu, et al. 1995).

A.3.8 Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci, et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns is vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960's and 1970's on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci, et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci, et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and

attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights. Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith, et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci, et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith, et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the 1988 Manci, et al., literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci, et al. (1988), reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

A.3.8.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci, et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect

(Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (U.S. Air Force 1994b). A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (U.S.Air Force 1994b). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994b).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a one-year time period and none were associated with aircraft disturbances (U.S.Air Force 1993). In 1987, Anderson contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level and 400 knots by running less than 10 meters. They resumed normal activity within one minute (U.S.Air Force 1994b). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers in a 1964 study (U.S. Air Force 1994b).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights (U.S. Air Force 1994b). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994b).

In a report to Congress, the U. S. Forest Service concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results

suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994b). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc, et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond, et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase were recorded, noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100 dB to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Manci, et al. 1988; Gladwin, et al. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 ft) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994a). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994a). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (U.S. Air Force 1994a). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dBA.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (U.S. Air Force 1994a). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55% for panic reactions, 31% for decreased production, 6% for reduced hatchability, 6% for weight loss, and less than 1% for reduced fertility (U.S. Air Force 1994a).

Turkeys

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles, et al. 1990a). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994a).

A.3.8.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock (Manci, et al. 1988). This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci, et al. 1988).

A.3.8.2.1 MAMMALS

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dBA can damage mammals' ears, and levels at 95 dBA can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet above ground level over important grizzly and polar bear habitat (Dufour 1980). Wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger, et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, raising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and, with more than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kg animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed.

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, is not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals

The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the

auricle and middle ear (Manci, et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci, et al. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaska Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America, 1980). Since 1980 it appears that research on responses of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci, et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dBA caused a greater intensity of startle reactions than lower-intensity booms at 72 to 79 dBA. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980 in Manci, et al. 1988).

Jehl and Cooper (1980) indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds. According to the research, while the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater "disturbance level" exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats as aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley AFBs from sorties predominantly involving jet aircraft. Survey results reported in Davis, et al. (2000), indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace. The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Parks Service (1994) on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights. Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. Neither did they show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson, et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech, Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats [although their hearing is actually similar to that of pinnipeds (Bullock, et al. 1980)]. Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson, et al. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Since manatees spend most of their time below the surface and do not startle readily, no effect of aircraft overflights on manatees would be expected (Bowles, et al. 1991b).

A.3.8.2.2 BIRDS

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of 1 to 5 kHz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis, et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Grubb and King 1991; Ellis, et al. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant (Branta bernicla nigricans) (Ward and Stehn 1990) to 85 dB for crested tern (Sterna bergii) (Brown 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by "raucous discordant cries." There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci, et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci, et al. (1988), reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

A recent study, conducted cooperatively between the DoD and the USFWS, assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater, et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period

of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater, et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey (Meleagris gallopavo silvestris) in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

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In a literature review of raptor responses to aircraft noise, Manci, et al. (1988), found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis, et al. (1991), performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 m or less produced few significant responses and no severe responses. Typical responses consisted of crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or reoccupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation.

Manci, et al. (1988), noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dBA) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle

A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 meters away caused reactions similar to other disturbance types. Ellis, et al. (1991), showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 meters, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon AFB that flights at or below 2,000 feet AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (U.S. Fish and Wildlife Serice 1998). However, Fraser, et al. (1985), suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less.

Osprey

A study by Trimper, et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until they grew to 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk

Anderson, et al. (1989), conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (nine of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

A.3.8.2.2.2 MIGRATORY WATERFOWL

A study of caged American black ducks was conducted by Fleming, et al. in 1996. It was determined that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects.

Another study by Conomy, et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dBA. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65% of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward, et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were under 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci, et al. 1988 reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards, et al. 1979).

A.3.8.2.2.3 WADING AND SHORE BIRDS

Black, et al. (1984), studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology. Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75% of the 220 observations. Ninety percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of Sooty Terns on the Dry Tortugas (Austin, et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, Sooties were observed to react to sonic booms by rising in a "panic flight," circling over the island, then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of Noddies on the same island hatched successfully in 1969, the year of the Sooty hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles, et al. 1991a; Bowles, et al. 1994; Cottereau 1972; Cogger and Zegarra 1980) failed to show adverse effects on hatching of eggs. A structural analysis (Ting, et al. 2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport. The concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

A.3.8.3 Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin, et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoots (genus Scaphiopus), may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour (1980) and Manci, et al. (1988), summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American Alligator and the Spectacled Caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including DNLs of 85 dB.

A.3.8.4 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the "startle" or "fright" response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

A.3.9 Property Values

Property within a noise zone (or Accident Potential Zone) may be affected by the availability of federally guaranteed loans. According to U.S. Department of Housing and Urban Development (HUD), Federal Housing Administration (FHA), and Veterans Administration (VA) guidance, sites are acceptable for program assistance, subsidy, or insurance for housing in noise zones of less than 65 DNL, and sites are conditionally acceptable with special approvals and noise attenuation in the 65 to 75 DNL noise zone and the greater than 75 DNL noise zone. HUD's position is that noise is not the only determining factor for site acceptability, and properties should not be rejected only because of airport influences if there is evidence of acceptability within the market and if use of the dwelling is expected to continue. Similar to the Navy's and Air Force's Air Installation Compatible Use Zone Program, HUD, FHA, and VA recommend sound attenuation for housing in the higher noise zones and written disclosures to all prospective buyers or lessees of property within a noise zone (or Accident Potential Zone).

Newman and Beattie (1985) reviewed the literature to assess the effect of aircraft noise on property values. One paper by Nelson (1978), reviewed by Newman and Beattie, suggested a 1.8 to 2.3 percent decrease in property value per decibel at three separate airports, while at another period of time, they found only a 0.8 percent devaluation per decibel change in DNL. However, Nelson also noted a decline in noise depreciation over time which he theorized could be due to either noise sensitive people being replaced by less sensitive people or the increase in commerical value of the property near airports; both ideas were supported by Crowley (1978). Ultimately, Newman and Beattie

summarized that while an effect of noise was observed, noise is only one of the many factors that is part of a decision to move close to, or away from, an airport, but which is sometimes considered an advantage due to increased opportunities for employment or ready access to the airport itself. With all the issues associated with determining property values, their reviews found that decreases in property values usually range from 0.5 to 2 percent per decibel increase of cumulative noise exposure.

More recently Fidell, et al. (1996) studied the influences of aircraft noise on actual sale prices of residential properties in the vicinity of two military facilities and found that equations developed for one area to predict residential sale prices in areas unaffected by aircraft noise worked equally well when applied to predicting sale prices of homes in areas with aircraft noise in excess of LDN 65 dB. Thus, the model worked equally well in predicting sale prices in areas with and without aircraft noise exposure. This indicates that aircraft noise had no meaningful effect on residential property values. In some cases, the average sale prices of noise exposed properties were somewhat higher than those elsewhere in the same area. In the vicinity of Davis-Monthan AFB/Tucson, AZ, Fidell found the homes near the airbase were much older, smaller and in poorer condition than homes elsewhere. These factors caused the equations developed for predicting sale prices in areas further away from the base to be inapplicable with those nearer the base. However, again Fidell found that, similar to other researchers, differences in sale prices between homes with and without aircraft noise were frequently due to factors other than noise itself.

A.3.10 Noise Effects on Structures

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally used to determine the possibility of damage. In general, with peak sound levels above 130 dB, there is the possibility of the excitation of structural component resonances. While certain frequencies (such as 30 hertz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977).

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise. In general, such noise-induced vibrations occur at peak sound levels of 110 dB or greater. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

A.3.11 Noise Effects on Terrain

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such effects, and it is considered improbable that such effects would result from routine, subsonic aircraft operations.

A.3.12 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures.

Particularly in older structures, seemingly insignificant surface cracks initiated by vibrations from aircraft noise may lead to greater damage from natural forces (Hanson, et al. 1991). There are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning.

As noted above for the noise effects of noise-induced vibrations of conventional structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

A.4 References

Acoustical Society of America. 1980. *San Diego Workshop on the Interaction Between Manmade Noise and Vibration and Arctic Marine Wildlife*. Acoust. Soc. Am., Am. Inst. Physics, New York. 84 pp.

American National Standards Institute. 1980. *Sound Level Descriptors for Determination of Compatible Land Use*. ANSI S3.23-1980.

American National Standards Institute. 1988. *Quantities and Procedures for Description and Measurement of Environmental Sound: Part 1*. ANSI S12.9-1988.

American National Standards Institute. 1996. *Quantities and Procedures for Description and Measurement of Environmental Sound: Part 4*. ANSI S12.9-1996.

American National Standards Institute. 2002. *Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools*. ANSI S12.60-2002.

Anderson, D.E., O.J. Rongstad, and W.R. Mytton. 1989. *Responses of Nesting Red-tailed Hawks to Helicopter Overflights*. The Condor, Vol. 91, pp. 296-299.

Andrus, W.S., M.E. Kerrigan, and K.T. Bird. 1975. *Hearing in Para-Airport Children*. Aviation, Space, and Environmental Medicine, Vol. 46, pp. 740-742.

Austin, Jr., O.L., W.B. Robertson, Jr., and G.E. Wolfenden. 1970. *Mass Hatching Failure in Dry Tortugas Sooty Terns (Sterna fuscata)*. Proceedings of the XVth International Arnithological Congress, The Hague, The Netherlands. August 30 through September 5.

Berger, E. H., W.D. Ward, J.C. Morrill, and L.H. Royster. 1995. *Noise And Hearing Conservation Manual, Fourth Edition*. American Industrial Hygiene Association, Fairfax, Virginia.

Berglund, B., and T. Lindvall, eds. 1995. *Community Noise*. Institute of Environmental Medicine.

Beyer, D. 1983. *Studies of the Effects of Low-Flying Aircraft on Endocrinological and Physiological Parameters in Pregnant Cows*. Veterinary College of Hannover, München, Germany.

Black, B., M. Collopy, H. Percivial, A. Tiller, and P. Bohall. 1984. *Effects of Low-Altitude Military Training Flights on Wading Bird Colonies in Florida*. Florida Cooperative Fish and Wildlife Research Unit, Technical Report No. 7.

Bond, J., C.F. Winchester, L.E. Campbell, and J.C. Webb. 1963. *The Effects of Loud Sounds on the Physiology and Behavior of Swine*. U.S. Department of Agriculture Agricultural Research Service Technical Bulletin 1280.

Bowles, A.E. 1995. *Responses of Wildlife to Noise*. In R.L. Knight and K.J. Gutzwiller, eds., "Wildlife and Recreationists: Coexistence through Management and Research," Island Press, Covelo, California, pp.109-156.

Bowles, A.E., F.T. Awbrey, and J.R. Jehl. 1991a. *The Effects of High-Amplitude Impulsive Noise On Hatching Success: A Reanalysis of the Sooty Tern Incident*. SD-TP-91-0006.

Bowles, A.E., B. Tabachnick, and S. Fidell. 1991b. *Review of the Effects of Aircraft Overflights on Wildlife*. Volume II of III, Technical Report, National Park Service, Denver, Colorado.

Bowles, A.E., C. Book, and F. Bradley. 1990a. *Effects of Low-Altitude Aircraft Overflights on Domestic Turkey Poults*. USAF, Wright-Patterson AFB. AL/OEBN Noise Effects Branch.

Bowles, A.E., M. Knobler, M.D. Sneddon, and B.A. Kugler. 1994. *Effects of Simulated Sonic Booms on the Hatchability of White Leghorn Chicken Eggs*. AL/OE-TR-1994-0179.

Bowles, A.E., P. K. Yochem, and F. T. Awbrey. 1990b. *The Effects of Aircraft Noise and Sonic Booms on Domestic Animals: A Preliminary Model and a Synthesis of the Literature and Claims (NSBIT Technical Operating Report Number 13)*. Noise and Sonic Boom Impact Technology, Advanced Development Program Office, Wright-Patterson AFB, Ohio.

Bronzaft, A.L. 1997. *Beware: Noise is Hazardous to Our Children's Development*. Hearing Rehabilitation Quarterly, Vol. 22, No. 1.

Brown, A.L. 1990. *Measuring the Effect of Aircraft Noise on Sea Birds*. Environment International, Vol. 16, pp. 587-592.

Bullock, T.H., D.P. Donning, and C.R. Best. 1980. *Evoked Brain Potentials Demonstrate Hearing in a Manatee (Trichechus inunguis)*. Journal of Mammals, Vol. 61, No. 1, pp. 130-133.

Burger, J. 1981. *Behavioral Responses of Herring Gulls (Larus argentatus) to Aircraft Noise*. Environmental Pollution (Series A), Vol. 24, pp. 177-184.

Burger, J. 1986. *The Effect of Human Activity on Shorebirds in Two Coastal Bays in Northeastern United States*. Environmental Conservation, Vol. 13, No. 2, pp. 123-130.

Cantrell, R.W. 1974. *Prolonged Exposure to Intermittent Noise: Audiometric, Biochemical, Motor, Psychological, and Sleep Effects*. Laryngoscope, Supplement I, Vol. 84, No. 10, p. 2.

Casady, R.B., and R.P. Lehmann. 1967. *Response of Farm Animals to Sonic Booms*. Studies at Edwards Air Force Base, June 6-30, 1966. Interim Report, U.S. Department of Agriculture, Beltsville, Maryland, p. 8.

Chen, T., S. Chen, P. Hsieh, and H. Chiang. 1997. *Auditory Effects of Aircraft Noise on People Living Near an Airport*. Archives of Environmental Health, Vol. 52, No. 1, pp. 45-50.

Chen, T., and S. Chen. 1993. *Effects of Aircraft Noise on Hearing and Auditory Pathway Function of School-Age Children*. International Archives of Occupational and Environmental Health, Vol. 65, No. 2, pp. 107-111.

Cogger, E.A., and E.G. Zegarra. 1980. *Sonic Booms and Reproductive Performance of Marine Birds: Studies on Domestic Fowl as Analogues*. In Jehl, J.R., and C.F. Cogger, eds., "Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands: Research Reports," San Diego State University Center for Marine Studies Technical Report No. 80-1.

Cohen, S., G.W. Evans, D.S. Krantz, and D. Stokols. 1980. *Physiological, Motivational, and Cognitive Effects of Aircraft Noise on Children: Moving from Laboratory to Field*. American Psychologist, Vol. 35, pp. 231-243.

Committee on Hearing, Bioacoustics, and Biomechanics. 1977. *Guidelines for Preparing Environmental Impact Statements on Noise*. The National Research Council, National Academy of Sciences.

Conomy, J.T., J.A. Dubovsky, J.A. Collazo, and W. J. Fleming. 1998. *Do Black Ducks and Wood Ducks Habituate to Aircraft Disturbance?* Journal of Wildlife Management, Vol. 62, No. 3, pp. 1135-1142.

Cottereau, P. 1972. *Les Incidences Du 'Bang' Des Avions Supersoniques Sur Les Productions Et La Vie Animals*. Revue Medicine Veterinaire, Vol. 123, No. 11, pp. 1367-1409

Cottereau, P. 1978. *The Effect of Sonic Boom from Aircraft on Wildlife and Animal Husbandry*. In "Effects of Noise on Wildlife," Academic Press, New York, New York, pp. 63-79.

Crowley, R.W. 1978. *A Case Study of the Effects of an Airport on Land Values*. Journal of Transportation Economics and Policy, Vol. 7. May.

Davis, R.W., W.E. Evans, and B. Wursig, eds. 2000. *Cetaceans, Sea Turtles, and Seabirds in the Northern Gulf of Mexico: Distribution, Abundance, and Habitat Associations*. Volume II of Technical Report, prepared by Texas A&M University at Galveston and the National Marine Fisheries Service. U.S. Department of the Interior, Geological Survey, Biological Resources Division, USGS/BRD/CR-1999-0006 and Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, Louisiana, OCS Study MMS 2000-003.

Dooling, R.J. 1978. *Behavior and Psychophysics of Hearing in Birds*. J. Acoust. Soc. Am., Supplement 1, Vol. 65, p. S4.

Dufour, P.A. 1980. *Effects of Noise on Wildlife and Other Animals: Review of Research Since 1971*. U.S. Environmental Protection Agency.

Edmonds, L.D., P.M. Layde, and J.D. Erickson. 1979. *Airport Noise and Teratogenesis*. Archives of Environmental Health, Vol. 34, No. 4, pp. 243-247.

Edwards, R.G., A.B. Broderson, R.W. Harbour, D.F. McCoy, and C.W. Johnson. 1979. *Assessment of the Environmental Compatibility of Differing Helicopter Noise Certification Standards*. U.S. Dept. of Transportation, Washington, D.C. 58 pp.

Ellis, D.H., C.H. Ellis, and D.P. Mindell. 1991. *Raptor Responses to Low-Level Jet Aircraft and Sonic Booms*. Environmental Pollution, Vol. 74, pp. 53-83.

Evans, G.W., and L. Maxwell. 1997. *Chronic Noise Exposure and Reading Deficits: The Mediating Effects of Language Acquisition*. Environment and Behavior, Vol. 29, No. 5, pp. 638-656.

Evans, G.W., and S.J. Lepore. 1993. *Nonauditory Effects of Noise on Children: A Critical Review*. Children's Environment, Vol. 10, pp. 31-51.

Evans, G.W., M. Bullinger, and S. Hygge. 1998. *Chronic Noise Exposure and Physiological Response: A Prospective Study of Children Living under Environmental Stress*. Psychological Science, Vol. 9, pp. 75-77.

Federal Interagency Committee on Aviation Noise (FICAN). 1997. *Effects of Aviation Noise on Awakenings from Sleep*. June.

Federal Interagency Committee On Noise (FICON). 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*. August.

Federal Interagency Committee on Urban Noise (FICUN). 1980. *Guidelines for Considering Noise in Land-Use Planning and Control*. U.S. Government Printing Office Report #1981-337-066/8071, Washington, D.C.

Fidell, S., B. Tabachnick, and L. Silvati. 1996. *Effects of Military Aircraft Noise on Residential Property Values*. BBN Systems and Technologies, BBN Report No. 8102.

Fidell, S., D.S. Barber, and T.J. Schultz. 1991. *Updating a Dosage-Effect Relationship for the Prevalence of Annoyance Due to General Transportation Noise*. J. Acoust. Soc. Am., Vol. 89, No. 1, pp. 221-233. January.

Fidell, S., K. Pearsons, R. Howe, B. Tabachnick, L. Silvati, and D.S. Barber. 1994. *Noise-Induced Sleep Disturbance in Residential Settings*. USAF, Wright-Patterson AFB, Ohio: AL/OE-TR-1994-0131.

Finegold, L.S., C.S. Harris, and H.E. von Gierke. 1994. *Community Annoyance and Sleep Disturbance: Updated Criteria for Assessing the Impact of General Transportation Noise on People*. Noise Control Engineering Journal, Vol. 42, No. 1, pp. 25-30.

Fisch, L. 1977. *Research Into Effects of Aircraft Noise on Hearing of Children in Exposed Residential Areas Around an Airport*. Acoustics Letters, Vol. 1, pp. 42-43.

Fleischner, T.L., and S. Weisberg. 1986. *Effects of Jet Aircraft Activity on Bald Eagles in the Vicinity of Bellingham International Airport*. Unpublished Report, DEVCO Aviation Consultants, Bellingham, WA.

Fleming, W.J., J. Dubovsky, and J. Collazo. 1996. *An Assessment of the Effects of Aircraft Activities on Waterfowl at Piney Island, North Carolina*. Final Report by the North Carolina Cooperative Fish and Wildlife Research Unit, North Carolina State University, prepared for the Marine Corps Air Station, Cherry Point.

Fraser, J.D., L.D. Franzel, and J.G. Mathiesen. 1985. *The Impact of Human Activities on Breeding Bald Eagles in North-Central Minnesota*. Journal of Wildlife Management, Vol. 49, pp. 585-592.

Frerichs, R.R., B.L. Beeman, and A.H. Coulson. 1980. *Los Angeles Airport Noise and Mortality: Faulty Analysis and Public Policy*. Am. J. Public Health, Vol. 70, No. 4, pp. 357-362. April.

Gladwin, D.N., K.M. Manci, and R. Villella. 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife*. Bibliographic Abstracts. NERC-88/32. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colorado.

Green, K.B., B.S. Pasternack, and R.E. Shore. 1982. *Effects of Aircraft Noise on Reading Ability of School-Age Children*. Archives of Environmental Health, Vol. 37, No. 1, pp. 24-31.

Grubb, T.G., and R.M. King. 1991. *Assessing Human Disturbance of Breeding Bald Eagles with Classification Tree Models*. Journal of Wildlife Management, Vol. 55, No. 3, pp. 500-511.

Gunn, W.W.H., and J.A. Livingston. 1974. *Disturbance to Birds by Gas Compressor Noise Simulators, Aircraft, and Human Activity in the MacKenzie Valley and the North Slope*. Chapters VI-VIII, Arctic Gas Biological Report, Series Vol. 14.

Haines, M.M., S.A. Stansfeld, R.F. Job, and B. Berglund. 1998. *Chronic Aircraft Noise Exposure and Child Cognitive Performance and Stress*. In Carter, N.L., and R.F. Job, eds., Proceedings of Noise as a Public Health Problem, Vol. 1, Sydney, Australia University of Sydney, pp. 329-335.

Haines, M.M., S.A. Stansfeld, R.F. Job, B. Berglund, and J. Head. 2001a. *A Follow-up Study of Effects of Chronic Aircraft Noise Exposure on Child Stress Responses and Cognition*. International Journal of Epidemiology, Vol. 30, pp. 839-845.

Haines, M.M., S.A. Stansfeld, R.F. Job, B. Berglund, and J. Head. 2001b. *Chronic Aircraft Noise Exposure, Stress Responses, Mental Health and Cognitive Performance in School Children*. Psychological Medicine, Vol. 31, pp.265-277. February.

Haines, M.M., S.A. Stansfeld, S. Brentnall, J. Head, B. Berry, M. Jiggins, and S. Hygge. 2001c. *The West London Schools Study: the Effects of Chronic Aircraft Noise Exposure on Child Health*. Psychological Medicine, Vol. 31, pp. 1385-1396. November.

Hanson, C.E., K.W. King, M.E. Eagan, and R.D. Horonjeff. 1991. *Aircraft Noise Effects on Cultural Resources: Review of Technical Literature*. Report No. HMMH-290940.04-1, available as PB93-205300, sponsored by National Park Service, Denver CO.

Harris, C.S. 1997. *The Effects of Noise on Health*. USAF, Wright-Patterson AFB, Ohio, AL/OE-TR-1997-0077.

Hygge, S. 1994. *Classroom Experiments on the Effects of Aircraft, Road Traffic, Train and Verbal Noise Presented at 66 dBA L_{eq}, and of Aircraft and Road Traffic Presented at 55 dBA L_{eq}, on Long Term Recall and Recognition in Children Aged 12-14 Years*. In Vallet, M., ed., Proceedings of the 6th International Congress on Noise as a Public Health Problem, Vol. 2, Arcueil, France: INRETS, pp. 531-538.

Hygge, S., G.W. Evans, and M. Bullinger. 2002. *A Prospective Study of Some Effects of Aircraft Noise on Cognitive Performance in School Children*. Psychological Science Vol. 13, pp. 469-474.

Ising, H., Z. Joachims, W. Babisch, and E. Rebentisch. 1999. *Effects of Military Low-Altitude Flight Noise I Temporary Threshold Shift in Humans*. Zeitschrift fur Audiologie (Germany), Vol. 38, No. 4, pp. 118-127.

Jehl, J.R., and C.F. Cooper, eds. 1980. *Potential Effects of Space Shuttle Sonic Booms on the Biota and Geology of the California Channel Islands*. Research Reports, Center for Marine Studies, San Diego State University, San Diego, CA, Technical Report No. 80-1. 246 pp.

Jones, F.N., and J. Tauscher. 1978. *Residence Under an Airport Landing Pattern as a Factor in Teratism*. Archives of Environmental Health, pp. 10-12. January/ February.

Kovalcik, K., and J. Sottnik. 1971. *Vplyv Hluku Na Mliekovú Úzitkovost Krávov* [*The Effect of Noise on the Milk Efficiency of Cows*]. Zivocisná Vyroba, Vol. 16, Nos. 10-11, pp. 795-804.

Kryter, K.D. 1984. *Physiological, Psychological, and Social Effects of Noise*. NASA Reference Publication 1115. July.

Kryter, K.D., and F. Poza. 1980. *Effects of Noise on Some Autonomic System Activities*. J. Acoust. Soc. Am., Vol. 67, No. 6, pp. 2036-2044.

Kushlan, J.A. 1978. *Effects of Helicopter Censuses on Wading Bird Colonies*. Journal of Wildlife Management, Vol. 43, No. 3, pp. 756-760.

LeBlanc, M.M., C. Lombard, S. Lieb, E. Klapstein, and R. Massey. 1991. *Physiological Responses of Horses to Simulated Aircraft Noise*. U.S. Air Force, NSBIT Program for University of Florida.

Lukas, J.S. 1978. *Noise and Sleep: A Literature Review and a Proposed Criterion for Assessing Effect*. In Darly N. May, ed., "Handbook of Noise Assessment," Van Nostrand Reinhold Company: New York, pp. 313-334.

Lynch, T.E., and D.W. Speake. 1978. *Eastern Wild Turkey Behavioral Responses Induced by Sonic Boom*. In "Effects of Noise on Wildlife," Academic Press, New York, New York, pp. 47-61.

Manci, K.M., D.N. Gladwin, R. Villella, and M.G Cavendish. 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis*. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, CO, NERC-88/29. 88 pp.

Meecham, W.C., and N. Shaw. 1979. *Effects of Jet Noise on Mortality Rates*. British Journal of Audiology, Vol. 13, pp. 77-80. August.

Metro-Dade County. 1995. *Dade County Manatee Protection Plan*. DERM Technical Report 95-5. Department of Environmental Resources Management, Miami, Florida.

Michalak, R., H. Ising, and E. Rebentisch. 1990. *Acute Circulatory Effects of Military Low-Altitude Flight Noise.* International Archives of Occupational and Environmental Health, Vol. 62, No. 5, pp. 365-372.

National Park Service. 1994. *Report to Congress: Report on Effects of Aircraft Overflights on the National Park System*. Prepared Pursuant to Public Law 100-91, The National Parks Overflights Act of 1987. 12 September.

Nelson, J.P. 1978. *Economic Analysis of Transportation Noise Abatement*. Ballenger Publishing Company, Cambridge, MA.

Newman, J.S., and K.R. Beattie. 1985. *Aviation Noise Effects*. U.S. Department of Transportation, Federal Aviation Administration Report No. FAA-EE-85-2.

Nixon, C.W., D.W. West, and N.K. Allen. 1993. *Human Auditory Responses to Aircraft Flyover Noise*. In Vallets, M., ed., Proceedings of the 6th International Congress on Noise as a Public Problem, Vol. 2, Arcueil, France: INRETS.

North Atlantic Treaty Organization. 2000. *The Effects of Noise from Weapons and Sonic Booms, and the Impact on Humans, Wildlife, Domestic Animals and Structures*. Final Report of the Working Group Study Follow-up Program to the Pilot Study on Aircraft Noise, Report No. 241. June.

Ollerhead, J.B., C.J. Jones, R.E. Cadoux, A. Woodley, B.J. Atkinson, J.A. Horne, F. Pankhurst, L. Reyner, K.I. Hume, F. Van, A. Watson, I.D. Diamond, P. Egger, D. Holmes, and J. McKean. 1992. *Report of a Field Study of Aircraft Noise and Sleep Disturbance*. London: Department of Safety, Environment and Engineering, Civil Aviation Authority. December.

Parker, J.B., and N.D. Bayley. 1960. *Investigations on Effects of Aircraft Sound on Milk Production of Dairy Cattle, 1957-58*. U.S. Agricultural Research Services, U.S. Department of Agriculture, Technical Report Number ARS 44-60.

Pater, L.D., D.K. Delaney, T.J. Hayden, B. Lohr, and R. Dooling. 1999. *Assessment of Training Noise Impacts on the Red-cockaded Woodpecker: Preliminary Results – Final Report*. Technical Report. U.S. Army, Corps of Engineers, CERL, Champaign, IL, Report Number 99/51, ADA Number 367234.

Pearsons, K.S., D.S. Barber, B.G. Tabachnick, and S. Fidell. 1995. *Predicting Noise-Induced Sleep Disturbance*. J. Acoust. Soc. Am., Vol. 97, No. 1, pp. 331-338. January.

Pearsons, K.S., D.S. Barber, and B.G. Tabachnick. 1989. *Analyses of the Predictability of Noise-Induced Sleep Disturbance*. USAF Report HSD-TR-89-029. October.

Pulles, M.P.J., W. Biesiot, and R. Stewart. 1990. *Adverse Effects of Environmental Noise on Health : An Interdisciplinary Approach*. Environment International, Vol. 16, pp. 437-445.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. *Marine Mammals and Noise*. Academic Press, San Diego, CA.

Rosenlund, M., N. Berglind, G. Bluhm, L. Jarup, and G. Pershagen. 2001. *Increased Prevalence of Hypertension in a Population Exposed to Aircraft Noise*. Occupational and Environmental Medicine, Vol. 58, No. 12, pp. 769-773. December.

Schultz, T.J. 1978. *Synthesis of Social Surveys on Noise Annoyance*. J. Acoust. Soc. Am., Vol. 64, No. 2, pp. 377-405. August.

Schwarze, S., and S.J. Thompson. 1993. *Research on Non-Auditory Physiological Effects of Noise Since 1988: Review and Perspectives*. In Vallets, M., ed., Proceedings of the 6th International Congress on Noise as a Public Problem, Vol. 3, Arcueil, France: INRETS.

Smith, D.G., D.H. Ellis, and T.H. Johnston. 1988. *Raptors and Aircraft*. In R.L Glinski, B. Gron-Pendelton, M.B. Moss, M.N. LeFranc, Jr., B.A. Millsap, and S.W. Hoffman, eds., Proceedings of the Southwest Raptor Management Symposium. National Wildlife Federation, Washington, D.C., pp. 360-367.

State of California. 1990. Administrative Code Title 21.

Stusnick, E., D.A. Bradley, J.A. Molino, and G. DeMiranda. 1992. *The Effect of Onset Rate on Aircraft Noise Annoyance, Volume 2: Rented Home Experiment*. Wyle Laboratories Research Report WR 92-3. March.

Tetra Tech, Inc. 1997. *Final Environmental Assessment Issuance of a Letter of Authorization for the Incidental Take of Marine Mammals for Programmatic Operations at Vandenberg Air Force Base, California*. July.

Ting, C., J. Garrelick, and A. Bowles. 2002. *An Analysis of the Response of Sooty Tern eggs to Sonic Boom Overpressures*. J. Acoust. Soc. Am., Vol. 111, No. 1, Pt. 2, pp. 562-568.

Trimper, P.G., N.M. Standen, L.M. Lye, D. Lemon, T.E. Chubbs, and G.W. Humphries. 1998. *Effects of Low-level Jet Aircraft Noise On the Behavior of Nesting Osprey*. Journal of Applied Ecology, Vol. 35, pp. 122-130.

U.S. Air Force. 1993. *The Impact of Low Altitude Flights on Livestock and Poultry*. Air Force Handbook. Volume 8, Environmental Protection. 28 January.

U.S. Air Force. 1994a. *Air Force Position Paper on the Effects of Aircraft Overflights on Domestic Fowl*. Approved by HQ USAF/CEVP. 3 October.

U.S. Air Force. 1994b. *Air Force Position Paper on the Effects of Aircraft Overflights on Large Domestic Stock*. Approved by HQ USAF/CEVP. 3 October.

U.S. Air Force. 2000. *Preliminary Final Supplemental Environmental Impact Statement for Homestead Air Force Base Closure and Reuse*. Prepared by SAIC. 20 July.

U.S. Department of the Navy. 2002. *Supplement to Programmatic Environmental Assessment for Continued Use with Non-Explosive Ordnance of the Vieques Inner Range, to Include Training Operations Typical of Large Scale Exercises, Multiple Unit Level Training, and/or a Combination of Large Scale Exercises and Multiple Unit Level Training*. March.

U.S. Environmental Protection Agency. 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety*. U.S. Environmental Protection Agency Report 550/9-74-004. March.

U.S. Environmental Protection Agency. 1978. *Protective Noise Levels*. Office of Noise Abatement and Control, Washington, D.C. U.S. Environmental Protection Agency Report 550/9-79-100. November.

U.S. Fish and Wildlife Service. 1998. *Consultation Letter #2-22-98-I-224 Explaining Restrictions on Endangered Species Required for the Proposed Force Structure and Foreign Military Sales Actions at Cannon AFB, NM*. To Alton Chavis HQ ACC/CEVP at Langley AFB from Jennifer Fowler-Propst, USFWS Field Supervisor, Albuquerque, NM. 14 December.

U.S. Forest Service. 1992. *Report to Congress: Potential Impacts of Aircraft Overflights of National Forest System Wilderness*. U.S. Government Printing Office 1992-0-685-234/61004, Washington, D.C.

von Gierke, H.E. 1990. *The Noise-Induced Hearing Loss Problem*. NIH Consensus Development Conference on Noise and Hearing Loss, Washington, D.C. 22–24 January.

Ward, D.H., and R.A. Stehn. 1990. *Response of Brant and Other Geese to Aircraft Disturbances at Izembek Lagoon, Alaska*. Final Technical Report, Number MMS900046. Performing Org.: Alaska Fish and Wildlife Research Center, Anchorage, AK. Sponsoring Org.: Minerals Management Service, Anchorage, AK, Alaska Outer Continental Shelf Office.

Ward, D.H., E.J. Taylor, M.A. Wotawa, R.A. Stehn, D.V. Derksen, and C.J. Lensink. 1986. *Behavior of Pacific Black Brant and Other Geese in Response to Aircraft Overflights and Other Disturbances at Izembek Lagoon, Alaska*. 1986 Annual Report, p. 68.

Weisenberger, M.E., P.R. Krausman, M.C. Wallace, D.W. De Young, and O.E. Maughan. 1996. *Effects of Simulated Jet Aircraft Noise on Heart Rate and Behavior of Desert Ungulates*. Journal of Wildlife Management, Vol. 60, No. 1, pp. 52-61.

Wesler, J.E. 1977. *Concorde Operations At Dulles International Airport*. NOISEXPO '77, Chicago, IL. March.

Wever, E.G., and J.A. Vernon. 1957. *Auditory Responses in the Spectacled Caiman*. Journal of Cellular and Comparative Physiology, Vol. 50, pp. 333-339.

World Health Organization. 2000. *Guidelines for Community Noise*. Berglund, B., T. Lindvall, and D. Schwela, eds.

Wu, Trong-Neng, J.S. Lai, C.Y. Shen, T.S Yu, and P.Y. Chang. 1995. *Aircraft Noise, Hearing Ability, and Annoyance*. Archives of Environmental Health, Vol. 50, No. 6, pp. 452-456. November-December.

APPENDIX B

Modeled Runway and Flight Track Utilization for Baseline Aircraft

Runway and Track Utilization for DHC6

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04R	87%	100%	T4R2	12%	12%
				T4R7	88%	88%
	04R Total				100%	100%
	22L	13%	0%	T2L2	100%	
				T2L5	0%	
	22L Total				100%	100%
	29	0%	0%	T29A		
	29 Total					
Departure	04R	86%	100%	T4R5	96%	96%
				T4R8	4%	4%
	04R Total				100%	100%
	11	0%	0%	T11D		
	11 Total					
	22L	14%	0%	T2L3	100%	
				T31	0%	
	22L Total				100%	100%
Touch and Go	04L	0%	0%	N/A		
	04R	85%	75%	T44R	100%	100%
	22L	15%	25%	T34	100%	100%
	22R	0%	0%	N/A		

Runway and Track Utilization for BEC58P

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04L	21%	21%	T4L4	24%	33%
				T4L5	6%	0%
				T4L6	34%	33%
				T4L8	36%	34%
	04L Total				100%	100%
	04R	62%	62%	T4R1	31%	33%
				T4R2	34%	33%
				T4R7	36%	34%
	04R Total				100%	100%
	22L	11%	11%	T2L1	31%	0%
				T2L2	37%	50%
				T2L9	33%	50%
	22L Total				100%	100%
	22R	4%	4%	T2R4	35%	35%
				T2R6	29%	29%
				T2R8	36%	36%
	22R Total				100%	100%
	29	2%	2%	T29A	100%	100%
	29 Total				100%	100%
Departure	04L	21%	21%	T4L1	31%	33%
				T4L2	23%	33%
				T4L7	46%	34%
	04L Total				100%	100%
	04R	62%	62%	T4R3	31%	33%
				T4R5	46%	44%
				T4R6	23%	22%
	04R Total				100%	100%
	11	2%	2%	T11D	100%	100%
	11 Total				100%	100%
	22L	11%	11%	T2L3	46%	100%
				T2L6	31%	0%
				T31	23%	0%
	22L Total				100%	100%
	22R	4%	4%	T2R1	24%	24%
				T2R2	29%	29%
				T2R9	47%	47%
	22R Total				100%	100%
Touch and Go	04L	21%		T4L3	100%	100%
	04R	64%		T4R4	100%	100%
	22L	11%		T2L4	100%	100%
	22R	4%		T2R3	100%	100%

Runway and Track Utilization for CNA172

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04L	62%	61%	T4L4	71%	73%
				T4L5	5%	6%
				T4L6	13%	12%
				T4L8	10%	9%
	04L Total				100%	100%
	04R	21%	20%	T4R1	77%	82%
				T4R2	13%	9%
				T4R7	10%	9%
	04R Total				100%	100%
	22L	4%	4%	T2L1	77%	100%
				T2L2	11%	0%
				T2L9	13%	0%
	22L Total				100%	100%
	22R	11%	13%	T2R4	10%	14%
				T2R6	77%	71%
				T2R8	13%	14%
	22R Total				100%	100%
	29	2%	2%	T29A	100%	100%
	29 Total				100%	100%
Departure	04L	62%	61%	T4L1	77%	79%
				T4L2	13%	12%
				T4L7	10%	9%
	04L Total				100%	100%
	04R	21%	20%	T4R3	77%	82%
				T4R5	10%	9%
				T4R6	13%	9%
	04R Total				100%	100%
	11	2%	2%	T11D	100%	100%
	11 Total				100%	100%
	22L	4%	4%	T2L3	11%	0%
				T2L6	77%	100%
				T31	13%	0%
	22L Total				100%	100%
	22R	11%	13%	T2R1	13%	14%
				T2R2	77%	71%
				T2R9	10%	14%
	22R Total				100%	100%
Touch and Go	04L	64%	64%	T4L3	100%	100%
	04R	21%	21%	T4R4	100%	100%
	22L	4%	4%	T2L4	100%	100%
	22R	11%	11%	T2R3	100%	100%

Runway and Track Utilization for Civilian Helicopter

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04L	69%	100%	T4L4	75%	75%
				T4L5	6%	6%
				T4L6	10%	10%
				T4L8	10%	10%
	04L Total				100%	100%
	04R	17%	0%	T4R1	78%	
				T4R2	11%	
				T4R7	11%	
	04R Total				100%	
	22L	3%	0%	T2L1	100%	
	22L Total				100%	
	22R	11%	0%	T2R4	0%	
				T2R6	91%	
				T2R8	9%	
	22R Total				100%	
Departure	04L	69%	100%	T4L1	81%	81%
				T4L2	10%	10%
				T4L7	10%	10%
	04L Total				100%	100%
	04R	17%	0%	T4R3	78%	
				T4R5	11%	
				T4R6	11%	
	04R Total				100%	
	22L	3%	0%	T2L6	100%	
	22L Total				100%	
	22R	11%	0%	T2R1	8%	
				T2R2	83%	
				T2R9	8%	
	22R Total				100%	
Touch and Go	04L	68%	64%	T4L3	100%	100%
	04R	17%	17%	T4R4	100%	100%
	22L	3%	5%	T2L4	100%	100%
	22R	12%	14%	T2R3	100%	100%

Runway and Track Utilization for HH65

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	01	15%	33%	H6A	100%	100%
	01 Total				100%	100%
	04L	15%	0%	T4L4	9%	
				T4L5	5%	
				T4L6	36%	
				T4L8	50%	
	04L Total				100%	
	04R	58%	67%	T4R1	12%	12%
				T4R2	35%	35%
				T4R7	53%	53%
	04R Total				100%	100%
	22L	10%	0%	T2L1	13%	
				T2L2	53%	
				T2L9	33%	
	22L Total				100%	
	22R	2%	0%	T2R4	67%	
				T2R8	33%	
	22R Total				100%	
Departure	04L	17%	0%	T4L1	12%	
				T4L2	32%	
				T4L7	56%	
	04L Total				100%	
	04R	65%	100%	T4R3	10%	10%
				T4R5	58%	58%
				T4R6	31%	31%
	04R Total				100%	100%
	19	5%	0%	H6B	100%	
	19 Total				100%	
	22L	11%	0%	T2L3	59%	
				T2L6	12%	
				T31	29%	
	22L Total				100%	
	22R	2%	0%	T2R1	33%	
				T2R9	67%	
	22R Total				100%	
Touch and Go	04L	17%	16%	T4L3	100%	100%
	04R	68%	68%	T4R4	100%	100%
	22L	12%	11%	T2L4	100%	100%
	22R	3%	5%	T2R3	100%	100%

Runway and Track Utilization for C-130

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04R	83%	75%	T4R2	10%	0%
				T4R7	90%	100%
	04R Total				100%	100%
	22L	15%	25%	T2L2	91%	100%
				T2L5	9%	0%
	22L Total				100%	100%
	29	2%	0%	T29A	100%	
	29 Total				100%	
Departure	04R	83%	75%	T4R5	90%	100%
				T4R8	10%	0%
	04R Total				100%	100%
	11	2%	0%	T11D	100%	
	11 Total				100%	
	22L	15%	25%	T2L3	91%	100%
				T31	9%	0%
	22L Total				100%	100%
Touch and Go	04R	85%	85%	T44R	100%	100%
	22L	15%	15%	T34	100%	100%

Runway and Track Utilization for P3C

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04R	85%	80%	T4R2	10%	10%
				T4R7	90%	90%
	04R Total				100%	100%
	22L	15%	20%	T2L2	89%	89%
				T2L5	11%	11%
	22L Total				100%	100%
Departure	04R	85%	80%	T4R5	95%	95%
				T4R8	5%	5%
	04R Total				100%	100%
	22L	15%	20%	T2L3	96%	96%
				T31	4%	4%
	22L Total				100%	100%
Touch and Go	04L	0%	0%	N/A		
	04R	85%	83%	T44R	100%	100%
	22L	15%	17%	T34	100%	100%
	22R	0%	0%	N/A		

Runway and Track Utilization for Military Helicopter

	Runway Use			Track Use		
OP TYPE	RWY ID	Day	Night	TRK_ID1	Day	Night
Arrival	04L	20%	20%	T4L4	33%	33%
				T4L5	17%	17%
				T4L6	33%	33%
				T4L8	17%	17%
	04L Total				100%	100%
	04R	67%	67%	T4R1	50%	50%
				T4R2	35%	35%
				T4R7	15%	15%
	04R Total				100%	100%
	22L	13%	13%	T2L1	50%	50%
				T2L2	25%	25%
				T2L9	25%	25%
	22L Total				100%	100%
Departure	04L	20%	20%	T4L1	50%	50%
				T4L2	33%	33%
				T4L7	17%	17%
	04L Total				100%	100%
	04R	67%	67%	T4R3	50%	50%
				T4R5	15%	15%
				T4R6	35%	35%
	04R Total				100%	100%
	22L	13%	13%	T2L3	25%	25%
				T2L6	50%	50%
				T31	25%	25%
	22L Total				100%	100%
Touch and Go	04L	17%	25%	T4L3	100%	100%
	04R	68%	75%	T4R4	100%	100%
	22L	12%	0%	T2L4	100%	100%
	22R	3%	0%	T2R3	100%	100%

APPENDIX C

Representative Profiles for HIARNG Aircraft

This appendix provides scaled plots of individual flight profiles for each modeled aircraft type. The

The flight profiles are shown in the following order:

Profile Pages	Aircraft
3 - 5	CH-47D
6 - 8	UH-60
9 – 11	OH58
12 – 14	E-2C

Each figure includes a table describing the profile parameters of the associated flight track. The columns of the profile data tables are described below:

Column Heading	Description
Point	Sequence letter along flight track denoting change in flight parameters
Distance (feet)	Distance along flight track from runway threshold in feet
Height (feet)	Altitude of aircraft in feet Above Ground Level (AGL*) or relative to Mean Sea Level(MSL)
Power (Appropriate Unit)*	Engine power setting and Drag Configuration/Interpolation Code (defines sets of interpolation code in NOISEMAP (F for FIXED, P for PARALLEL, V for VARIABLE))
Speed (kts)	Indicated airspeed of aircraft in knots
Yaw Angle (degrees)**	Angle of the aircraft relative to its vertical axis in degrees; positive nose left
Angle of Attack (degrees)**	Angle of the aircraft, not of the wing; angle between the climb angle and the pitch angle, in degrees, positive nose up. The climb angle is the angle between the horizontal and the velocity vector (same convention). The pitch angle is the angle between the horizontal and the thrust vector (same convention)
Roll Angle (degrees)**	Angle of the aircraft relative to its longitudinal axis in degrees; positive left side down.

Notes:* not applicable to CH-47D, UH-60, and OH58
** for UH-60 and OH58

Flight Profile 103

Point	Distance NM	Height ft	Power KNOTS	Notes
a	6.58	2,000 MSL	Lfo Lite 130 kts	
b	1.95	800 MSL	Lfo Lite 100 kts	Begin turn
c	1.56	800 MSL	Lfo Lite 100 kts	End turn
d	0.49	300 MSL	Lfo Lite 70 kts	500 fpm descent
e	0.12	100 MSL	Lfo Lite 40 kts	
f	0.00	20 AGL	Lfo Lite 40 kts	

Flight Profile 103 - Arrival
Based CH-47D
on Runway 04L, Flight Track T4L6

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:111,000 (1 inch = 9,240 feet)

Flight Profile 121

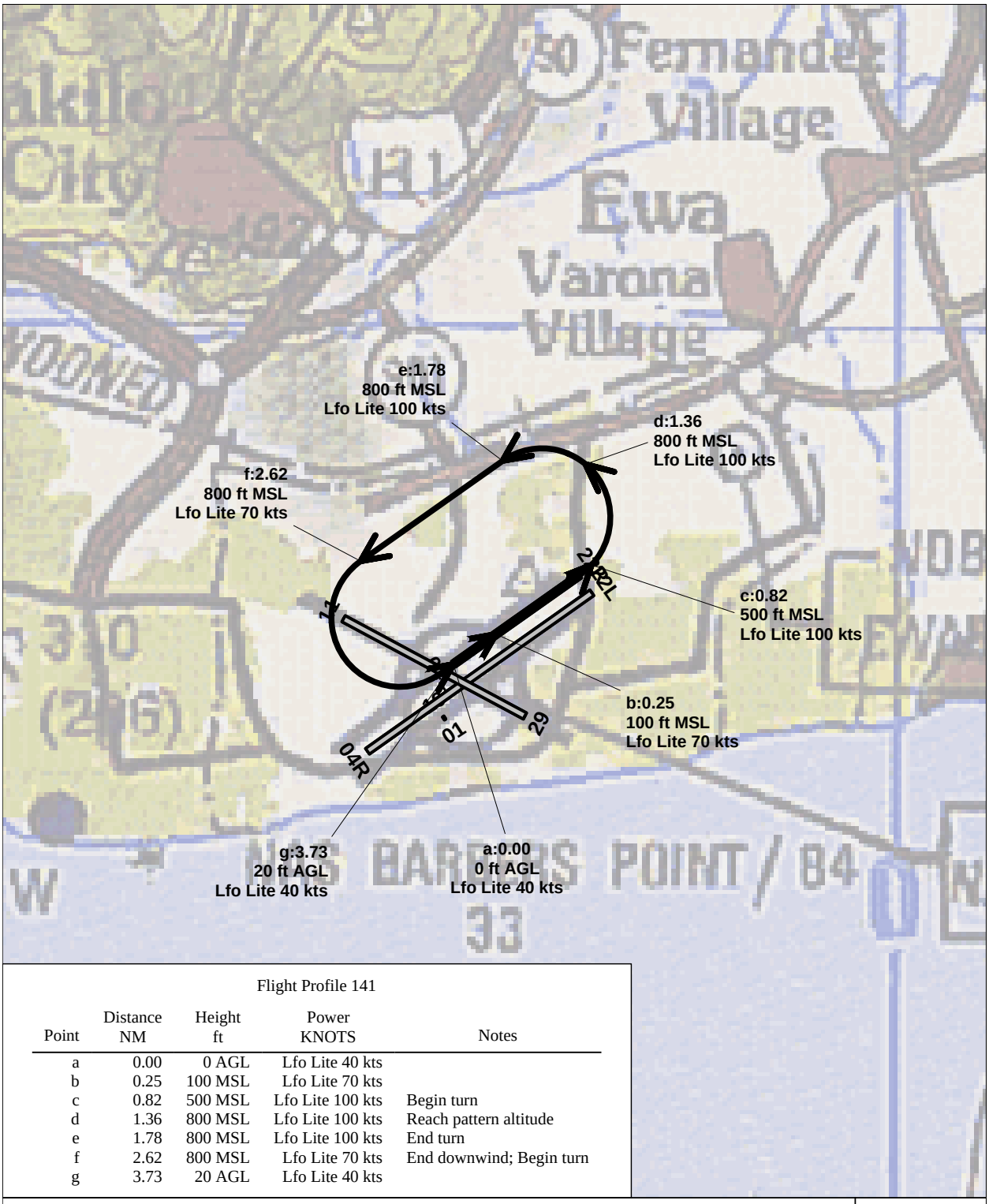
Point	Distance NM	Height ft	Power KNOTS	Notes
a	0.00	33 MSL	Lfo Lite 40 kts	
b	0.13	100 MSL	Lfo Lite 40 kts	
c	0.51	300 MSL	Lfo Lite 70 kts	
d	1.09	600 MSL	Lfo Lite 100 kts	Begin turn
e	1.48	800 MSL	Lfo Lite 100 kts	End turn
f	6.58	2,000 MSL	Lfo Lite 130 kts	

Flight Profile 121 - Departure
Based CH-47D
on Runway 04L, Flight Track T4L1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:63,800 (1 inch = 5,320 feet)

N



Flight Profile 141

Point	Distance NM	Height ft	Power KNOTS	Notes
a	0.00	0 AGL	Lfo Lite 40 kts	
b	0.25	100 MSL	Lfo Lite 70 kts	
c	0.82	500 MSL	Lfo Lite 100 kts	Begin turn
d	1.36	800 MSL	Lfo Lite 100 kts	Reach pattern altitude
e	1.78	800 MSL	Lfo Lite 100 kts	End turn
f	2.62	800 MSL	Lfo Lite 70 kts	End downwind; Begin turn
g	3.73	20 AGL	Lfo Lite 40 kts	

Flight Profile 141 - Touch and Go Pattern
Based CH-47D
on Runway 04L, Flight Track T4L3

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

Scale in Feet 1:53,000 (1 inch = 4,420 feet)

N

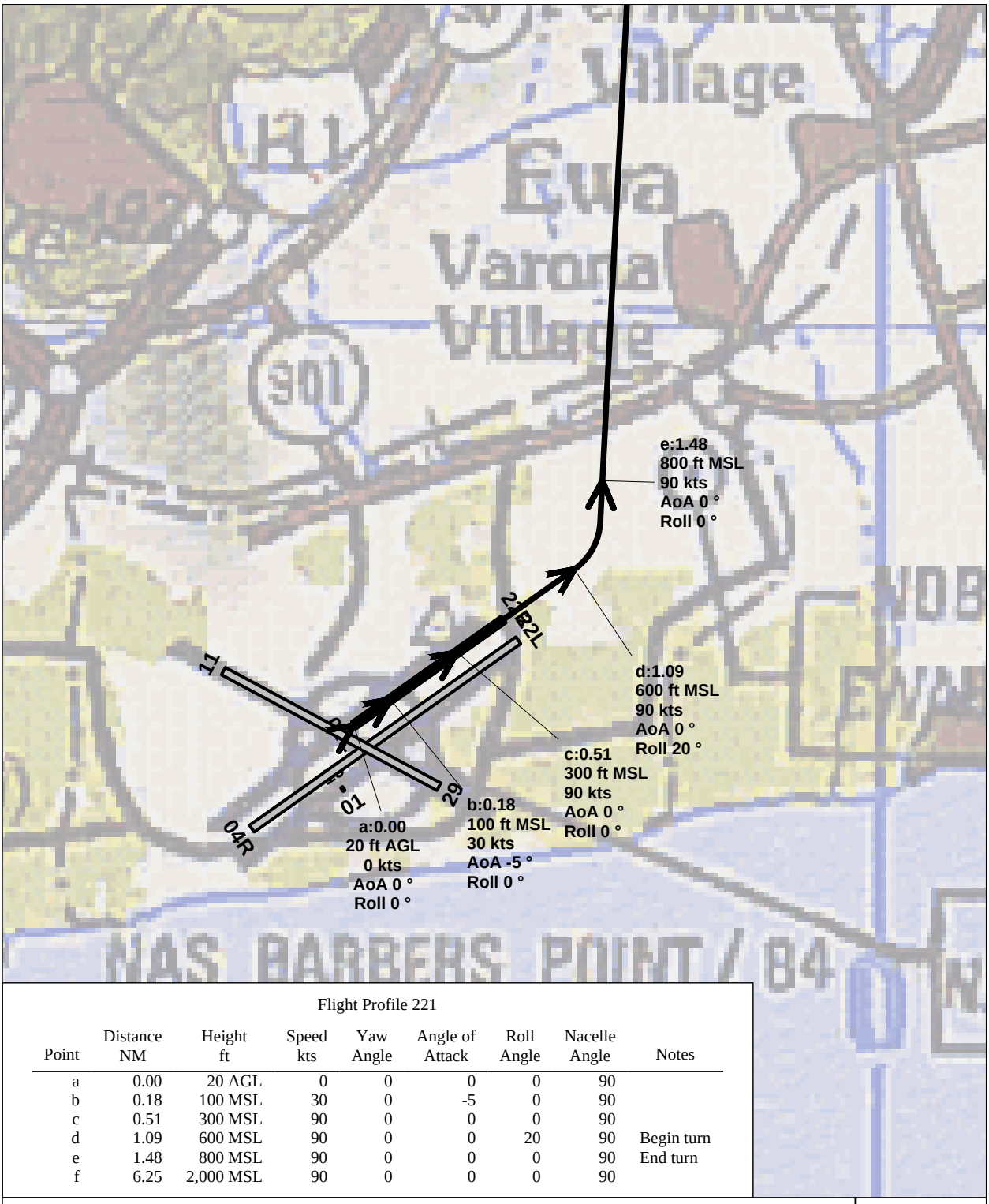
Flight Profile 203

Point	Distance NM	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	6.58	2,000 MSL	90	0	0	0	90	
b	1.95	800 MSL	90	0	0	20	90	Begin turn
c	1.56	800 MSL	90	0	0	0	90	End turn
d	0.49	300 MSL	90	0	0	0	90	500 fpm descent
e	0.16	100 MSL	30	0	-5	0	90	
f	0.00	20 AGL	0	0	0	0	90	

Flight Profile 203 - Arrival
Based UH-60L / UH-60M
on Runway 04L, Flight Track T4L6

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:70,600 (1 inch = 5,890 feet)



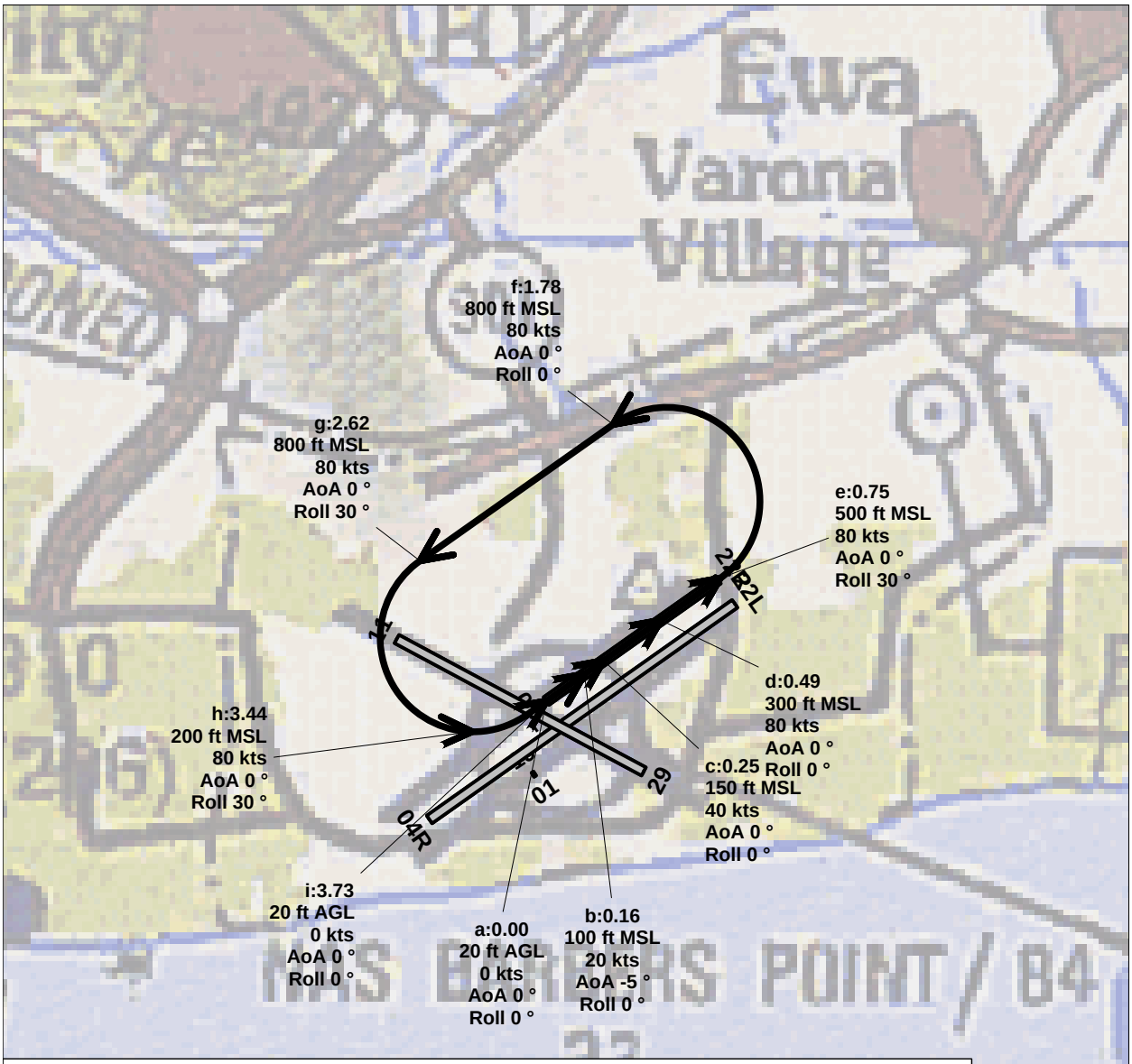
Flight Profile 221

Point	Distance NM	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0.00	20 AGL	0	0	0	0	90	
b	0.18	100 MSL	30	0	-5	0	90	
c	0.51	300 MSL	90	0	0	0	90	
d	1.09	600 MSL	90	0	0	20	90	Begin turn
e	1.48	800 MSL	90	0	0	0	90	End turn
f	6.25	2,000 MSL	90	0	0	0	90	

Flight Profile 221 - Departure
Based UH-60L / UH-60M
on Runway 04L, Flight Track T4L1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:44,600 (1 inch = 3,720 feet)



Flight Profile 241

Point	Distance NM	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0.00	20 AGL	0	0	0	0	90	
b	0.16	100 MSL	20	0	-5	0	90	
c	0.25	150 MSL	40	0	0	0	90	
d	0.49	300 MSL	80	0	0	0	90	
e	0.75	500 MSL	80	0	0	30	90	Begin turn
f	1.78	800 MSL	80	0	0	0	90	End turn
g	2.62	800 MSL	80	0	0	30	90	End downwind; begin turn
h	3.44	200 MSL	80	0	0	30	90	
i	3.73	20 AGL	0	0	0	0	90	

Flight Profile 241 - Touch and Go Pattern

Based UH-60L / UH-60M

on Runway 04L, Flight Track T4L3

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:44,600 (1 inch = 3,710 feet)

N

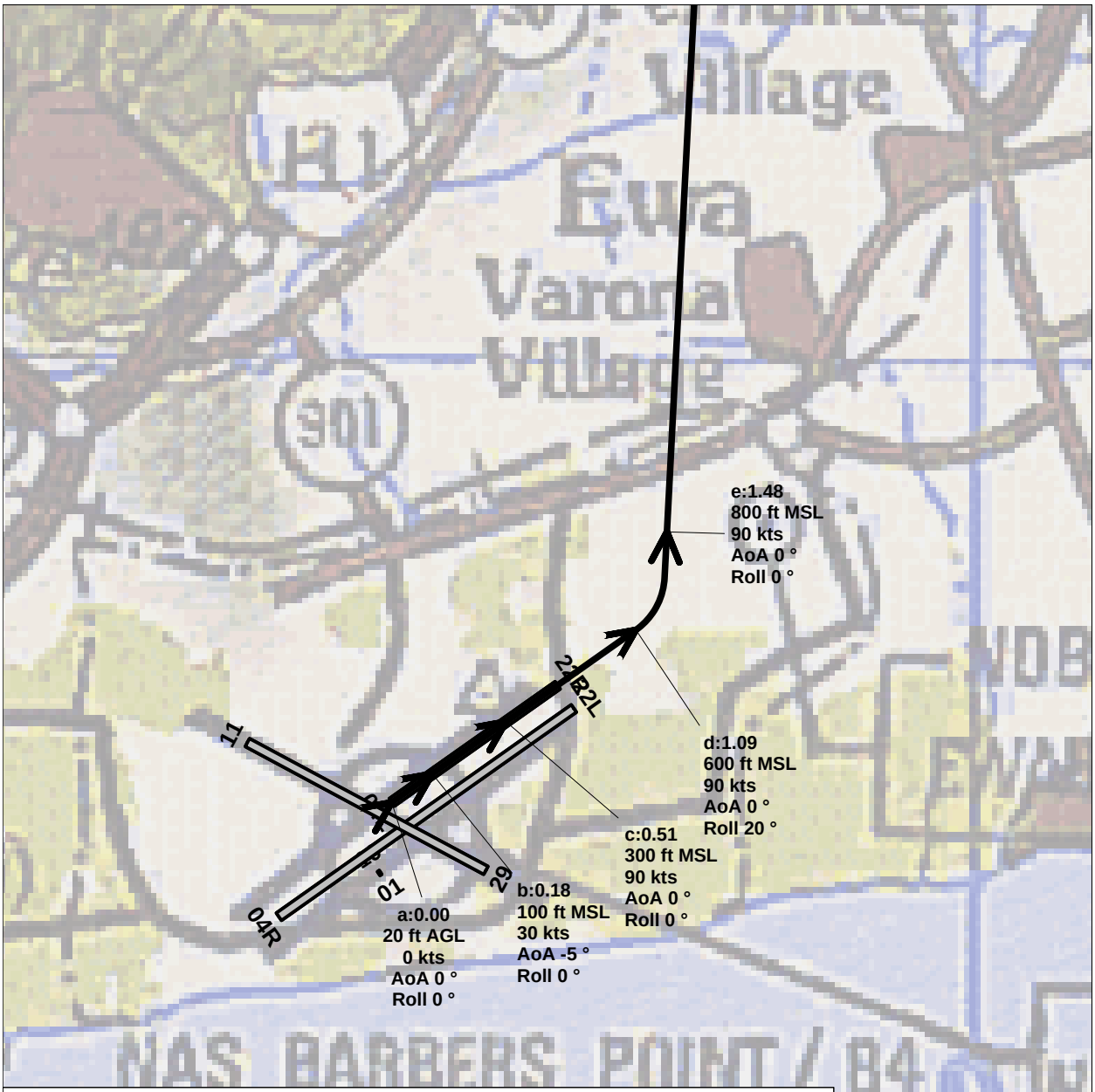
Flight Profile 303

Point	Distance NM	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	6.58	2,000 MSL	90	0	0	0	90	
b	1.95	800 MSL	90	0	0	20	90	Begin turn
c	1.56	800 MSL	90	0	0	0	90	End turn
d	0.49	300 MSL	90	0	0	0	90	500 fpm descent
e	0.16	100 MSL	30	0	-5	0	90	
f	0.00	20 AGL	0	0	0	0	90	

Flight Profile 303 - Arrival
Based OH58
on Runway 04L, Flight Track T4L6

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:70,600 (1 inch = 5,890 feet)



Flight Profile 321

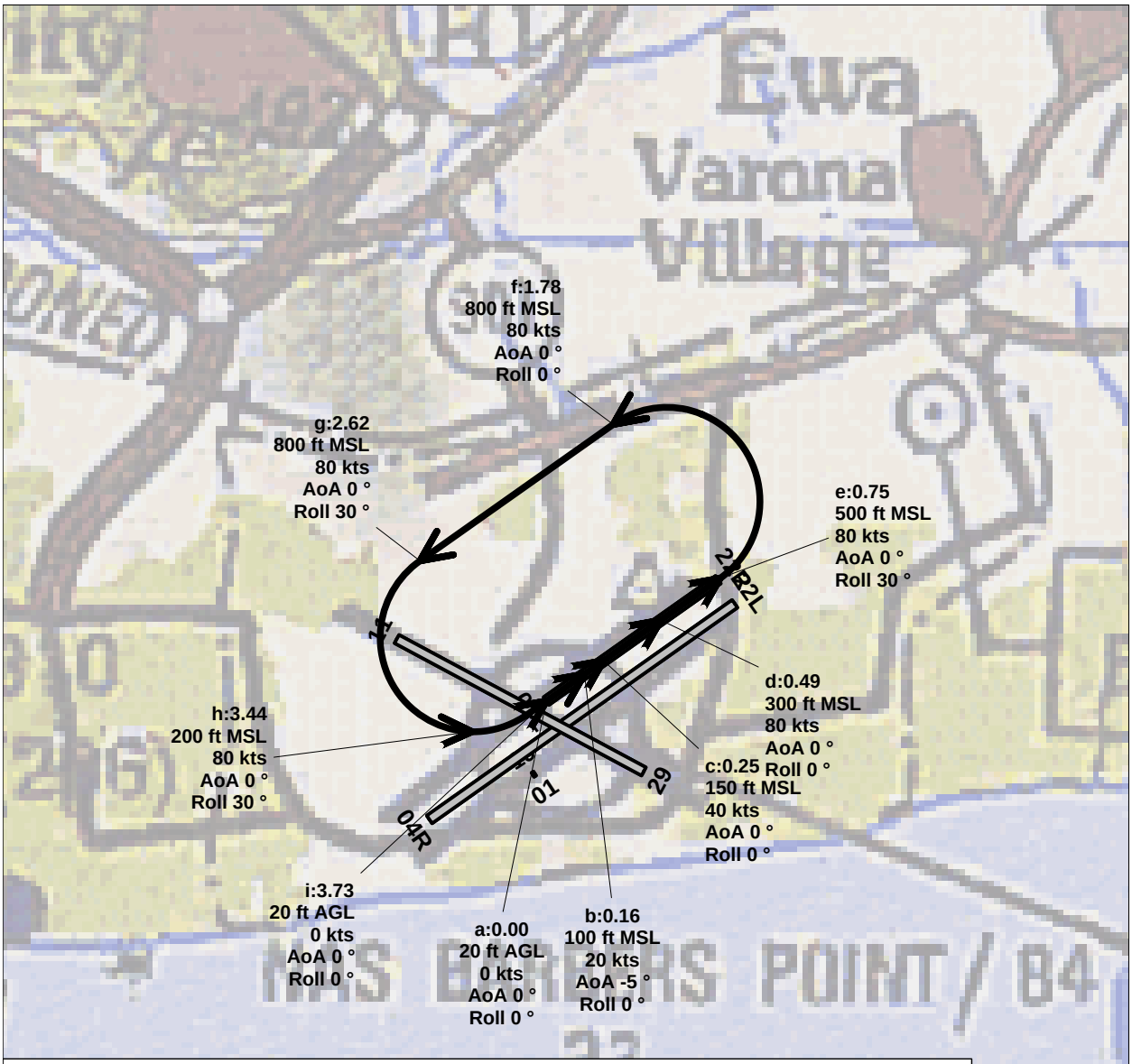
Point	Distance NM	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0.00	20 AGL	0	0	0	0	90	
b	0.18	100 MSL	30	0	-5	0	90	
c	0.51	300 MSL	90	0	0	0	90	
d	1.09	600 MSL	90	0	0	20	90	Begin turn
e	1.48	800 MSL	90	0	0	0	90	End turn
f	6.25	2,000 MSL	90	0	0	0	90	

Flight Profile 321 - Departure
Based OH58
on Runway 04L, Flight Track T4L1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:44,600 (1 inch = 3,720 feet)

N



Flight Profile 341

Point	Distance NM	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0.00	20 AGL	0	0	0	0	90	
b	0.16	100 MSL	20	0	-5	0	90	
c	0.25	150 MSL	40	0	0	0	90	
d	0.49	300 MSL	80	0	0	0	90	
e	0.75	500 MSL	80	0	0	30	90	Begin turn
f	1.78	800 MSL	80	0	0	0	90	End turn
g	2.62	800 MSL	80	0	0	30	90	End downwind; begin turn
h	3.44	200 MSL	80	0	0	30	90	
i	3.73	20 AGL	0	0	0	0	90	

Flight Profile 341 - Touch and Go Pattern

Based OH58

on Runway 04L, Flight Track T4L3

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:44,600 (1 inch = 3,710 feet)

Flight Profile 401

Point	Distance NM	Height ft	Power LBS/HR	Speed kts
a	6.62	1,500 MSL	1030 Approach	130
b	5.28	1,000 MSL	1030 Approach	100
c	3.14	1,000 MSL	1030 Approach	62
d	0.00	50 AGL	1030 Approach	62

Flight Profile 401 - Arrival
Based C-26
on Runway 04R, Flight Track T4R2

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:75,200 (1 inch = 6,260 feet)

N

Flight Profile 421

Point	Distance NM	Height ft	Power LBS/HR	Speed kts
a	0.00	0 AGL	2250 Max	0
b	0.21	0 AGL	2250 Takeoff	105
c	1.00	1,000 MSL	2250 Takeoff	130
d	8.23	3,000 MSL	2000 Takeoff	150

Flight Profile 421 - Departure
Based C-26
on Runway 04R, Flight Track T4R5
Prior to brake release, aircraft sits at 2250 LBS/HR Max for 5 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:93,300 (1 inch = 7,770 feet)

Flight Profile 441

Point	Distance NM	Height ft	Power LBS/HR	Speed kts	Notes
a	0.00	50 AGL	1030 Approach	140	
b	0.16	0 AGL	2250 Approach	140	
c	0.95	0 AGL	2250 Approach	140	
d	1.97	300 MSL	2250 Approach	140	
e	3.13	800 MSL	2000 Approach	140	reach pattern altitude
f	6.67	800 MSL	2000 Approach	140	End Downwind
g	8.78	440 MSL	1030 Approach	140	
h	10.06	50 AGL	1030 Approach	140	

Flight Profile 441 - Touch and Go Pattern

Based C-26

on Runway 04R, Flight Track T44R

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:78,400 (1 inch = 6,530 feet)

APPENDIX E
TRAFFIC REPORT

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November 23, 2009 (revised May 25, 2010)

To: Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street, Suite 1400
American Savings Bank Tower
Honolulu, Hawaii 96813

From: Shruti Malik, PE;
Bhanu Kala, PE;
Peter Costa

Subject: **Environmental Assessment for the Hawaii Army National Guard in Kalaeloa, Hawaii: Traffic Impact Analysis Memorandum**

1. Introduction

This memorandum serves as the transportation section of the Environmental Assessment (EA) for the proposed development and relocation of the Hawaii Army National Guard (HIARNG) facilities (herein referred to as the proposed project), located in Kalaeloa, O'ahu, Hawaii. A description of the nearby transportation network, assessment of the study area operations under with and without project scenarios, identification of project-related transportation impacts, and recommendation of mitigations to reduce the intensity of transportation impacts are included in this memorandum.

1.1 Project Description

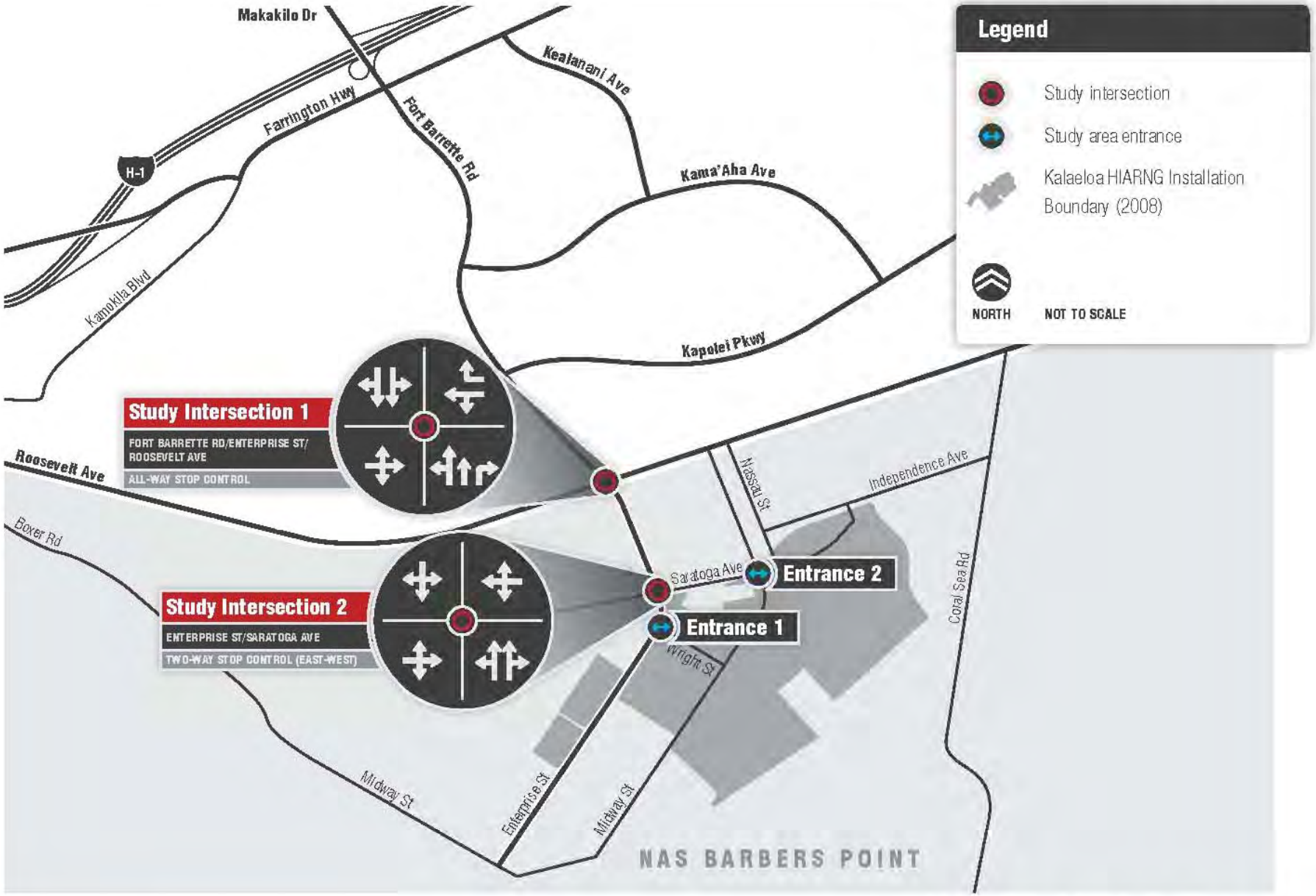
The HIARNG plans to relocate and consolidate its facilities to Kalaeloa, Oahu, Hawaii. The relocation effort will be completed in a total of four phases. HIARNG proposes to renovate and construct these facilities within the 150-acre HIARNG site located at Kalaeloa.

1.2 Study Area and Approach

The proposed project site is located in the southwest region of Oahu, directly south of the Interstate H-1 (H-1). The project site is bounded by Saratoga Avenue to the north, Kalaeloa Airport to the south, Coral Sea Road to the east, and Enterprise Street to the west. The study area for this project consists of the following two intersections located in the vicinity of the project site:

1. Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue
2. Enterprise Street/ Saratoga Avenue

The location of the project site and the study intersections in exhibited in **Figure 1-1**.



PROJECT SITE AND STUDY INTERSECTIONS

Figure 1-1

WilburSmith ASSOCIATES

The study area operations were evaluated under four scenarios. These scenarios are described below:

1. *Existing Conditions* - This scenario represents the existing conditions without the proposed project.
2. *Existing plus Project Conditions* – This scenario represents the existing conditions with the proposed project.
3. *Year 2030 Baseline Conditions* – This scenario represents the future cumulative conditions without the proposed project. It involves the planned and proposed improvements to the transportation network.
4. *Year 2030 Baseline plus Project Conditions* – This scenario represents the future cumulative conditions with the proposed project.

2. Existing Conditions

A description of the transportation network located nearby the project site, methodology adopted to analyze the study intersections, and the evaluation of intersection operations under existing conditions are discussed in this section.

2.1 Roadway Network

The proposed project site is adjacent to roadways that provide regional and local access to the project site. A summary of the main facilities located nearby the study area, including their roadway classification, number of travel lanes, and other traffic flow characteristics is provided below.

2.1.1 Regional Roadways

Interstate H-1 (H-1) is primarily an east-west freeway located north of the proposed project site. The freeway traverses through the entire island of Oahu, connecting various cities, neighborhoods, local attractions, and other key facilities throughout the island. East of the Waiawa interchange, it provides five travel lanes in each direction with one lane in each direction designated as a HOV lane for vehicles with two or more occupants, during the peak commute periods. Between the Waiawa and Kunia interchanges, the freeway provides four lanes in each direction. West of the Kunia interchange, the freeway has three travel lanes in each direction. Fort Barrette Road connects the project site to the H-1 Freeway.

Farrington Highway (State Route 93) extends east-west to accommodate traffic between its east terminus, at the interchange with Kamehameha Highway, and the Wai'anae coast of Oahu. The highway is located north of the project site and is located generally parallel to and one-half of a mile south of the H-1 Freeway nearby the study area. It provides four lanes in each direction from the Kamehameha interchange to Old Fort Weaver Road. It extends westward with one lane in each direction to the Villages of Kapolei where it widens to provide two lanes in each direction from Kapolei Golf Course Road into the City of Kapolei. Fort Barrette Road connects the project site to the Farrington Highway.

2.1.2 Local Roadways

Fort Barrette Road/ Enterprise Street is a north-south roadway that provides direct access from the project site to the Farrington Highway and the H-1 Freeway. It is a two-lane divided roadway from south of Farrington Highway to Franklin D. Roosevelt Avenue. North of Farrington Highway it extends as Makakilo Drive, a four-lane roadway with median divider. South of Franklin D. Roosevelt Avenue it extends as Enterprise Street, a three-lane roadway (one lane in the southbound direction and two lanes in the northbound direction).

Franklin D. Roosevelt Avenue is an east-west roadway that connects Fort Barrette Road to Kapolei Parkway and Fort Weaver Road using Geiger Road. This roadway extends from Saratoga Street to Essex Road. It extends as Geiger Road, east of Essex Road and as East-West Loch Road, east of Fort Weaver Road. The roadway includes one travel lane in each direction, with left turn pockets at most intersections.

Saratoga Avenue is an east-west roadway that extends from Boxer Road to Independence Avenue and connects many residential neighborhoods to other major roadways. Throughout the extent of the roadway, there is one lane in each direction.

Wright Street is an east-west local roadway that serves as the primary entrance to the proposed project site. It extends from Enterprise Street to Midway Street, providing one travel lane in each direction.

Midway Street is a north-south local roadway that serves as the secondary entrance to the proposed project site. It extends from Roosevelt Avenue to Boxer Road, encompassing the entire existing Naval Air Station. This roadway has one travel lane in each direction.

2.2 Transit Network

The City and County of Honolulu provides TheBus fixed-route transit service to the communities adjacent to and in the general vicinity of the proposed project site. These routes include both suburban trunk and express routes. TheBus operates seven bus lines that directly serve the project site and its immediate vicinity; they include:

- **Route 41 Kapolei Transit Center –** This route serves the Villages of Kapolei area, including a portion of the Makakilo Drive/ Fort Barrette Road. Service is provided approximately at one hour intervals from about 4:40 AM to 9:49 PM, seven days a week.

- **Route 415 Kapolei/Kalaeloa –** This route serves the Kalaeloa area, including the entire study area. Limited service is provided at approximately 30 minute intervals from 5:05 AM to 6:05 AM and 5:15 PM to 6:15 PM during the weekday; no weekend service is provided.

The service frequencies of TheBus routes serving the project site are provided in **Table 2.1**.

Table 2.1
Existing Transit Service

Route	Service Type	Weekday Frequency (minutes)	Weekend Frequency (minutes)	Hours of Operation	Streets Served Near Project Site
41	Local	30[1]	60	5:00 AM –9:25 PM	Roosevelt Avenue, Kapolei Parkway
415	Local	30	n/a	5:05 AM – 6:05 AM 5:15 PM – 6:15 PM	Fort Barrette Road, Enterprise Street, Saratoga Avenue

Source: TheBus, 2009

Notes:
(1) School Days of Operation during the weekday, the bus operates at 25 minute headways
n/a – no transit service available

2.3 Intersection Operations

2.3.1 Methodology for Intersection Analysis

Operations of the study intersections were evaluated using Level of Service (LOS) calculations. LOS is a qualitative description of the performance of an intersection based on the average delay per vehicle. Intersection levels of service range from LOS A, which indicates free flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays.

Signalized Intersections – Levels of Service for signalized intersections were calculated using the Highway Capacity Manual 2000 (HCM 2000) methodology. The LOS is based on the average delay (in seconds per vehicle) for the various movements within the intersection. A combined weighted average delay and LOS are provided for each intersection. The average delay for signalized intersections was calculated using the Synchro analysis software and is correlated to the level of service designation as shown in **Table 2.2**.

Table 2.2
Level of Service Criteria – Signalized Intersections

Level of Service	Description of Operations	Average Delay
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 – 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 – 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 – 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 – 80.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	≥ 80.1

Source: Highway Capacity Manual, Transportation Research Board, 2000

Notes:
Delay is presented in seconds per vehicle.

Unsignalized Intersections – Unsignalized intersections were evaluated using the Highway Capacity Manual 2000 methodology. The LOS rating is based on the weighted average control delay expressed in seconds per vehicle as illustrated in **Table 2.3**. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration. At two-way controlled intersections, LOS is calculated for each controlled movement, as opposed to the intersection as a whole. For all-way stop controlled locations, LOS is computed for the intersection as a whole.

Table 2.3
Level of Service Criteria – Unsignalized Intersections

Level of Service	Description of Operations	Average Delay
A	No Delay for stop-controlled approaches.	≤ 10.0
B	Operations with minor delays.	10.1 – 15.0
C	Operations with moderate delays.	15.1 – 25.0
D	Operations with some delays.	25.1 – 35.0
E	Operations with high delays, and long queues.	35.1 – 50.0
F	Operations with extreme congestion, with very high delays and long queues unacceptable to most drivers.	≥ 50.1

Source: Highway Capacity Manual, Transportation Research Board, 2000

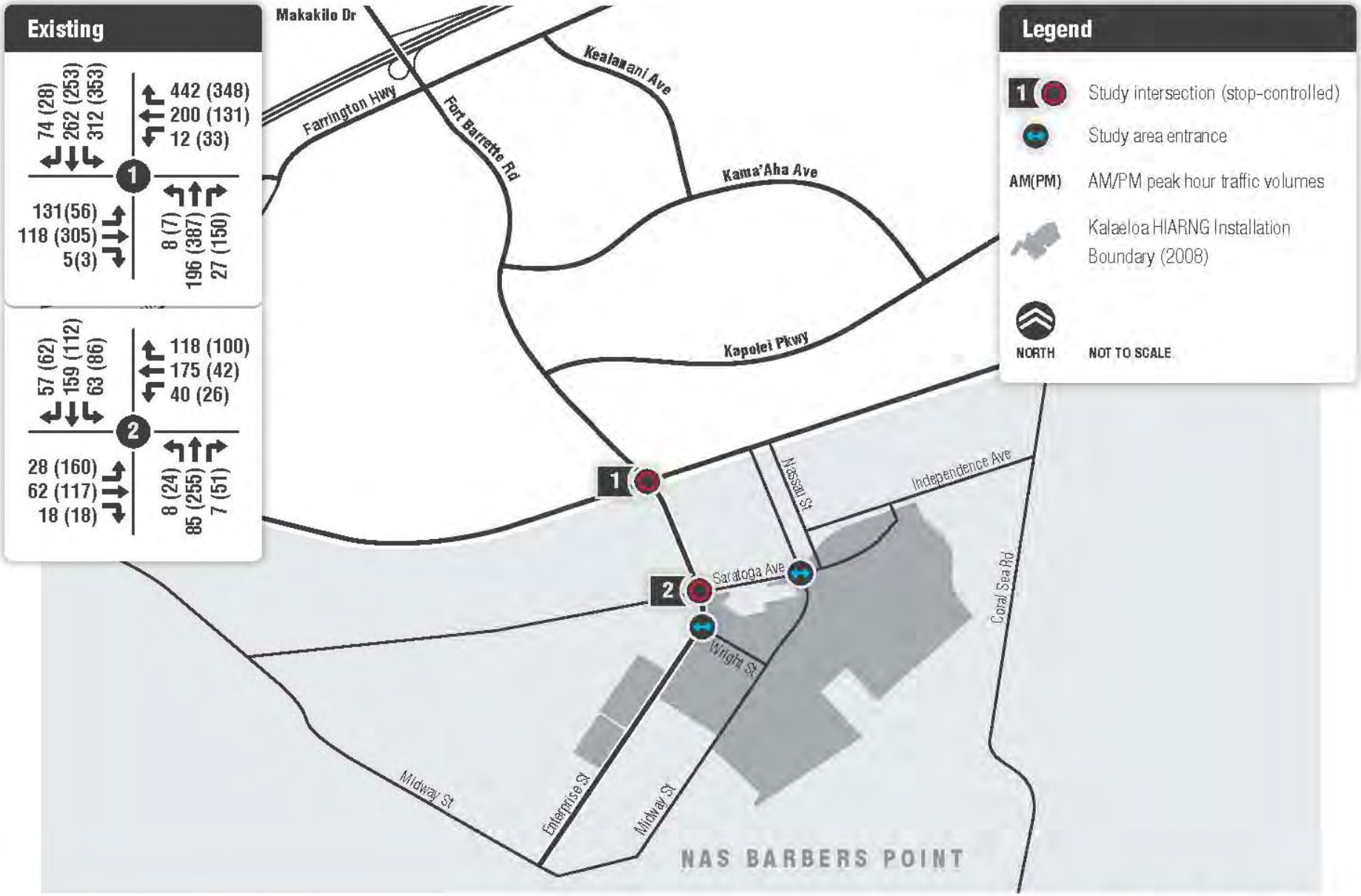
Notes:
Delay is presented in seconds per vehicle.

Since there are no established local criteria describing the operating conditions of intersections, LOS D or better is typically considered to be acceptable for peak hours, while LOS E or worse is considered as an unacceptable condition. This was the criteria used in identifying the operating conditions of intersections for this transportation study.

2.3.2 Existing Intersection Operations

Existing intersection operating conditions were evaluated for the morning peak hour (7:00 AM to 8:00 AM) and evening peak hour (3:45 PM to 5:00 PM) using Synchro simulation software. Intersection turning movement counts were collected by Wilbur Smith Associates (WSA) in August 2009. The traffic movements were counted and recorded by traffic surveyors in 15 minute intervals during the peak commute periods. These counts were then post-processed to determine the peak one-hour traffic volumes at each study intersection. In addition, five-minute spot check counts were collected along Midway Street and Wright Street entrances.

The existing traffic volumes at the study intersections are exhibited in **Figure 2-1**; whereas, the operations of the study intersections under existing conditions are presented in **Table 2.4**.



EXISTING TRAFFIC VOLUMES
Figure 2-1

WilburSmith ASSOCIATES

During the AM peak hour, both the study intersections operate at an unacceptable LOS. The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection operates at LOS F with an average delay of 84.5 seconds per vehicle and the worst approach of the Enterprise Street/ Saratoga Avenue intersection operates at LOS F with an average delay of 111.7 seconds per vehicle.

Similar to the AM peak hour, during the PM peak hour, both the study intersections continue to operate at an unacceptable LOS. The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection operates at a LOS F with an average delay of 83.6 seconds per vehicle. This intersection experiences a significant delay in the southbound approach (Fort Barrette Road), primarily for the southbound left turning movement. The worst approach of the Enterprise Street/ Saratoga Avenue intersection operates at LOS F, with an average delay of 372.6 seconds. The poor operation of this intersection is due to significant delay of the eastbound movement.

The Synchro output sheets for intersection operations are provided in **Appendix A-1**.

Table 2.4
Peak Hour Intersection Operations – Existing Conditions

#	Intersection	Traffic Control	AM Peak			PM Peak		
			Delay	V/C	LOS	Delay	V/C	LOS
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**84.5**	-	**F**	**83.6**	-	**F**
2	Enterprise Street/ Saratoga Avenue	TWSC	**111.7 (WB)**	**1.13**	**F**	**372.6 (EB)**	**1.69**	**F**

Source: Wilbur Smith Associates, November 2009

Notes:
AWSC – All-way Stop Control, TWSC – Two-way Stop Control
V/C – Volume-to-capacity ratio
EB – Eastbound
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

3. Project Trip Generation and Distribution

3.1. Project Alternatives

HIARNG is considering three alternatives to consolidate its units within the project site and provide sufficient room for operations. Each alternative includes separate locations of HAIRNG facilities and building configurations within the project site. As such, the travel behavior and traffic circulation in and around the proposed project site would vary according to each alternative. The alternatives are outlined below:

- **No-Action Alternative –** Under this alternative, the proposed construction and renovation projects within the project site would not be implemented.
- **Alternative 1 –** Under this alternative, the Army Aviation Support Facility (AASF) building would be moved to the southwest quadrant of the site and Aviation Readiness Center (RC) to the western portion of the site. The Joint Forces Hawaii Army National Guard (JF-HIARNG) Headquarters and Army Brigade RC would be constructed in the eastern portion of the site, while Building 282 would be demolished. Furthermore, the existing gateways would be modified; the main gate would be relocated to Midway Street and the secondary gate to Wright Street.[1]

[1] The building layout plan for Alternative 1 is illustrated in Figure 2-2 of the *DOPAA Report* (August 2009).

- **Preferred Alternative –** This alternative is identical to Alternative 1, with the exception that Building 282 would be retained and renovated to serve as the Army Aviation RC (in which a new building would not be constructed). The existing gateways would not be relocated.

3.2 Project Trip Generation

Presently 530 full-time personnel work at Kalaeloa on weekdays. In addition, 654 inactive duty reserve personnel conduct training exercises at Kalaeloa. Reserve personnel train one weekend per month but not all reserve personnel will be training simultaneously. The proposed action will station 108 full-time and 285 inactive duty reserve personnel presently operating at Wheeler Army Airfield to Kalaeloa. Additionally, 266 full-time (including 34 from CSMS) and 229 inactive duty reserve personnel that are stationed at Fort Ruger will relocate to Kalaeloa.

Based on the personnel relocating to Kalaeloa, it was estimated that the proposed project would generate a total of 624 daily vehicle trips, which includes an estimated 566 trips made by full-time personnel and an estimated 58 trips made by authorized military vehicles. During the AM peak hour, the proposed project would have 283 inbound trips and 29 outbound trips, while during the PM peak hour there would be 29 inbound trips and 283 outbound trips. The project trip generation is shown in **Table 3.1**.

Table 3.1
Project Trip Generation

Category[1,4]	Total Personnel/ Inventory	Daily Trips[2]	AM Peak Hour Trips		PM Peak Hour Trips	
			In	Out	In	Out
Authorized Full Time Personnel	283	566	283	0	0	283
Authorized Military Vehicles	4	8	0	4	4	0
Military Fuel Trucks	12	10[3]	0	5	5	0
Government Vehicles	20	40	0	20	20	0
Total	**319**	**624**	**283**	**29**	**29**	**283**

Source: Wilbur Smith Associates, November 2009

Notes:
(1) Trip Generation based on *Draft DOPAA-EA for the Relocation of Units and Construction Projects at Kalaeloa, Oahu, Hawaii.* Hawaii Army National Guard, August 2009.
(2) Total number of vehicles represents the total daily trips based on the full build out assumptions (Table 2-2 of *DOPAA-EA* Report).
(3) Assumed 10 daily trips per 22 working days per month equates to 5 daily trips for Military Fuel Trucks.
(4) Emergency vehicles (22 vehicles) were not included in the trip generation since these vehicles are assumed to only operate during disaster events and will not be used on a daily basis.

3.3 Project Trip Distribution

The assumed distribution of the vehicle trips accessing the proposed project site is provided in **Table 3.2** and exhibited in **Figure 3-1**.

PROJECT TRIP DISTRIBUTION
Figure 3-1

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Table 3.2
Project Trip Distribution

To / From	Project Trip Percentage
Honolulu and Kapolei using Interstate H-1	30%
Ewa Beach using Fort Weaver Road and Roosevelt Avenue	20%
Ewa using Roosevelt Avenue	20%
Kapolei using Farrington Highway	10%
Makakilo City using Makakilo Drive and Fort Barrette Road	10%
Kapolei using Fort Barrette Road	10%

: Source: Wilbur Smith Associates, November 2009

The existing and projected traffic would access the project site via gateway locations. Based on the building layout and the gateway locations proposed in each alternative, the project-related trips were assigned to each gateway. As such, the analysis assumes that for the Preferred Alternative, 65 percent of the proposed project-related trips would access the project site using the primary gateway located on Wright Street and the remaining 35 percent would access the site using the secondary gateway located on Midway Street. Conversely, the analysis assumes that for Alternative 1, 65 percent of the proposed project-related trips would access the site using the primary gateway located on Midway Street and 35 percent would access it using the secondary gateway located on Wright Street.

4. Existing plus Project Conditions

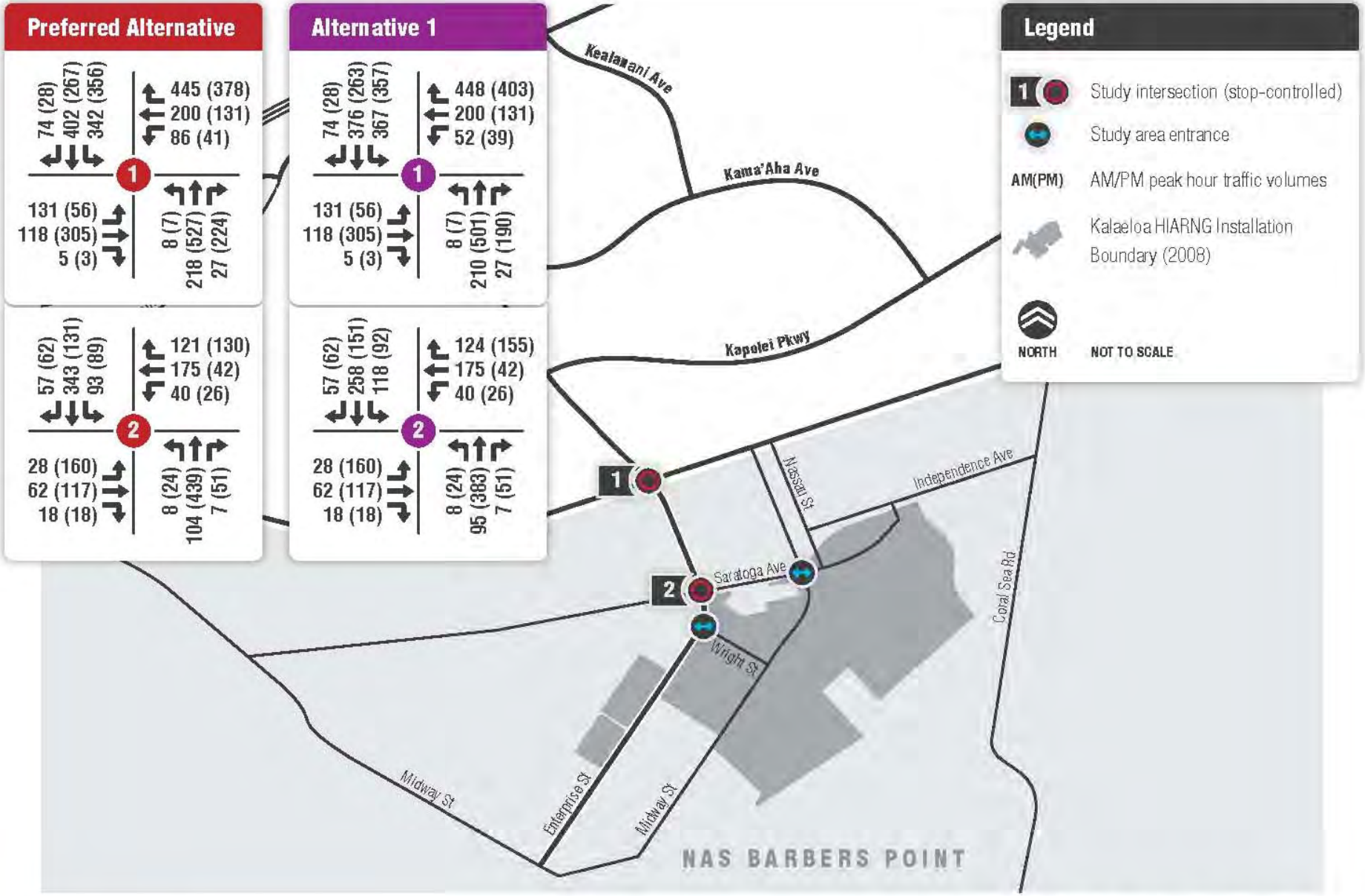
The following section describes the traffic operations of the study intersections for the Preferred Alternative and Alternative 1 under Existing plus Project Conditions. The proposed peak hour project-related trips are distributed to the study area using the assumed trip distribution discussed in Section 3.3. The resulting traffic volumes at the intersections are added to the existing intersection counts to obtain the turning movement volumes at the study intersections under Existing plus Project Conditions. These traffic volumes are exhibited in **Figure 4-1**.

4.1 Thresholds of Evaluation

Neither the City and County of Honolulu nor the State of Hawai'i have guidelines for identifying the transportation impacts caused by a project. Therefore, WSA used the following guidelines to identify the transportation impacts at intersections. A project would cause an impact at an intersection if:

1. it degrades the LOS of the intersection to LOS E or worse
2. it degrades the volume-to-capacity ratio (V/C ratio) of an intersection operating at LOS E or F by more than 10 percent
3. it degrades the average delay of a signalized or all-way stop controlled intersection operating at LOS E or F by more than 3 seconds

Guidelines 1 and 2 were obtained from the ongoing Ho'opili Traffic Impact Analysis Report in Kapolei, while Guideline 3 was obtained from the City of Berkeley's Guidelines for Development of Traffic Impact Reports.



EXISTING PLUS PROJECT TRAFFIC VOLUMES

Figure 4-1

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4.2 Intersection Operations – Preferred Alternative

The study intersection operations for the Preferred Alternative under Existing plus Project Conditions are presented in **Table 4.1**.

During the AM peak hour, both the study intersections would operate at an unacceptable LOS under Existing plus Project Conditions. The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS F, with an average delay of 136.9 seconds per vehicle and the worst approach (eastbound approach) of the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F, with an average delay of more than 1000 seconds per vehicle.

Similarly, during the PM peak hour, both the study intersections would continue to operate at an unacceptable LOS (LOS F).

During both the peak hours, the project traffic will deteriorate the study intersections operations. The average delay values of the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection are increased by more than 3 seconds and the V/C ratios are increased by more than 10 percent. Therefore, the Preferred Alternative would result in transportation impacts at both the study intersections under Existing plus Project Conditions.

The Synchro output sheets for intersection operations are provided in **Appendix A-2**.

Table 4.1
Peak Hour Intersection Operations – Existing plus Project Conditions (Preferred Alternative)

#	Intersection	Traffic Control	Existing			Existing + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**84.5**	**-**	**F**	**136.9**	**-**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**111.7 (WB)**	**1.13**	**F**	**>1000 (EB)**	**>3**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**83.6**	**-**	**F**	**108.0**	**-**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**372.6 (EB)**	**1.69**	**F**	**906.7 (EB)**	**2.84**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
AWSC – All-way Stop Control, TWSC – Two-way Stop Control
V/C – Volume-to-capacity ratio
EB – Eastbound, WB – Westbound
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

4.3 Intersection Operations – Alternative 1

The study intersection operations for Alternative 1 under Existing plus Project Conditions are presented in **Table 4.2**.

During the AM peak hour, both the study intersections would operate at an unacceptable LOS under Existing plus Project Conditions. The worst approach (eastbound approach) of the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F, with an average delay of more than 1000 seconds per vehicle and the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at a LOS F, with an average delay of 131.4 seconds per vehicle.

Similar to the AM peak hour, during the PM peak hour, both the study intersections would operate at an unacceptable LOS (LOS F).

During both the peak hours, the average delay values of the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection are increased by more than 3 seconds and the V/C ratios are increased by more than 10 percent. Therefore, Alternative 1 would result in transportation impacts at both the study intersections under Existing plus Project Conditions.

The Synchro output sheets for intersection operations are provided in **Appendix A-3**.

Table 4.2
Peak Hour Intersection Operations – Existing plus Project Conditions (Alternative 1)

#	Intersection	Traffic Control	Existing			Existing + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**84.5**	-	**F**	**131.4**	-	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**111.7 (WB)**	**1.13**	**F**	**>1000 (EB)**	**>3**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**83.6**	-	**F**	**109.4**	-	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**372.6 (EB)**	**1.69**	**F**	**>1000 (EB)**	**>3**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
AWSC – All-way Stop Control, TWSC – Two-way Stop Control
V/C – Volume-to-capacity ratio
EB – Eastbound, WB – Westbound
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

5. Year 2030 Conditions

5.1 Year 2030 Baseline Conditions

This section discusses the methodology involved in the development of year 2030 traffic volumes, planned and programmed improvements within the study area, and the operations of the study intersections under Year 2030 Baseline Conditions. These conditions form the basis against which transportation impacts related to the proposed project under future cumulative conditions will be identified.

5.1.1 Planned Roadway and Intersection Improvements

There are several circulation improvements planned throughout the region, with the majority of these improvements along regional corridors and major access points. The improvement planned near the project site includes:

- Widen Fort Barrette Road located between Farrington Highway and Roosevelt Avenue from two to four travel lanes[5]

5.1.2 Development of Year 2030 Baseline Traffic Volumes

Traffic volumes under Year 2030 Baseline Conditions were estimated based on the forecasts provided by the Year 2030 Oahu Metropolitan Planning Organization (OMPO) Transportation Model. This approach results in a cumulative impact assessment for future conditions and takes into account any anticipated developments expected by year 2030 near the project, plus the expected growth in housing and employment for the remainder of the region.

The OMPO Model study area is divided into 23 districts. The most recent version of the OMPO Model estimates future travel demand for the entire Oahu region based on the UrbanSim modeling forecasts for year 2030.

Within the OMPO model, the entire study area covering the Oahu region is divided into approximately 763 geographic areas, known as Transportation Analysis Zones (TAZs). For each TAZ, the model estimates the travel demand based on the population and employment assumptions; determines the origin, destination, and mode of travel for each trip; and assigns those trips to the transportation network. This model output was used to determine the study intersection traffic volumes under year 2030 conditions.

Since the OMPO model was developed as a tool to forecast future traffic volumes on major regional facilities and local streets, post-processing of the model output was conducted to develop future intersection turning movement volumes. The AM and PM peak hour roadway segment volumes for each intersection approach under year 2030 conditions as predicted by the OMPO Transportation Model were utilized to calculate the turning movement volumes for year 2030.

5.1.3 Year 2030 Baseline Intersection Operations

Traffic signal warrant analysis was performed on the study intersections under Year 2030 Baseline Conditions and both the intersections were observed to satisfy the signal warrant. As such, for analysis

[5] Oahu Regional Transportation Plan 2030 (April 2006).

purposes both the study intersections were considered as signalized intersections under year 2030 conditions. Traffic signal warrant analysis sheets for Year 2030 Baseline Conditions are included in **Appendix B-1.**

Year 2030 baseline traffic volumes at the study intersections are exhibited in **Figure 5-1**; whereas, the operations of the study intersections under Year 2030 Baseline Conditions are provided in **Table 5.1.**

During the AM peak hour, the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS E, with 66.5 seconds of average delay per vehicle. The Enterprise Street/ Saratoga Avenue intersection would operate at LOS F, with 118.4 seconds of average delay per vehicle.

During the PM peak hour, both the study intersections would operate under unacceptable conditions (LOS E or worse). The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS F, with 140.2 seconds of average delay per vehicle and the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F, with 355.3 seconds of average delay per vehicle.

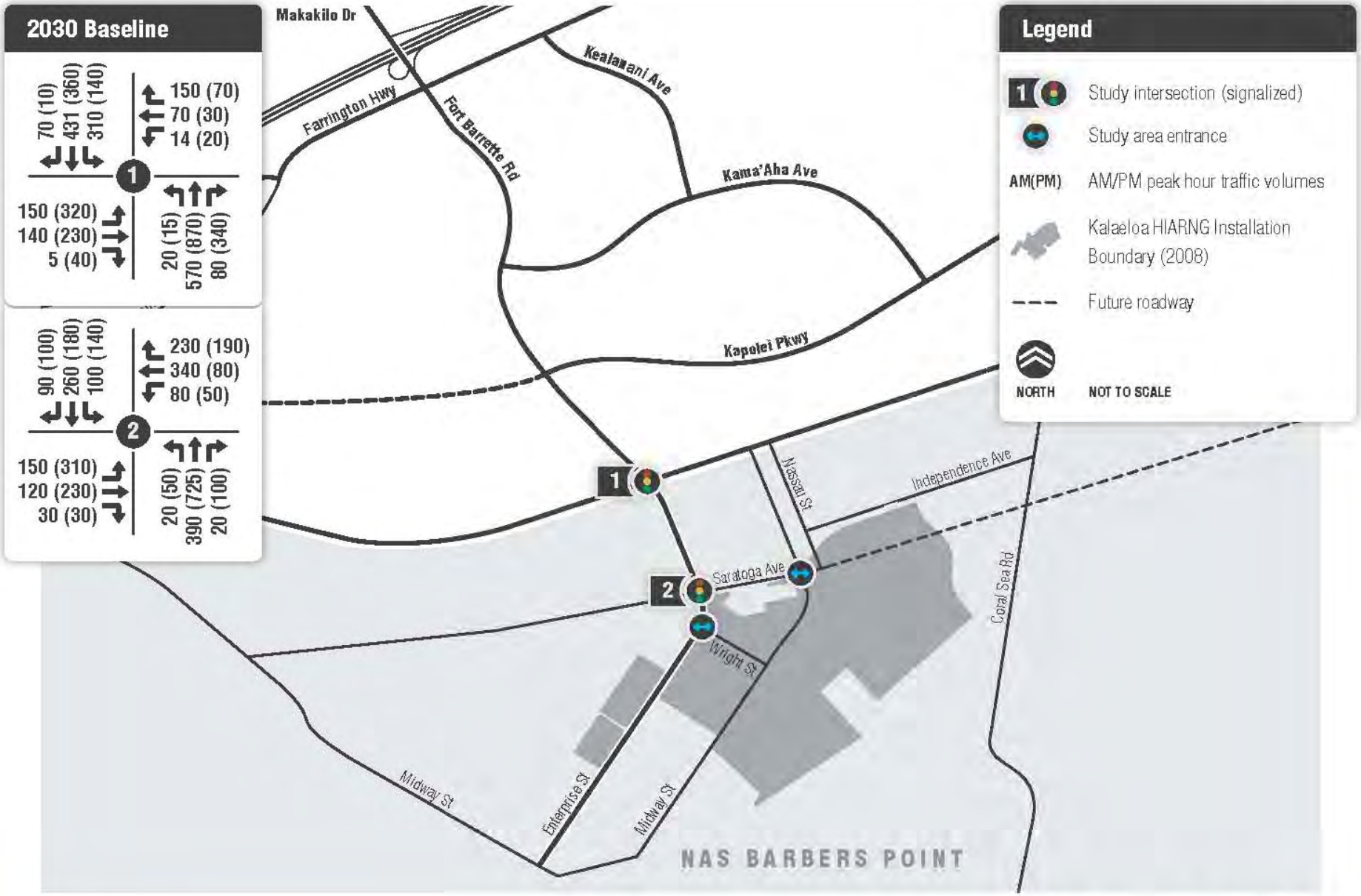
The Synchro output sheets for intersection operations are provided in **Appendix A-4**.

Table 5.1
Peak Hour Intersection Operations – Year 2030 Baseline Conditions

#	Intersection	Traffic Control	AM Peak			PM Peak		
			Delay	V/C	LOS	Delay	V/C	LOS
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**66.5**	**0.96**	**E**	**140.2**	**1.27**	**F**
2	Enterprise Street/ Saratoga Avenue	Signal	**118.4**	**1.30**	**F**	**355.3**	**2.63**	**F**

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.



YEAR 2030 BASELINE TRAFFIC VOLUMES
Figure 5-1

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5.2 Year 2030 Baseline plus Project Conditions

This section discusses the study intersection operations under Year 2030 Baseline plus Project Conditions for both the project alternatives – Preferred Alternative and Alternative 1. Turning movement volumes at the study intersections under Year 2030 plus Project Conditions are exhibited in **Figure 5-2**.

5.2.1 Year 2030 Baseline plus Project Intersection Operations – Preferred Alternative

The study intersection operations for the Preferred Alternative under Year 2030 Baseline plus Project Conditions are presented in **Table 5.2**.

During the AM and PM peak hours, both study intersections would operate at LOS F with the Preferred Alternative.

The project traffic would increase the average delay at both study intersections by more than 3 seconds. Therefore, the Preferred Alternative would result in transportation impacts at both the study intersections under Year 2030 Baseline plus Project Conditions.

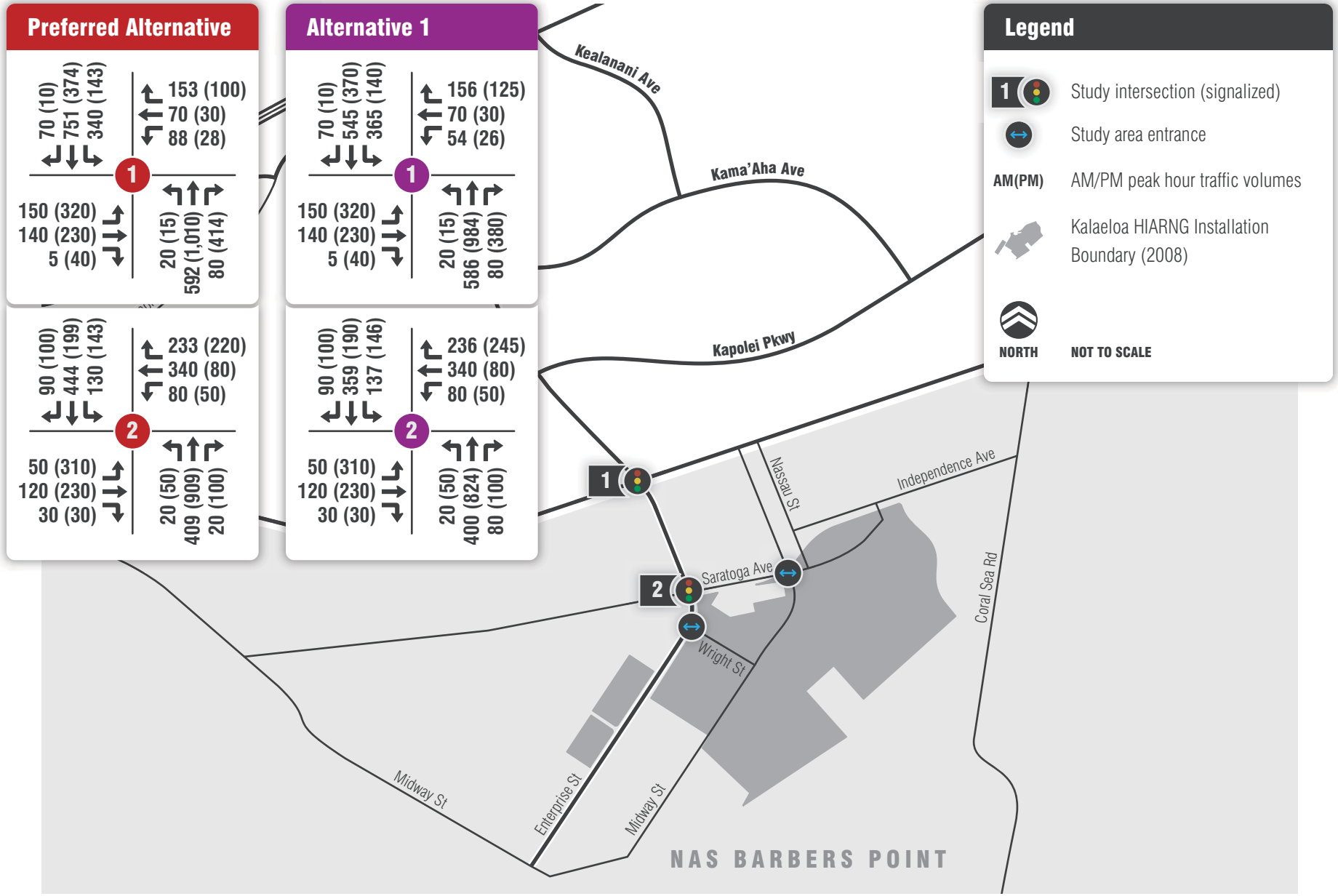
The Synchro output sheets for intersection operations are provided in **Appendix A-5**.

Table 5.2
Peak Hour Intersection Operations – Year 2030 Baseline plus Project Conditions
(Preferred Alternative)

#	Intersection	Traffic Control	2030 Baseline			2030 Baseline + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**66.5**	**0.96**	**E**	**117.1**	**1.12**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**118.4**	**1.30**	**F**	**194.1**	**1.53**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**140.2**	**1.27**	**F**	**184.8**	**1.34**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**355.3**	**2.63**	**F**	**521.7**	**3.71**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.



YEAR 2030 BASELINE PLUS PROJECT TRAFFIC VOLUMES

Figure 5-2

5.2.2 Year 2030 Baseline plus Project Intersection Operating Conditions – Alternative 1

The study intersection operations for Alternative 1 under Year 2030 Baseline plus Project Conditions are presented in **Table 5.3**.

During the AM peak hour, both the study intersections would operate under unacceptable conditions (LOS E or worse). The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate with 93.4 seconds of average delay per vehicle, while the Enterprise Street/ Saratoga Avenue intersection would operate with 191.7 seconds of average delay per vehicle.

Similar to the Preferred Alternative, both the study intersections would operate under unacceptable conditions (LOS E or worse) during the PM peak hour with Alternative 1.

The project traffic would increase the average delay at both study intersections by more than 3 seconds. Therefore, Alternative 1 would result in transportation impacts at both the study intersections under Year 2030 Baseline plus Project Conditions.

The Synchro output sheets for intersection operations are provided in **Appendix A-6**.

Table 5.3
Peak Hour Intersection Operations – Year 2030 Baseline plus Project Conditions
(Alternative 1)

#	Intersection	Traffic Control	2030 Baseline			2030 Baseline + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**66.5**	**0.96**	**E**	**93.4**	**1.08**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**118.4**	**1.30**	**F**	**191.7**	**1.53**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**140.2**	**1.27**	**F**	**161.8**	**1.33**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**355.3**	**2.63**	**F**	**452.2**	**3.19**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

6. Project Impact Analysis

This section identifies the potential transportation impacts associated with the proposed project. Recommended improvements to the surrounding circulation system are proposed at locations where significant impacts are identified. However, it should be recognized that the recommendations herein, including recommended mitigation measures, are based on traffic counts conducted in August 2009. Since the counts were done prior to the completion of several roadway improvements in the area, and new roadway improvements are planned in the vicinity, it may be prudent to conduct new traffic counts and analysis if a more timely analysis of the projects likely impact is desired.

6.1 Intersection Impacts and Mitigations

6.1.1 Existing plus Project Conditions – Preferred Alternative

As identified in Section 4.2, the Preferred Alternative would result in transportation impacts at both the study intersections. A description of the potential impacts and the proposed mitigations required to reduce the effect of those impacts is provided below.

Impact 1A: Impact at the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection under Existing plus Project Conditions (Preferred Alternative)

Under Existing Conditions, the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS F with approximate average delay value of 85 seconds during the AM peak hour and 84 seconds during the PM peak hour. Under Existing plus Project Conditions for the Preferred Alternative, the approximate average delay values of this intersection would increase to approximately 137 seconds during the AM peak hour and 108 seconds during the PM peak hour. Since the proposed project related traffic would increase the average delay values of this intersection by more than 3 seconds during both the peak hours, a transportation impact would result.

Recommended Mitigation Measures:

- Install a traffic signal.

With the proposed mitigations, the intersection operations would improve to LOS D and LOS C during the AM and PM peak hours.

Traffic signal warrant analysis sheets are provided in **Appendix B-3**, while the Synchro output sheets for the recommended mitigations are included in **Appendix C-1.**

Impact after Mitigation: Less-than-significant level

Impact 1B: Impact at the Enterprise Street/ Saratoga Avenue intersection under Existing plus Project Conditions (Preferred Alternative)

Under Existing Conditions, the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F with the worst approach having V/C ratios of 1.13 during the AM peak hour and 1.69 during the PM peak hour. Under Existing plus Project Conditions for the Preferred Alternative, the V/C ratios of this intersection would be greater than 3 during the AM peak hour and 2.84 during the PM peak hour. Since

the proposed project related traffic would increase the V/C ratios of the worst approach by more than 10 percent during both the peak hours, a transportation impact would result.

Recommended Mitigation Measures:

- Install a traffic signal.

With the proposed mitigations, the intersection operations would improve to LOS C and LOS B during the AM and PM peak hours.

Traffic signal warrant analysis sheets are provided in **Appendix B-4**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-2.**

Impact after Mitigation: Less-than-significant level

A comparison of the intersection operations with and without the recommended mitigations under Existing plus Project Conditions (Preferred Alternative) is shown in **Table 6.1**.

6.1.2 Existing plus Project Conditions – Alternative 1

As identified in *Section 4.3,* Alternative 1 would result in transportation impacts at both the study intersections. A description of the potential impacts and the proposed mitigations is provided below.

Impact 2A: Impact at the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection under Existing plus Project Conditions (Alternative 1)

Under Existing Conditions, the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS F with approximate average delay value of 85 seconds during the AM peak hour and 84 seconds during the PM peak hour. Under Existing plus Project Conditions for Alternative 1, the approximate average delay values of this intersection would increase to 131 seconds during the AM peak hour and 110 seconds during the PM peak hour. Since the proposed project related traffic would increase the average delay values of this intersection by more than 3 seconds during both the peak hours, a transportation impact would result.

Recommended Mitigation Measures:

- Install a traffic signal.

With the proposed mitigations, the intersection operations would improve to LOS D and LOS C during the AM and PM peak hours.

Traffic signal warrant analysis sheets are provided in **Appendix B-3**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-3.**

Impact after Mitigation: Less-than-significant level

Impact 2B: Impact at the Enterprise Street/ Saratoga Avenue intersection under Existing plus Project Conditions (Alternative 1)

Under the Existing Conditions, the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F with the worst approach having V/C ratios of 1.13 during the AM peak hour and 1.69 during the PM peak hour. Under Existing plus Project Conditions for Alternative 1, the V/C ratios of this intersection would be greater than 3 during both the AM and PM peak hours. Since the proposed project related traffic would increase the V/C ratios of the worst approach by more than 10 percent during both the peak hours, a transportation impact would result.

Recommended Mitigation Measures:

- Install a traffic signal.

With the proposed mitigations, the intersection operations would improve to LOS C and LOS B during the AM and PM peak hours.

Traffic signal warrant analysis sheets are provided in **Appendix B-4**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-4.**

Impact after Mitigation: Less-than-significant level

A comparison of the intersection operations with and without the recommended mitigations under Existing plus Project Conditions (Alternative 1) is shown in **Table 6.1**.

Table 6.1
Peak Hour Intersection Operations – Existing plus Project plus Mitigation Conditions

#	Intersection	Traffic Control	Existing + Project (AM)			Existing + Project + Mitigations (AM)			Existing + Project (PM)			Existing + Project + Mitigations (PM)			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	
Preferred Alternative															
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal[1]	**136.9**	-	**F**	46.7	0.92	D	**108**	-	**F**	27.2	0.76	C	No
2	Enterprise Street/ Saratoga Avenue	Signal[2]	**>1000 (EB)**	**>3**	**F**	21.1	0.81	C	**906.7 (EB)**	**2.84**	**F**	12.2	0.62	B	No
Alternative 1															
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal[1]	**131.4**	-	**F**	35.6	0.87	D	**109.4**	-	**F**	26.6	0.75	C	No
2	Enterprise Street/ Saratoga Avenue	Signal[2]	**>1000 (EB)**	**>3**	**F**	20.5	0.80	C	**>1000 (EB)**	**>3**	**F**	12.7	0.65	B	No

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.
[1]The traffic control at this intersection is an all-way stop control under without mitigation conditions and a traffic signal under with mitigation conditions.
[2]The traffic control at this intersection is a two-way stop control under without mitigation conditions and a traffic signal under with mitigation conditions.

6.1.3 Year 2030 Baseline plus Project Conditions – Preferred Alternative

As identified in *Section 5.2.1*, the Preferred Alternative would result in transportation impacts at both the study intersections. The projected traffic growth in the study area under future conditions and the project-related traffic would deteriorate the intersection operations under Year 2030 Baseline plus Project conditions. As such, mitigation measures are recommended to reduce or nullify the effect of project traffic on the study intersections. A description of the potential impacts and the proposed mitigations is provided below. It must be noted that the study intersections operate at LOS F (unacceptable conditions) under Year 2030 Baseline Conditions. The mitigations recommended below improve the intersection operations to LOS D or better (acceptable conditions). Therefore, a fair share methodology must be adopted to identify the client's contribution.

Impact 3A: Impact at the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection under Year 2030 Baseline plus Project Conditions (Preferred Alternative)

Under Year 2030 Baseline Conditions, the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS E (approximate average delay of 66 seconds) during the AM peak hour and at LOS F (approximate average delay of 140 seconds) during the PM peak hour. Under Year 2030 Baseline plus Project Conditions for the Preferred Alternative, this intersection would operate at LOS F (approximate average delay of 117 seconds) during the AM peak hour and at LOS F (approximate average delay of 185 seconds) during the PM peak hour. Since the proposed project related traffic would increase the average delay values of this intersection by more than 3 seconds while operating at LOS F during both peak hours, a transportation impact would result.

Recommended Mitigation Measures:

All of the items below would have to be completed in order to improve LOS at the intersection

1. Install a traffic signal;
2. Southbound Approach – Construct a new left-turn pocket; convert the existing shared left-through lane to a through only lane;
3. Eastbound Approach – Construct two new left-turn pockets; convert the existing shared left-through-right lane to a shared through-right lane, and
4. Westbound Approach – Convert the existing shared left-through lane to an exclusive left-turn lane; convert the existing right-turn lane to a shared through-right lane.

With the proposed mitigations, the intersection operations would improve to LOS D during both the AM and PM peak hours.

Traffic signal warrant analysis sheets are provided in **Appendix B-5**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-3.**

Impact after Mitigation: Less-than-significant level

Impact 3B: Impact at the Enterprise Street/ Saratoga Avenue intersection under Year 2030 Baseline plus Project Conditions (Preferred Alternative)

Under Year 2030 Baseline Conditions, the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F (approximate average delay of 118 seconds) during the AM peak hour and at LOS F (approximate average delay of 355 seconds) during the PM peak hour. Under Year 2030 Baseline plus Project Conditions for the Preferred Alternative, this intersection would operate at LOS F (approximate average delay of 194 seconds) during the AM peak hour and at LOS F (approximate average delay of 522 seconds) during the PM peak hour. Since the proposed project related traffic would increase the average delay values of this intersection by more than 3 seconds while operating at LOS F during both peak hours, a transportation impact would result.

Recommended Mitigation Measures:

All of the items below would have to be completed in order to improve LOS at the intersection.

1. Install a traffic signal;
2. Southbound Approach – Construct a new left-turn pocket; convert the existing shared left-through-right lane to a shared through-right lane;
3. Eastbound Approach – Construct two new left-turn pockets; convert the existing shared left-through-right lane to a shared through-right lane, and
4. Westbound Approach – Construct a new left-turn pocket; construct a new right-turn pocket; convert the existing shared left-through-right lane to an exclusive through only lane.

With the proposed mitigations, the intersection operations would improve to LOS C and LOS D during the AM and PM peak hours. Traffic signal warrant analysis sheets are provided in **Appendix B-6**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-3.**

Impact after Mitigation: Less-than-significant level

A comparison of the intersection operations with and without the recommended mitigations under Year 2030 Baseline plus Project Conditions (Preferred Alternative) is shown in **Table 6.2**.

6.1.4 Year 2030 Baseline plus Project Conditions – Alternative 1

As identified in *Section 5.2.2,* Alternative 1 would result in transportation impacts at both the study intersections. A description of the potential impacts and the proposed mitigations is provided below.

Impact 4A: Impact at the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection under Year 2030 Baseline plus Project Conditions (Alternative 1)

Under Year 2030 Baseline Conditions, the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS E (approximate average delay of 66 seconds) during the AM peak hour and at LOS F (approximate average delay of 140 seconds) during the PM peak hour. Under Year 2030 Baseline plus Project Conditions for Alternative 1, this intersection would operate at LOS F (approximate average delay of 93 seconds) during the AM peak hour and at LOS F (approximate average delay of 162 seconds) during the PM peak hour. Since the proposed project related traffic would increase the average delay values of this intersection by more than 3 seconds while operating at LOS F during both peak hours, a transportation impact would result.

Recommended Mitigation Measures:

- Same mitigations as recommended for Impact 3A.

With the proposed mitigations, the intersection operations would improve to LOS D during both the AM and PM peak hours. Traffic signal warrant analysis sheets are provided in **Appendix B-5**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-4.**

Impact after Mitigation: Less-than-significant level

Impact 4B: Impact at the Enterprise Street/ Saratoga Avenue intersection under Year 2030 Baseline plus Project Conditions (Alternative 1)

Under Year 2030 Baseline Conditions, the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F (approximate average delay of 118 seconds) during the AM peak hour and at LOS F (approximate average delay of 355 seconds) during the PM peak hour. Under Year 2030 Baseline plus Project Conditions for Alternative 1, this intersection would operate at LOS F (approximate average delay of 192 seconds) during the AM peak hour and at LOS F (approximate average delay of 452 seconds) during the PM peak hour. Since the proposed project related traffic would increase the average delay values of this intersection by more than 3 seconds while operating at LOS F during both peak hours, a transportation impact would result.

Recommended Mitigation Measures:

- Same mitigations as proposed for Impact 3B.

With the proposed mitigations, the intersection operations would improve to LOS C and LOS D during the AM and PM peak hours.

Traffic signal warrant analysis sheets are provided in **Appendix B-6**, while the Synchro output sheets for the recommended mitigation measures are included in **Appendix C-4.**

Impact after Mitigation: Less-than-significant level

A comparison of the intersection operations with and without the recommended mitigations under Year 2030 Baseline plus Project Conditions (Alternative 1) is shown in **Table 6.2**.

6.2 Pedestrian and Bicycle Impacts

The proposed project would not affect existing and future bicycle and pedestrian facilities; therefore, there would be no identifiable pedestrian and bicycle impacts associated with the proposed project.

6.3 Transit Impacts

There would be no identifiable transit impacts associated with the proposed project.

Table 6.2
Peak Hour Intersection Operations – Year 2030 Baseline plus Project plus Mitigation Conditions

#	Intersection	Traffic Control	2030 Baseline + Project (AM)			2030 Baseline + Project + Mitigations (AM)			2030 Baseline + Project (PM)			2030 Baseline + Project + Mitigations (PM)			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	
Preferred Alternative															
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**117.1**	**1.12**	**F**	40.6	0.91	D	**184.8**	**1.34**	**F**	50.7	1.00	D	No
2	Enterprise Street/ Saratoga Avenue	Signal	**194.1**	**1.53**	**F**	25.5	0.72	C	**521.7**	**3.71**	**F**	54.1	0.94	D	No
Alternative 1															
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**93.4**	**1.09**	**F**	39.2	0.89	D	**161.8**	**1.33**	**F**	52.7	1.00	D	No
2	Enterprise Street/ Saratoga Avenue	Signal	**191.7**	**1.53**	**F**	26.2	0.74	C	**452.2**	**3.19**	**F**	51.0	0.94	D	No

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

6.4 Construction Impacts

The construction of the proposed project is estimated to start in year 2011 and conclude in year 2014. Construction vehicles accessing the project site would include cement vehicles, construction worker vehicles, and additional heavy vehicles (including single-unit and combination trucks). The approximate number of construction vehicles has not been determined yet. The construction-related traffic is estimated to access the project site from the north using the H-1 Freeway and from the west using local streets. As such, it is assumed that Fort Barrette Road/ Enterprise Avenue, Roosevelt Avenue, and Saratoga Avenue would experience the majority of construction traffic. Under Existing Conditions, the study intersections operate at LOS F (unacceptable conditions). The construction-related traffic would further worsen the study intersection operations and cause impacts to them. However, these are temporary impacts and occur during the construction phase only. The following mitigation measures are recommended to either reduce or nullify the constructions impacts:

- Schedule construction operations during off-peak period, so that construction traffic would not disrupt the peak period traffic.
- Provide a park-and-ride lot for construction workers located nearby the H-1 freeway. Shuttles can be used to transport them between the park-and-ride lot and the project site.

7. Training Period Analysis

Presently 530 full-time personnel work at Kalaeloa on weekdays. In addition, 654 inactive duty reserve personnel conduct training exercises at Kalaeloa. Reserve personnel train one weekend per month and two consecutive weeks during the summer each year. However, not all reserve personnel train simultaneously. The proposed action will station 108 full-time and 285 inactive duty reserve personnel presently operating at Wheeler Army Airfield to Kalaeloa. Additionally, 266 full-time (including 34 from CSMS) and 229 inactive duty reserve personnel that are stationed at Fort Ruger will relocate to Kalaeloa.

Based on the above, reserve personnel were estimated to be on-site between 38 and 63 days each year for training purposes, including at least one weekend per month and two consecutive weeks during summer annually. The actual number of on-site days for a given reserve unit would vary according to the training requirements

Since the total number of on-site reserve personnel can vary depending on deployment, the analysis assumes that the number of reserve personnel that could potentially be on site at any time would not exceed 322 staff members, which represents the maximum number of reserved personnel for the aviation units likely to be on-site during training exercises. The remaining non-aviation units would likely train at different times or at other locations and are not included in the traffic estimate for the training period analysis.

The following section includes an assessment of the study area operations when HIARNG Reserve Personnel would access the project site during the training period in summer. For the weekend training period, this analysis is not valid.

7.1 Reserve Personnel Trip Distribution

The 322 reserve personnel would enter the project site during the AM peak hour and exit during the PM peak hour. The trip distribution percentages that were applied to full-time personnel and military vehicles, as discussed in Section 3.3, were also applied to the reserve personnel trips.

7.2 Existing plus Project Conditions – Training Period

This section describes the intersection operations under Existing plus Project conditions during the training period. The traffic volumes at the study intersections under Existing plus Project Conditions during the training period are exhibited in **Figure 7-1.**

7.2.1 Intersection Operations – Preferred Alternative

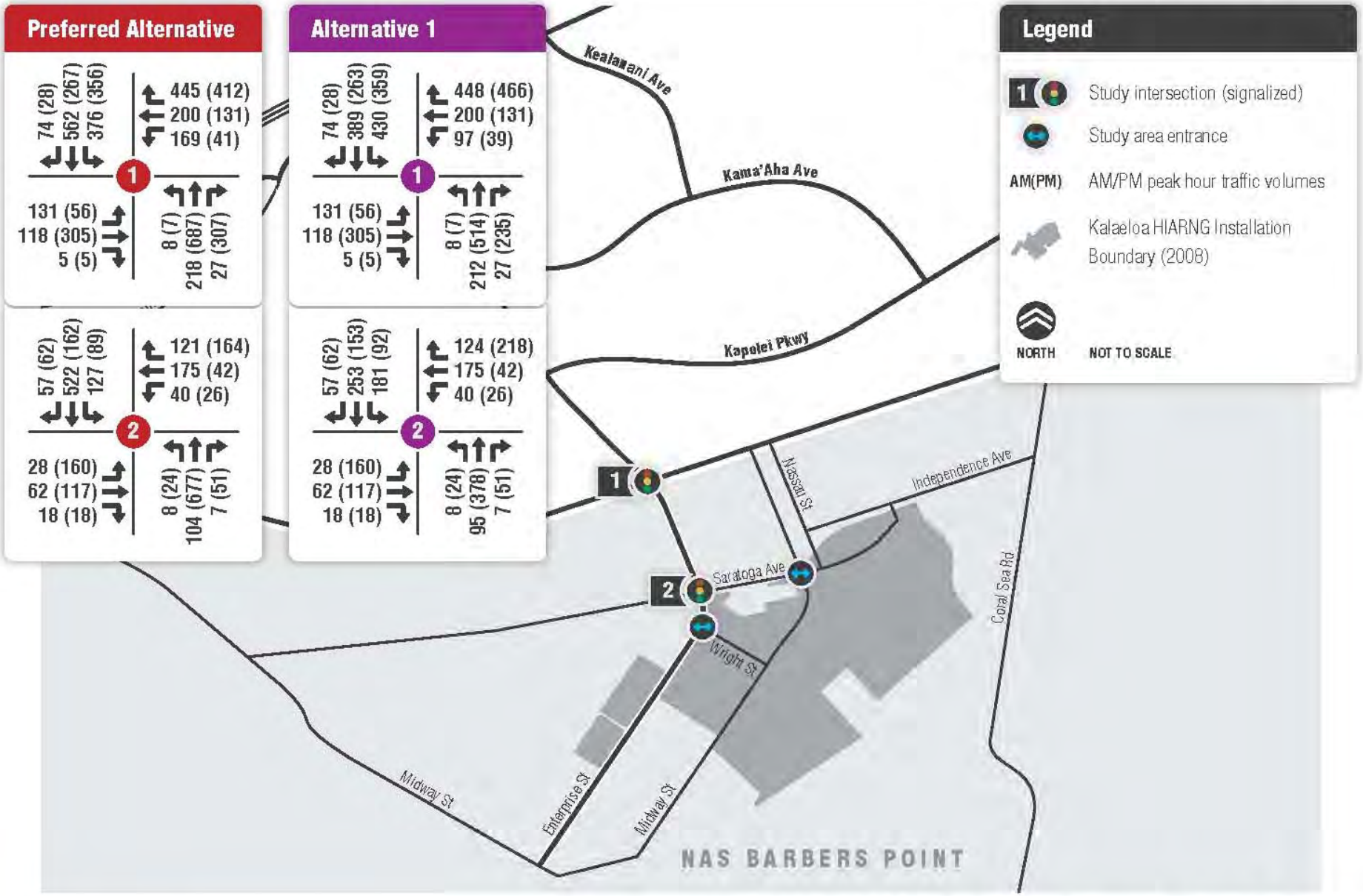
The study intersection operations under Existing plus Project Conditions for the preferred Alternative are shown in **Table 7.1.**

During the AM peak hour, both the study intersections would operate at an unacceptable LOS (LOS F) under Existing plus Project Conditions. The Enterprise Street/ Saratoga Avenue intersection would have an average delay of greater than 1,000 seconds per vehicle and the Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would have an average delay of 226.3 seconds per vehicle.

Similar to AM peak hour, both the study intersections would continue to operate at LOS F during the PM peak hour.

During both the peak hours, the average delay values at the study intersections would increase by more than 3 seconds compared to Existing Conditions. Therefore, during the training period, the Preferred Alternative would result in transportation impacts at both the study intersections under Existing plus Project Conditions.

The Synchro output sheets for intersection operations are provided in **Appendix A-7**.



EXISTING PLUS PROJECT TRAFFIC VOLUMES (TRAINING PERSONNEL)

Figure 7-1

WilburSmith ASSOCIATES

Table 7.1
Peak Hour Intersection Operations – Existing plus Project Conditions (Training Period)
Preferred Alternative

#	Intersection	Traffic Control	Existing			Existing + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**84.5**	**-**	**F**	**226.3**	**-**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**111.7 (WB)**	**1.13**	**F**	**>1000 (WB)**	**4.02**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**83.6**	**-**	**F**	**213.9**	**-**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**372.6 (EB)**	**1.69**	**F**	**>1000 (EB)**	**14.3**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
AWSC – All-way Stop Control, TWSC – Two-way Stop Control
V/C – Volume-to-capacity ratio
EB – Eastbound, WB – Westbound
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

7.2.2 Intersection Operations – Alternative 1

The study intersection operations under Existing plus Project Conditions for Alternative 1 are shown in **Table 7.2.**

The operations of the study intersections under Alternative 1 would be similar to those under the Preferred Alternative. The study intersections would operate at an unacceptable LOS (LOS F) during both the AM and PM peak hours. Compared to Existing Conditions, the average delay values of both the intersections would increase by more than 3 seconds during the AM and PM peak hours. Therefore, during the training period, Alternative 1 would result in transportation impacts at both the study intersections under Existing plus Project Conditions.

The Synchro output sheets for intersection operations are provided in **Appendix A-8**.

Table 7.2
Peak Hour Intersection Operations – Existing plus Project Conditions (Training Period)
Alternative 1

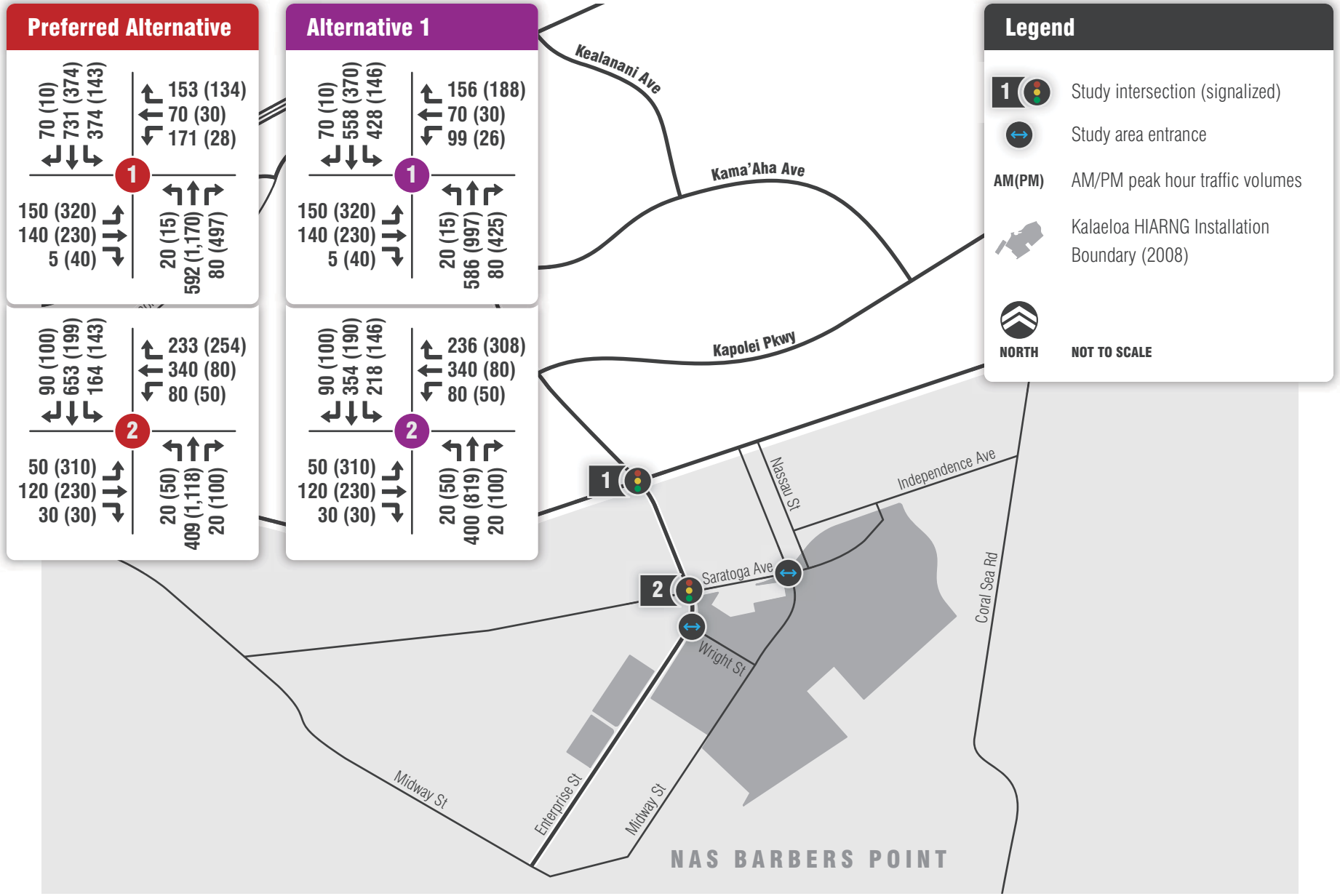
#	Intersection	Traffic Control	Existing			Existing + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**84.5**	**-**	**F**	**171.1**	**-**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**111.7 (WB)**	**1.13**	**F**	**>1000 (WB)**	**2.84**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	AWSC	**83.6**	**-**	**F**	**175.2**	**-**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	TWSC	**372.6 (EB)**	**1.69**	**F**	**>1000 (EB)**	**8.6**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
AWSC – All-way Stop Control, TWSC – Two-way Stop Control
V/C – Volume-to-capacity ratio
EB – Eastbound, WB – Westbound
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

7.3 Year 2030 Baseline plus Project Conditions – Training Period

This section describes the intersection operations under Year 2030 Baseline plus Project conditions during the training period. The traffic volumes at the study intersections under Year 2030 Baseline plus Project Conditions during the training period are exhibited in **Figure 7-2.**



YEAR 2030 BASELINE PLUS PROJECT TRAFFIC VOLUMES (TRAINING PERSONNEL)

Figure 7-2

WilburSmith ASSOCIATES

7.3.1 Intersection Operations – Preferred Alternative (Training Period)

The study intersection operations under Year 2030 Baseline plus Project Conditions for the Preferred Alternative are shown in **Table 7.3.**

During the AM peak hour, both the study intersections would operate under unacceptable conditions (LOS E or worse). The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would operate at LOS F, with 194.4 seconds of average delay per vehicle, while the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F, with 282.9 seconds of average delay per vehicle.

Similarly, both the study intersections would operate under unacceptable conditions (LOS E or worse) during the PM peak hour. The Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue intersection would continue to operate at LOS F, with 192.9 seconds of average delay per vehicle And the Enterprise Street/ Saratoga Avenue intersection would operate at LOS F, with 970.2 seconds of average delay per vehicle.

Compared to Year 2030 Baseline Conditions, the average delay values of the study intersections would increase by more than 3 seconds during the AM and PM peak hours. Therefore, during the training period, the Preferred Alternative would result in transportation impacts at both the study intersections under Year 2030 Baseline plus Project Conditions..

The Synchro output sheets for intersection operations are provided in **Appendix A-9**.

Table 7.3
Peak Hour Intersection Operations – Year 2030 Baseline plus Project Conditions (Training Period)
Preferred Alternative

#	Intersection	Traffic Control	2030 Baseline			2030 Baseline + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**66.5**	**0.96**	**E**	**194.4**	**1.38**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**118.4**	**1.30**	**F**	**282.9**	**1.77**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**140.2**	**1.27**	**F**	**192.9**	**1.43**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**355.3**	**2.63**	**F**	**970.2**	**6.75**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

7.3.2 Intersection Operations – Alternative 1

The study intersection operations under Year 2030 Baseline plus Project Conditions for Alternative 1 are shown in **Table 7.4.**

During both the AM and PM peak hours, the study intersections would operate under unacceptable conditions (LOS E or worse).

Similar to the Preferred Alternative, the project traffic during the training period would increase the V/C ratios of the study intersections operating at LOS F under baseline conditions by more than 10 percent and would increase the average delays by more than 3 seconds. Therefore, during the training period, Alternative 1 would result in transportation impacts at both the study intersections under Year 2030 Baseline plus Project Conditions.

The Synchro output sheets for intersection operations are provided in **Appendix A-10**.

Table 7.4
Peak Hour Intersection Operations – Year 2030 Baseline plus Project Conditions (Training Period)
Alternative 1

#	Intersection	Traffic Control	2030 Baseline			2030 Baseline + Project			Impact?
			Delay	V/C	LOS	Delay	V/C	LOS	
AM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**66.5**	**0.96**	**E**	**130.8**	**1.15**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**118.4**	**1.30**	**F**	**249.3**	**1.69**	**F**	Yes
PM Peak Hour									
1	Fort Barrette Road/ Enterprise Street/ Roosevelt Avenue	Signal	**140.2**	**1.27**	**F**	**159.6**	**1.34**	**F**	Yes
2	Enterprise Street/ Saratoga Avenue	Signal	**355.3**	**2.63**	**F**	**498.7**	**3.48**	**F**	Yes

Source: Wilbur Smith Associates, November 2009

Notes:
Signal – Traffic Signal
V/C – Volume-to-capacity ratio
Delay is presented in seconds per vehicle.
Bold type indicates unacceptable LOS values.

7.4 Intersection Impacts and Mitigations – Training Period

The analysis indicates that during the training period, the project traffic consisting of the full-time personnel and the reserve personnel would result in significant impacts to the study intersections. However, these transportation impacts occur for a short period only, two weeks annually in summer. For the rest of the year, training occurs during the weekends, when traffic in the study area would be less than the average weekday traffic. Since the impacts due to the training traffic are restricted to a short period,

no permanent mitigations are recommended to improve the intersection operations. However, the following transportation demand strategies are proposed to reduce the transportation impacts:

- Schedule the training to begin and end during off-peak period so that the training traffic would avoid the peak commute period.
- Promote car-pooling among the trainees to reduce the number of vehicle trips to the project site.
- Encourage trainees to use bicycles by providing bicycle parking and shower facilities within the project site.
- Arrange shuttles to transport the trainees to/from the project site.

8. Conclusions

This transportation impact analysis evaluated the operations of two key intersections under Existing Conditions, Year 2030 Baseline Conditions, Existing plus Project Conditions, and Year 2030 Baseline plus Project conditions. The traffic operations at each intersection were assessed under two build alternatives - 1) Preferred Alternative and 2) Alternative 1. Each alternative considered a different building layout and gateway locations for the proposed project.

The results of the analysis indicate that the two study intersections currently operate under unacceptable conditions and the proposed project would increase traffic and further worsen their traffic operations. As such, the proposed project would result in significant impacts to both the study intersections.

A comparison of the build alternatives indicates that the traffic operations would be similar under both the alternatives.

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APPENDIX F
FLEXTIME POLICIES

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BENJAMIN J. CAYETANO
GOVERNOR

EDWARD L. CORREA, JR.
MAJOR GENERAL
ADJUTANT GENERAL

CLARENCE M. AGENA
BRIGADIER GENERAL (HI)
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

HIHRO

MEMORANDUM FOR SEE DISTRIBUTION

21 MAR 2002

SUBJECT: 5-4-9 Flexible Work Schedule

1. The State of Hawaii, Department of Defense, shall maintain a safe, healthy and positive work environment for all our employees. To fulfill this directive, I have authorized the 5-4-9 flexible work schedule for our full-time support personnel of the Hawaii Army National Guard.

2. In order to ensure we meet our mission requirements and maintain our support to our soldiers, employees and the public, the following guidelines will be implemented and followed in the Hawaii Army National Guard regarding the 5-4-9 flexible work schedule:

a. As the Adjutant General, I retain the right to prescribe work schedules necessary to meet the requirements established in Hawaii Revised Statutes, Federal and State mission requirements.

b. Our supervisors retain the right to schedule irregular tours of duty throughout the administrative workweek and the right to assign personnel to the appropriate modified work schedule. The exclusive bargaining unit representative will be given two weeks notice and the right to bargain over the impact and implementation of any changes to the 5-4-9 flexible work schedules.

c. Supervisors will make every reasonable effort to accommodate full-time support personnel request for exclusion from the 5-4-9 flexible work schedule based upon personal hardship. Personnel may request to remain or change to the standard 5 days, 8 hours work schedule due to personal hardship.

d. The default off day will be the second Monday of every pay period based upon the federal pay period calendar. If a holiday occurs on the second Monday, the preceding workday will be the designated in lieu of holiday (Friday).

e. Supervisors may designate another working day as the off day in order to accomplish mission requirements. However, once the designated off day is established, it cannot be adjusted or changed without my approval. The exclusive bargaining unit representatives will be notified in advance prior to schedule changes.

f. Full time support personnel using the 5-4-9 flexible work schedules may continue to utilize flexitour. Using flexitour, our employees are allowed to select starting and stopping times with their supervisor's approval. Once selected, the hours are fixed until the employee or agency agrees to select different starting and stopping times. Personnel may establish their start times between 0600 and 0800 hours.

g. There will be no "glide scheduling" of personnel using the 5-4-9 flexible work schedule.

h. Core hours for the agency will be 0900 to 1500 hours daily.

3. The United States Property and Fiscal Office (USPFO) will be responsible to ensure that all units are in compliance with this policy in addition to federal and state laws. The time and attendance cards will be monitored to ensure compliance with this policy. All work schedule changes will be submitted to the USPFO at least three weeks prior to the pay period that the change is taking place. (See enclosure)

4. This policy does not supersede any applicable collective bargaining agreement. Employees should refer to their collective bargaining agreement or inquire with their union representative for guidance regarding enforcement of the policy. Any grievances regarding this policy will follow collective bargaining agreements. Any disciplinary actions will be administrated in accordance with National Guard Regulation 600-5 and Technician Personnel Regulation (TPR) 752.

5. This policy is applicable to all HIARNG federal technicians, AGR personnel and State employees who are exempt from the Fair Labor Standard Act. The United Public Workers (UPW) bargaining unit members are exempt from this policy. This policy is effective immediately and will remain in effect unless superseded.

6. This revised work schedule policy is one of many positive steps we are taking to improve the working conditions in our department while simultaneously improving productivity. I encourage all efforts by supervisors and employees to foster a culture that continues to enhance job performance of our people. I will monitor this policy to ensure we continue to fulfill our duty and obligations to our community, state and country. If

HIHRO
SUBJECT: 5-4-9 Flexible Work Schedule

you have any questions about this policy, please contact Colonel Joseph J. Chaves, Personnel Officer, at (808) 733-4118.

EDWARD L. CORREA, JR.
Major General, HIARNG
Adjutant General

Encl:
Work Schedule Change Sheet

DISTRIBUTION:
A

WORK SCHEDULE CHANGE

SSN: NAME: ACT UIC: DIST:

EFFECTIVE DATE_____ T&A STATUS CODE: AWS CODE:

**********PAY PERIOD TOUR OF DUTY********

	SUN	MON	TUE	WED	THR	FRI	SAT
WEEK 1							
SHIFT							
NIGHT DIFF							
WEEK 2							
SHIFT							
NIGHT DIFF							

TIMECARD DESTINATION_____

UNGRADED EMPLOYEE: ROTATING SHIFT HOURS (1)_____ (2)_____ (3)_____

_____ _____

CERTIFYING OFFICIAL SIGNATURE DATE SUBMITTED

1. **AWS CODE:** Use "0" for not on 5-4-9 schedule and "6" for 5-4-9 schedule.
2. The "**Effective Date**" should be the **first day of the pay period** to be changed.
3. **Work schedule changes** must be **received by the CSR, O/USPFO-HI, three weeks prior to the start of the affected pay period.**

HIARNG FORM 157, 21 March 2002

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495

POLICY DIRECTIVE 1989-6

31 October 1989

SUBJECT: FLEXIBLE WORKING HOURS PROGRAM

1. REFERENCE. State of Hawaii, Department of Personnel Services memorandum, 30 June 1989, subject: Policy on Flexible Working Hours.

2. GENERAL.

a. Purpose.

(1) To provide employees with the opportunity to participate in setting their work starting and ending times, where feasible, to accommodate individual needs.

(2) To improve productivity and efficiency through improved employee working conditions and/or increased hours of operations.

(3) To help ease peak morning and afternoon traffic congestion by spreading work arrival and departure times.

b. Applicability. Departmental -- State and Federal employees -- participation is encouraged; however, mission requirements and existing non-traditional work hours may preclude participation by some.

3. DEFINITIONS.

a. Office Hours. The hours during which a government office is open to transact public business. For most offices, the hours are from 0745 to 1630, Monday through Friday, unless otherwise provided by executive order. (Ref. Section 80-1, Hawaii Revised Statutes.)

b. Work Day. The period of eight hours (excluding meal break) during which a full-time employee is scheduled to perform the duties of his position.

c. Flexible Working Hours. A privilege granted to an employee to arrive at or depart from work at times other than those set by Office Hours. This program authorizes the following type of flexible hours:

Staggered Hours. A flexible hours program in which employees arrive at and depart from work during the flexible bands at fixed-time

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This Policy Directive supersedes CPR 30/40/51-110, 5 May 1978, subject as above.

intervals (15 minutes) set by management. Employees are afforded an opportunity to request the start-end times or to request a change to such times.

d. Core Time. The hours (except lunch break) during which all employees of the work unit must be at work. Core Time shall begin no later than 0900 and end no sooner than 1515.

e. Flexible Bands. The hours preceding and following the core time during which employees may be afforded a choice over their starting and departure times. The Flexible Bands shall not exceed 0630-0900 and 1515-1745.

f. Flexible Lunch Break. Management may allow employees to expand their 45-minute lunch break, provided the employee makes up the time and works a total of 8 hours in a day. This option may be exercised only after the employee's supervisor has approved such request in advance of the Flexible Lunch Break. Employees on a Flexible Lunch Break shall not be considered to be on a split shift.

4. RESPONSIBILITY. The authority and responsibility for implementing this program rests with the Adjutant General. Program managers are the key persons who can most accurately assess operational needs and tailor a flexible working hours plan best suited for the work unit. Applicable laws, rules, regulations, including the collective bargaining agreement shall be observed.

a. Department of Personnel Services.

(1) Provide overall guidance in the implementation of this policy.

(2) Provide assistance when requested in developing and implementing the departmental programs, encouraging the widest application of this program.

(3) Maintain statewide data on the level of participation by employees, on the types and extent of the departmental programs.

b. Department. In the Department of Defense, the Support Personnel Management Office (SPMO) and the Administrative Services Office (ASO), Personnel Section, shall be responsible for developing, implementing and maintaining currency of the specific flexible working hours program in accordance with this policy and rules, regulations and collective bargaining agreement as applicable.

5. GENERAL GUIDELINES.

a. Where the same starting time is selected by more employees than can be accommodated, approval of employees' selections will be based on the following criteria:

(1) Operational requirements.

(2) Recognizing employees' use of public transportation, or use of carpooling and vanpooling.

(3) Seniority.

b. In authorizing employee selection of starting times, management should give due consideration to items 1 through 7 below:

(1) Work unit or crew limitation - e.g.

(a) Whether or not all members of a work unit must start together.

(b) Whether or not different crews need all report simultaneously for work.

(2) Shift requirements - e.g.

(a) Can some employees be offered flexible hours?

(b) Should shift times be revised?

(3) Machine down time.

(4) Need for continuous staffing of office to service public during office hours.

(5) Operational efficiency and safety - e.g.

(a) Can an employee arriving early still contact other offices to obtain information essential to his own tasks?

(b) Are working conditions such that an employee can safely be in the workplace alone?

(6) Supervisory requirements - e.g.

(a) Does the nature of the work require continuous presence of a supervisor for decisions, approval, assignment of tasks, etc.?

(b) Adequate supervisory control must be maintained without incurring additional expense.

(7) Size of the operation unit - e.g.

(a) Is the unit too small to provide continuous service during office hours unless all employees arrive and depart at the same time?

(b) If the office does not service the public, could the office hours be changed?

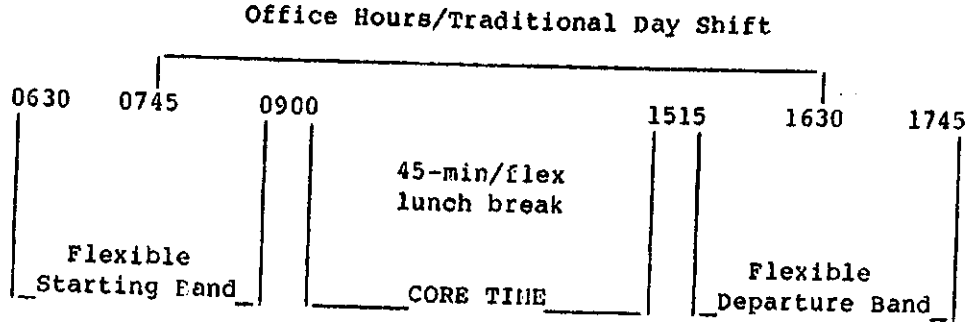
(c) Management is encouraged to review its total operations, giving due consideration to such items as 1 through 7 above, in order that the largest number of employees may be allowed to participate in flexible working hours.

c. Nothing herein shall be construed to require the establishment of a formal time-keeping system; however, attendance record may be required by other programs. Managers are advised to ensure proper time-keeping controls to prevent abuse of privileges and to minimize possible FLSA violations.

6. FLEX-TIME PARAMETERS

a. The time frame limits available for this program shall be from 0630 to 1745. (Work schedules for employees who already start work before 0630 or end work after 1745 need not have those times changed to conform to this position.)

b. Example of flexible bands and core time is shown below:



If an employee is authorized staggered hours, the employee may request consideration for a change in the start-end time selected for such reasons as carpooling, geographic transportation. Such requests should be accommodated unless there are overriding operational needs or the change may be impractical from an administrative standpoint.

7. DEPARTMENTAL IMPLEMENTATION PROCEDURES.

a. The outside parameters of the flexible hours program shall be within the 0630 to 1745 time frame and shall be appropriate to operations.

b. Supervisors must inform their subordinates of the program. The availability of the staggered work hours program which may differ based upon operational requirements, safety factors or similar appropriate reasons. When a request is denied, the immediate supervisor must provide the employee with

an explanation for the denial. Division/staff office managers will establish informal procedures to be used by employees who wish to receive reconsideration of their denied requests when denial lacked substantive cause. These informal procedures must permit reconsideration up to division/staff office manager level.

c. When mission requirements preclude approval of flexible working hours schedules for all employees in an activity/facility/worksite, the supervisor must base approvals and denials on the skills and types of work required by the mission. Where all other factors are equal, the employee with the most seniority within the Department of Defense will be given preference of schedule under the flexible working hours program.

d. Time and attendance verification is mandatory. Scheduling under the flexible working hours program will be established so that no less than two employees will be permitted to work during non-traditional hours (0630 to 0745 and 1630 to 1745) unless a supervisor is present to verify attendance within each activity/facility/worksite.

e. Employees participating in the program should be informed that their schedule selections must be maintained on a continuing basis. A schedule will be documented and maintained at each worksite. It is suggested that a copy of the schedule be posted in an appropriate place at each worksite.

f. Requests for schedule changes must be accepted/approved by the appropriate manager prior to changing. It is suggested that, when possible, schedule changes be made in conjunction with pay periods.

(HIADMP)

ALEXIS T. LUM
Major General, HIARNG
Adjutant General

DISTRIBUTION:
A

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APPENDIX G
HISTORIC RESOURCES CORRESPONDENCE

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XEROX COPY WITH NON-REMOVABLE
ATTACHMENT

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTY
ERNEST Y. W. LAU

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

FEB 28 2003

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

Richard Young, Colonel, Engineer
Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

LOG NO: 31735
DOC NO: 0302st08
Architecture

Dear Colonel Young:

SUBJECT: **Section 106 Review (NHPA)**
Refurbishing of Buildings 117 and 282 at Kalaeloa
TMK: (1)9-1-013:001, Barbers Point, Ewa, Oahu, Hawaii

Thank you for the letter dated February 11, 2003, regarding the proposed refurbishing of Buildings 117 and 282. According to Suzuki/Morgan Architects, Ltd. the Building 282 project has not yet been awarded by the National Guard so there are no drawings. We believe that the final plans of Building 117 dated November 01, 2002, meet the Secretary of Interior Standards, therefore there should be "no historic properties adversely affected." We note and applaud that the majority of the windows will be refurbished. Should any changes occur to the plans during construction, please contact our office.

Thank you for the opportunity to comment. Should you have any questions please contact Susan Tasaki at 692-8032.

Sincerely,

Peter T. Young, Chairman and
State Historic Preservation Officer

ST:jk

Post-it® Fax Note 7671	Date 3/31/03	# of pages ▶ 01
To Ruth	From Susan	
Co./Dept.	Co.	
Phone #	Phone #	
Fax # 735-0532	Fax #	

MAR - 3 2003

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 28, 2008

Lieutenant Colonel Marjean Stubbert
Facility Management Officer
Hawaii Army National Guard
State of Hawaii Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

LOG NO: 2008.3054
DOC NO: 0807AL13
Architecture

Dear Lieutenant Colonel Stubbert:

SUBJECT: Section 106 (NHPA) Consultation
Emergency Repairs
Building 117
Kalaeloa (Barbers Point Naval Air Station), Island of O'ahu
TMK: 1-9-1-13:045 and 1-9-1-13:050

This is in response to your letter dated July 17, 2008, which we received in our office on July 23. SHPD staff engaged in a site visit regarding this project on July 22.

The proposed project is to make immediate repairs to Building 117 to avert the danger of exterior panels above the main hangar doors on the front and rear façades detaching for termite-deteriorated wooden members. The HIARNG will remove and replace in-kind the deteriorated wood structural members and reattach existing corrugated metal panels and downspouts. Deteriorated fascia will also be replaced in-kind. Constructed in 1944 for the repair and assembly of carrier planes at Barbers Point Naval Air Station, Building 117 is a Category I facility eligible for listing on the National Register of Historic Places under criteria A and C. Copies of the HABS photo-documentation were enclosed with the transmittal.

Thank you for the opportunity to consult. Based on the scope of work, the SHPD concurs with the Hawaii Army National Guard's determination of **no adverse effect** for the proposed undertaking. Should you have any architectural questions or concerns, please do not hesitate to contact Dr. Astrid Liverman in our O'ahu office at (808) 692-8028 or Astrid.M.Liverman@hawaii.gov.

Sincerely,

Nancy A. McMahon
Deputy State Historic Preservation Officer
Archaeology and Historic Preservation Manager

AMBL:

LINDA LINGLE
GOVERNOR

ROBERT G. F. LEE
MAJOR GENERAL
ADJUTANT GENERAL

GARY M. ISHIKAWA
BRIGADIER GENERAL (HI)
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

May 12, 2009

HIARFM-ENV

Nancy McMahon
Deputy State Historic Preservation Officer
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building
601 Kamokila Blvd., Suite 555
Kapolei, Hawai`i 96707

Dear Ms. McMahon:

Subject: Section 106 (NHPA) Review
Emergency Repairs to Building 117 at Kalaeloa (Barbers Point Naval Air Station)
TMK: 9-1-13-45 and 9-1-13-50

The Hawaii Army National Guard (HIARNG) intends to repair a building eligible for listing on the National Register of Historic Places (NRHP). Repairs to Building 117 are necessary to eliminate the danger of cracked glass windows in the upper hanger bay falling and presenting an unacceptable risk to personnel and property. The HIARNG intends to place clear Fiberglass Corrugated Panels on 1"x 4" wooden runners, secured to the metal frames of each 5' wide banks of windows. The clear Fiberglass Corrugated Panels will be mounted over the wooden runners on the inside of the building. This design will still allow ambient light and will not change the outside appearance of the 12"x12" divided light window. Installation of the clear fiberglass panels is a temporary, emergency repair to prevent serious injury or death , as the high bay windows are scheduled to be replaced in kind within the next few years.

Building 117, a World War II era aircraft hangar, was built in 1944 by Albert Kahn as part of the Naval Air Station at Barbers Point involved in the repair and assembly of WWII carrier planes. This building is classified as a Category I (property of major importance) structure eligible for the NRHP under criterion A and C. Photographs of the building and high bay windows, and a site map are enclosed with this letter.

Section 106 of the National Historic Preservation Act of 1966 requires Federal agencies to take into account the effects of their undertakings on historic properties and to consult with our State's Historic

Preservation Division to determine a finding of No Adverse Effect. The HIARNG seeks a concurrence of No Adverse Effect for this undertaking from your office in writing within 30 days of receipt of this letter.

If there are any questions, please contact Ms. Angela Kieran-Vast at (808) 672-1255.

Sincerely,

Marjean Stubbert
Lieutenant Colonel
Hawaii Army National Guard
Facility Management Officer

Enclosures

LINDA LINGLE
GOVERNOR

ROBERT G. F. LEE
MAJOR GENERAL
ADJUTANT GENERAL

GARY M. ISHIKAWA
BRIGADIER GENERAL (HI)
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

May 20, 2009

NGHI-ENV

Nancy McMahon
Deputy State Historic Preservation Officer
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building
601 Kamokila Blvd., Suite 555
Kapolei, Hawai`i 96707

Dear Ms. McMahon:

Subject: Review of Final Draft Historic Building Survey and Evaluation Report of Hawaii Army National Guard Installations, Hawaii
TMK: Various

Dear Ms. McMahon:

Enclosed are one hard copy and one electronic copy of the Final Draft Historic Buildings Survey and Evaluation Report of Ten Hawaii Army National Guard Facilties, for your review. Section 106 of the National Historic Preservation Act of 1966 requires Federal agencies to take into account the effects of their undertakings on historic properties and to consult with our State's Historic Preservation Division on our findings of buildings eligible for the National Register of Historic Places. The HIARNG seeks comments and/or concurrence from your office on this document.

We request that your organization review the enclosed documents and provide comments and/or concurrence in writing to the HIARNG within 30 days of receipt of this letter.

If there are any questions, please contact Ms. Angela Kieran-Vast at (808) 672-1255.

Sincerely,

Marjean Stubbert
Lieutenant Colonel
Hawaii Army National Guard
Facility Management Officer

Enclosures

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
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KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 1, 2009

Lt. Col. Marjean Stubbert
Hawaii Army National Guard
Facility Management Officer
State of Hawaii
Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, HI 96816-4495

LOG NO: 2009.2274
DOC NO: 0907ST01
Architecture

Dear Lt. Col. Stubbert:

SUBJECT: **Section 106 (NHPA) Consultation**
Emergency Repairs to Building 117
Kalaeloa (Barbers Point Naval Air Station), Island of O'ahu
TMK: (1) 9-1-013:045 and :050

Thank you for the submittal received May 13, 2009 regarding emergency repairs for Building 117 located at Kalaeloa (Barbers Point Naval Air Station). The building is not listed on the Hawaii or National Registers of Historic Places.

The Category I (property of major importance) building has been determined to be eligible for listing as a World War II-era aircraft hangar under Criteria A ("associated with events that have made a significant contribution to the broad patterns of our history"). Built in 1944 by Albert Cahn "as part of the Naval Air Station at Barbers Point (and) involved in the repair and assembly of WWII carrier planes", it is eligible for listing under Criteria C ("that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components lack individual distinction").

Proposed work involves replacement of cracked glass windows in the upper hangar bay with fiberglass corrugated panels on 1"x4" wood runners that will be attached to the interior side of the metal frames of 5-foot-wide window banks. The high bay windows are proposed for replacement in-kind within the next few years.

As this is a temporary repair addressing health and safety issues, we concur that the determination for the proposed project is "**no adverse effect**" with the condition that the attachment "will be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic (feature) would be

LOG NO: 2009.2274
DOC NO: 0907ST01

unimpaired." Furthermore, we request that the attached features be painted and/or be of the same color of the existing building's features to minimize any impacts to the historic character.

In addition if possible, we request before-and-after photographs including closer views meeting National Park Service requirements of the affected historic features for our files.

Thank you for the opportunity to comment. Should you have any questions regarding architectural concerns, please call Susan Tasaki, at (808) 692-8015.

Sincerely,

Nancy A. McMahon
Deputy State Historic Preservation Officer

c:
U.S. Department of the Interior, National Park Service, Frank Hays, Director, Pacific West Region-Honolulu [Frank_Hays@nps.gov]
Advisory Council on Historic Preservation, Katherine Kerr, Historic Preservation Specialist, Office of Federal Agency Programs [kkerr@achp.gov]
National Trust for Historic Preservation, Brian R. Turner, Law Fellow, Western Office [Brian_Turner@nthp.org]
Historic Hawaii Foundation, Kiersten Faulkner, Executive Director [Kiersten@historichawaii.org]

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 2, 2009

LOG: 2009.3809
DOC: 0909RS02A

Marjean Stuffert
Lieutenant Colonel
Hawaii Army National Guard
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Lt. Col. Stuffert:

SUBJECT: **Section 106 (NHPA) Consultation / Review of Final Draft Historic Building Survey and Evaluation Report of Hawaii Army National Guard Installations, Hawaii**
Permit # (None)
Building Owner: Hawaii Army National Guard
Location: Fort Ruger/Diamond Head Crater, Kapaa Armory, Kalaeloa, Kaunakakai Armory, Kealakekua Armory, Keeau Armory, TS Kekaha WETS, Wahiawa Armony, Waiawa Gulch
Tax Map Key: Various

This letter is in response to your letter of May 20, 2009, received by our office on June 4, 2009, re the *Final Draft of* the *Historic Building Survey and Evaluation Report of Hawaii Army National Guard Installations*. The document, prepared by Engineering-Environmental Management, Inc., was prepared for the State of Hawaii Department of Defense, Office of the Adjuntant General, Hawaii National Guard as Contract No. 57758, Project No, CA-2822.

The document covers Fort Ruger/Diamond Head Crater, Kapaa Armory, Kalaeloa (former Barber's Point Naval Air Station), Kaunakakai Armory, Kealakekua Armory, Keaau Armory, TS Kekaha WETS, Wahiawa Armory, and Waiawa Gulch. Seventy three buildings were surveyed.

Twenty two buildings were recommended eligible for the National Register of Historic Places (NRHP) listing, and 31 were recommended not eligible. Twenty buildings were already listed as contributing at the Fort Ruger Historic District: Battery Hulings, Battery Dodge, Battery 407, Mule Tunnel Storage, and 16 storage tunnels at Battery Harlow. Ten additional buildings eligible at Fort Ruger included: seven M Tunnels, Vault No. III, Building 300, and Building 301. Four buildings at Kalaeloa identified as eligible included: Nos. 00091, 99117, 99282, and 99663; three at Waiawa Gulch: 00013, 00025, and 00065; and armories at Kapaa, Keaau, and Kealakekua. All buildings found to be eligible for NHRP were also considered to be eligible for the Hawaii Register of Historic Places.

Cultural landscapes were determined to be present at Fort Ruger/Diamond Head, Kekaha on Kauai, Kealakekua and Keaau on Hawaii. Ft. Ruger/Diamond Head was determined to be the most significant.

The *Final Draft Report* recommended that:

- At Fort Ruger the seven M Tunnels and Vault III should be added to the District. In addition, the period of significance should be expanded to include the Cold War period to allow Buildings 300 and 301 to be considered contributing.
- Buildings and structures less than 50 years of age by 2013 were evaluated against National Park Service criterion G for their association with the Cold War. Such buildings and structures may need to be

reevaluated when they reach 50 years of age for NRHP eligibility for other than exceptional significance to the Cold War.

- Diamond Head Crater remains a significant historic military landscape and should be further investigated, assessed, and documented. Other stakeholders should be included in such work.
- Maintenance and treatment plans tied to programmatic agreements should be developed between the Hawaii Army National Guard the Hawaii State Historic Preservation Division, providing appropriate maintenance and repairs to groups of similar resources (regardless of location) in order to simplify and streamline the Section 106 compliance process.

This office accepts the studies, conclusions, and recommendations of the *Final Draft Report.* Please advise us of any further information that may arise. We look forward to receiving a hard copy and CD of the final report for our library.

If you have any questions, please call Ross W. Stephenson at 692-8028.

Mahalo for the opportunity to comment.

Nancy McMahon, Deputy State Historic Preservation Officer

LINDA LINGLE
GOVERNOR

ROBERT G. F. LEE
MAJOR GENERAL
ADJUTANT GENERAL

GARY M. ISHIKAWA
BRIGADIER GENERAL (HI)
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

February 2, 2010

NGHI-ENV

Ms. Pua Aiu, PhD
State Historic Preservation Officer
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building
601 Kamokila Blvd., Suite 555
Kapolei, Hawai`i 96707

Dear Ms. Aiu:

Subject: Section 106 (NHPA) Review
Changes to Construction and Renovation Design Plans at Buildings 117 and 663, Kalaeloa, Hawaii
TMK: (1)9-013:045
LOG NO: 31735
DOC NO: 0302st08
Architecture

The Hawaii Army National Guard (HIARNG) is planning to renovate two NRHP-eligible buildings and construct a new building at Kalaeloa located in Kapolei, Hawaii. We have conducted the background research, consultation, and archaeological/architectural surveys pursuant to Section 800.4(a) and (b) of the regulations, in order to further identify properties that may be affected by our proposed project.

We have defined the Area of Potential Effect (APE) as Buildings 117 and 663.

- Within the APE, the following properties are eligible for or listed on the National Register of Historic Places:

- Building 117, a World War II era aircraft hangar, was built in 1944 by Albert Kahn as part of the Naval Air Station at Barbers Point involved in the repair and assembly of WWII carrier planes. This building is classified as a Category I (property of major importance) structure eligible for the NRHP under criterion A and C.

- Building 663 was built in 1943 for "aviation armament" and likely was used as a weapons and weapons parts storage and shop for the repair of Navy aircraft. It was later used as a paint mixing/air conditioning building and is currently an unused FMS#1 Storage Building. Building 663 is recommended eligible for listing in the NRHP under Criteria A and C. The boundaries of the eligible building include the physical footprint of the building itself and the entirety of the overhead utility/conveyance bridge to the point where it enters Building 117.

The design plans (Suzuki/Morgan, 2001) for the Building 117 renovation and new construction were approved in a letter from the State Historic Preservation Division (SHPD) to the HIARNG dated February 28, 2003. There have been a few changes in the design plans since the 2003 concurrence of no effect letter was issued. A copy of the 2003 SHPD concurrence letter is enclosed in this correspondence.

Changes from 2001 Suzuki Morgan design plans include the following:

Building 117 Low Bay

1. Keep all historic windows in place and only replace broken or missing glazing.

2. Install clear, transparent film in interior side of existing windows to hold windows in place and prevent glass from breaking and falling into hangar.

3. Repaint over existing windows on the exterior to match HIARNG or existing color.

4. To the South and East face of Low Bay, demolish portion of existing window sections to install new sliding panels per 2003 approved plan. Deviation will be wall portions to infill space between windows and new sliding panels.

5. Dividing one separate storage (L135) from the CSMS #1 storage (L136).

6. Reduce Electrical Supervisor Office (L132) to put a closet space to the Electronics Workbay.

7. Keep existing double swing panels at the South side of Low Bay, between grid LG & LH. Remove door latches, patch with blanks and weld doors shut. Construct gypsum board wall immediately behind welded doors.

Building 663

1. Keep all historic windows in place and replace only broken or missing glazing.

2. Install all ADA shower stalls in both toilet rooms on the first floor.

3. Reduce second floor reception area (A202) to add new toilet room next to office (A203).

4. Install clear, transparent film on interior side of existing windows to hold windows in place and prevent glass from breaking and falling inside building.

New Building

1. Move the new building farther away from B117, in a south easterly direction.

The HIARNG applied the criteria of adverse effect, as stipulated in 36 CFR 800.5(a)(1) and has determined that the above-listed changes to the proposed action previously SHPD approved Feburary 28, 2003, will have **no adverse effect** to historic properties.

If we do not hear from you within thirty (30) days as per 36 CFR 800.3(c)(4), we will assume that you concur with our finding and will proceed with our project. If you have any questions about this project, please contact Mr. Jeffrey D'Agostino, Environmental Protection Specialist, at (808) 672-1919.

Sincerely,

Marjean Stubbert
Lieutenant Colonel
Hawaii Army National Guard
Facility Management Officer

Enclosures

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 27, 2010

Marjean Stubbert
Lieutenant Colonel
Hawaii Army National Guard, Facility Management Officer, State of Hawaii
Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

LOG NO:2010.0400
DOC NO:1003MA04

Architecture

Dear Lt. Col. Stubbert:

SUBJECT: **Section 106 (NHPA) Review**
Changes to Construction and Renovation Design Plans Building 117 and 663, Kalaeloa, Oahu, Hawaii
TMK: (1) 9-013:045

Thank you for the opportunity to comment on the aforementioned undertaking which we received on February 9, 2010. We are sorry for the delay in responding to your letter. The proposed undertaking involves renovation of two NRHP-eligible buildings and the construction of a new building at Kalaeloa located in Kapolei, Hawaii.

We originally reviewed this project in 2003 and stated that we "felt there should be no historic properties adversely affected." However, we had no drawings to refer to as the project had not yet been awarded. Upon review of the reduced size drawings attached to the letter, we have a few issues/ requests:

- Please send one complete set of drawings printed at half size so that the plans are readable and we have them for our records. Because the drawings that were sent with the letter are so small and the number of them scant, it is difficult to make an accurate determination of effect.
- Nowhere in your letter or in the drawings does it say that the work will be done to meet the "Secretary of Interior Standards." Therefore, we assume that, although the work appears to be mindful of the fact that this is a historic building, mitigation consultation will be necessary. As part of the Section 106 review process, we will include the Preservation Partners in this discussion.
- As part of the mitigation, prior to work on the buildings, HABS Level 2 documentation will be required. It shall be accompanied by HABS level photographs that will show exterior, interior and overall setting. These should be taken with a large-format 4 x 5 negative camera. Two sets shall be taken, and the HABS report as well as the negatives sent to the National Park Service, for recordation.

Given the information, we cannot concur with the Army's determination of no adverse effect.

We look forward to receiving the requested information so that we can make a proper determination. Should you have any questions regarding architectural concerns, please contact Nancy A. McMahon at (808) 692-8015.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO)
State Historic Preservation Officer

cc. National Park Service
Attention: Mr. Frank Hays
Box 50165
Honolulu, HI 96850

Historic Hawaii Foundation
Attention: Ms. Kiersten Faulkner
680 Iwilei Road, Suite 690
Honolulu, HI 96817

National Park Service
Attention: Dr. Elaine Jackson-Retondo
National Register &NHL program
1111 Jackson Street, Suite 700
Oakland, CA 94607-4807

Anthea Hartig and Betsy Merritt
National Trust for Historic Preservation
5 3rd Street #707
San Francisco, CA 94103

LINDA LINGLE
GOVERNOR

ROBERT G. F. LEE
MAJOR GENERAL
ADJUTANT GENERAL

GARY M. ISHIKAWA
BRIGADIER GENERAL (HI)
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

April 21, 2010

NGHI-ENV

Ms. Nancy McMahon (Deputy SHPO)
State Historic Preservation Officer
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building
601 Kamokila Blvd., Suite 555
Kapolei, Hawai`i 96707

Dear Ms. McMahon:

Subject: Section 106 (NHPA) Review
Changes to Construction and Renovation Design Plans at Buildings 117 and 663, Kalaeloa, Hawaii
TMK: (1)9-013:045
LOG NO: 31735
DOC NO: 0302st08
Architecture

We received the State Historic Preservation Division's response, dated March 27, 2010, to the HIARNG's Section 106 (NHPA) Review request referenced above. The following are HIARNG's responses to SHPD's three issues/requests:

- The March 27, 2010 letter stated that when the SHPD office originally reviewed the project in 2003, "there were no drawings to refer to as the project had not yet been awarded." The 2003 SHPD letter states that the plans for Bldg 282 were not reviewed because the project had not been awarded, however this project involves Bldg 117/663, not Bldg 282. However, in the 2003 SHPD response letter, the SHPD clearly states that "the final plans of Building 117 dated November 01, 2002, meet the Secretary of Ineterior Standards, therefore there should be 'no historic properties adversely affected'." Therefore, the statement made in the March 27, 2010 letter that the SHPD never received

nor reviewed the drawings for Bldg 117 is incorrect. However, HIARNG has included a full set of plans at half size with this correspondence for SHPD to review and file.

- The Hawaii Army National Guard (HIARNG) is planning to renovate two NRHP-eligible buildings in accordance with the Secretary of the Interior's Standards for Rehabilitation. The design plans (Suzuki/Morgan, 2001) for the Building 117 renovation and new construction were approved in a letter from the State Historic Preservation Division (SHPD) to the HIARNG dated February 28, 2003. Changes from 2001 Suzuki Morgan design plans are detailed in our February 2, 2010 letter and will be made in accordance with the Secretary of Interior's Standards for Rehabilitation. A copy of the 2003 SHPD concurrence letter, the HIARNG's February 2, 2010 review request letter and the most recent March 27, 2010 SHPD response letter are enclosed in this correspondence. HIARNG has copied the Preservation Partners on this correspondence should they wish to comment on this project.

- SHPD is requiring HABS Level 2 documentation prior to work on the building. A HABS recordation was previously conducted on Bldgs 117 and 663, and is archived at the Library of Congress. The HABS document is entitled "Naval Air Station Barbers Point, Assembly and Repair Shop, between Enterprise Aveneue and Wright, Midway, and Lang, Ewa Vicinity, Honolulu County, HI". The Library of Congress call number is "HABS HI, 2-EWA.V, 10-" and the survey number is "HABS HI-279-0".

The HIARNG applied the criteria of adverse effect, as stipulated in 36 CFR 800.5(a)(1) and has determined that the changes to the proposed action previously approved by SHPD in 2003, and detailed in the enclosed February 2, 2010 letter from HIARNG to the SHPD, will be made in accordance with the Secretary of Interior's Standards, and will have **no adverse effect** to historic properties.

If we do not hear from you within thirty (30) days as per 36 CFR 800.3(c)(4), we will assume that you concur with our finding and will proceed with our project. If you have any questions about this project, please contact Mr. Jeffrey D'Agostino, Environmental Protection Specialist, at (808) 672-1919.

Sincerely,

Jeffrey D'Agostino
Environmental Protection Specialist
Hawaii Army National Guard

Enclosures

cc. National Park Service
Attention: Mr. Frank Hayes
Box 50165
Honolulu, HI 96850

Historic Hawaii Foundation
Attention: Ms. Kiersten Faulkner
680 Iwilei Road, Suite 690
Honolulu, HI 96817

National Park Service
Attention: Dr. Elaine Jackson-Retondo
National Resgister & NHL program
1111 Jackson Street, Suite 700
Oakland, Ca 94607-4807

Anthea Hartig and Betsy Meritt
National Trust for Historic Preservation
5 3rd Street #707
San Francisco, CA 94103

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
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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

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 17, 2010

Jeffrey D'Agostino
Environmental Protection Specialist
Hawaii Army National Guard
3949 Diamond Head Road
Honolulu, Hawaii 96816

LOG NO:2010.1872
DOC NO:1005MA05

Architecture

Dear Mr. D'Agostino:

SUBJECT: Section 106 Review Buildings 117 and 663 Kalaeloa
Hawaii State Department of Defense
TMK: 1-9-013: 045

Thank you for your letter of April 21, 2010 which we received on April 27, 2010. The APE for this project is defined as Buildings 117 and 663, both of which appear to meet the criteria for listing in the Hawaii and National Registers of Historic Places. The buildings have been documented by HABS report HABS HI-279-0, which is in the Library of Congress. The current undertaking was initially reviewed by the SHPO in 2003 with a determination that there should be "no historic properties adversely affected." Since the review of that proposed project, the Hawaii Army National Guard's architect has made a number of changes to the proposed remodeling plans, including the retention of historic windows.

We have reviewed the potential effects, by consulting the attached plans and information. Based on our examination, we concur that, Pursuant to 800.4 (d) (1), **this undertaking will have no adverse effect to historic properties**.

While there is low probability of encountering archaeological sites in this area, in the event that historic resources, including human skeletal remains, are identified during the construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Division, Oahu Section, needs to be contacted immediately.

Should you have any questions regarding architectural concerns, please contact Nancy A. McMahon at (808) 692-8015.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO)
State Historic Preservation Officer

cc. U.S. Department of the Interior, National Park Service
Frank Hays, Director, Pacific West Region-Honolulu [Frank_Hays@nps.gov]
Dr. Elaine Jackson-Retondo, Architectural Historian, Pacific West Region [Elaine_Jackson-Retondo@nps.gov]
National Trust for Historic Preservation
Brian R. Turner, Law Fellow, Western Office [Brian_Turner@nthp.org]
Elizabeth S. Merritt, Deputy General Counsel, Law Department [Betsy_Merritt@nthp.org]
Historic Hawaii Foundation
Kiersten Faulkner, Executive Director [Kiersten@historichawaii.org]
Katie Kastner, Director of Field Services [Katie@historichawaii.org]
Advisory Council on Historic Preservation, Louise Brodnitz, Historic Preservation Specialist [LBrodnitz@achp.gov]

APPENDIX H
COMMENTS ON THE DOPAA

This page is intentionally left blank.

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

REPLY TO
ATTENTION OF:

September 29, 2009

Regulatory Branch

File Number: POH-2009-00293

Glenn Metzler
TEC, Inc.
1001 Bishop Street, Suite 1400
American Savings Bank Tower
Honolulu, Hawai'i 96813

RECEIVED OCT 0 2 2009

Dear Mr. Metzler:

This letter is in response to your request, dated August 8, 2009, for our review and comments regarding the draft description of the proposed action and alternatives for the relocation of units and construction projects at Kalaeloa, Oahu, Hawai'i.

Based on the information furnished to our office there do not appear to be any water resources (i.e. streams and wetlands) within or around the proposed demolition, renovation, and construction areas as identified in Figure 2-1, Proposed Action Buildings and Properties of Interest. Please note that under Section 404 of the Clean Water Act of 1972 (33 U.S.C. 1344), Department of Army (DA) authorization is required for any activities that result in the discharge (placement) of dredge and/ or fill material into waters of the U.S. Additionally, Section 10 of the Rivers and Harbors Act (RHA) of 1899 requires that a Department of Army (DA) permit be obtained for structures or work in or affecting navigable waters of the U.S. (33 U.S.C. 403).

Thank you for the opportunity to comment. If you have any questions, please contact Ms. Meris Bantilan-Smith, of my Regulatory staff at 808-438-7023 (FAX: 808-438-4060) or by electronic mail at Meris.Bantilan-Smith@usace.army.mil. Please include File Number POH-2009-293 in any future correspondence regarding this project. Please be advised you can provide comments on your experience with the Corps' Honolulu District Regulatory Branch by accessing our web-based customer survey form at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

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

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Pacific Islands Water Science Center
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813
Phone: (808) 587-2400/Fax: (808) 587-2401

September 15, 2009

Lieutenant Colonel Marjean R. Stubbert
Hawaii Army National Guard
Construction and Facilities Management Officer
State of Hawaii
Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Lieutenant Colonel Stubbert:

Subject: Notice of Preparation of an Environmental Assessment (EA) for the Relocation of Units and Construction Projects at Kalaeloa, Oahu, Hawaii

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

We appreciate the opportunity to participate in the review process.

Sincerely,

Stephen S. Anthony
Acting Center Director

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED OCT 0 2 2009

September 29, 2009

TEC Inc.
1001 Bishop Street Suite 1400
American Savings Bank Tower
Honolulu, Hawaii 96813

Attention: Mr. Glenn Metzler

Ladies and Gentlemen:

Subject: Notice of Preparation of an Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa, Oahu

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

Other than the comments from Engineering Division, Land Division-Oahu, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Historic Preservation will be submitting comments through a separate letter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Morris M. Atta
Administrator

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION
2009 SEP 14 A 11:43
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 31, 2009

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
__Div. of Forestry & Wildlife
__Div. of State Parks
__Commission on Water Resource Management
_Office of Conservation & Coastal Lands
_x_Land Division –Oahu District

'09 AUG 31 AM 11:12 ENGINEERING

FROM: Morris M. Atta
SUBJECT: Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa
LOCATION: Island of Oahu
APPLICANT: TEC Inc. on behalf of Department of Defense

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 25, 2009.

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

Attachments

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

Signed: Eric T. Hirano
Date: 9/13/09

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/MorrisAtta
Ref.: EARelocationUnitsConstrucionProjectsKalaeloa
Oahu.717

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 site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone D. The Flood Insurance Program does not have any regulations for developments within Flood Zone D.**

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

( ) 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:

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

( ) Mr. Frank DeMarco at (808) 961-8042 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 Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 9/13/09

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 31, 2009

MEMORANDUM

FROM/TO:

DLNR Agencies:
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
__Div. of Forestry & Wildlife
__Div. of State Parks
__Commission on Water Resource Management
__Office of Conservation & Coastal Lands
x Land Division –Oahu District

TO:

~~FROM~~:
SUBJECT: Morris M. Atta
Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa
LOCATION: Island of Oahu
APPLICANT: TEC Inc. on behalf of Department of Defense

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 25, 2009.

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

Attachments

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

Signed:
Date: 9/2/09

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
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

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 14, 2009

LOG: 2009.3925
DOC: 0909RS14

Environmental Office
Hawaii Army National Guard
3949 Diamond Head Road
Honolulu, HI 96816

Dear Members of the Environmental Office:

SUBJECT: **Section 106 (NHPA) Consultation / Environmental Assessment**
Permit # (None)
Building Owner: Hawaii Air National Guard, State of Hawaii
Location: Kalaeloa
Tax Map Key: (1) 9-1-013:045

This letter is in response to your communication of September 10, 2009, received by our office via email on September 12, 2009, re Hawaii Air National Guard operations at Kalaeloa. Kalaeloa is the Native Hawaiian name for the area formerly occupied by Barbers Point Naval Air Station (BPNAS). The eastern portion of the base was one of several locations attacked by the Imperial Japanese Navy on December 7, 1941. The western half of the base was constructed during World War II as a forward training facility for the Pacific Theater of Operations. The BPNAS was closed in July 1999 as part of the Base Realignment and Closure Act. The property has been subdivided and is being redeveloped by federal, state, county, military, and civilian organizations. The base and many of its structures are eligible for both the Hawaii and National Registers of Historic Places.

The Hawaii Army National Guard (HIARNG) is proposing to consolidate its operations at Kalaeloa. The HIARNG has three major commands: the JFHQ-HIARNG (formerly known as Headquarters State Area Command), the 29th Infantry Brigade Combat Team (formerly called the 29th Separate Infantry Brigade), and the 103rd Troop Command. Activities are currently spread out between the proposed site, the Diamond Head Area, and Wheeler Army Air Field. Operations include deployments of aircraft and troops, vehicle and equipment storage and maintenance, training exercises, defense support to civil authorities operations, and logistical support activities.

HIARNG has submitted an Environmental Assessment (EA) to evaluate and summarize potential impacts of proposed construction, and renovation of new and existing buildings for the relocation.

The Preferred Alternative for reuse of the site would renovate Buildings 19, 46, 117, 663, 666, 1784, 1785, 1786, 1787, 178; while demolishing Buildings 282 and 1903.

Rejected options included:

Alternative 1 would change the locations of facilities such as the Army Air Support Facility, JFHQ-HIARNG Readiness Center, and the Brigade Readiness Center. While noise would be located farther from residential areas and traffic distances lessened within the HIARNG site, the Brigade Readiness Center would be farther from Building 117, the JFHQ would not be central, the temporary Army Aviation Readiness Center in Building 282 would be far from the AASF, and ground maintenance would be subjected to possible foreign object damage from jet blast.

Alternative 2 would permanently retain Building 282 as the Army Aviation Ready Readiness Center.

Alternative 3 would be the no action alternative, considered unsatisfactory because of existing operational inefficiencies.

This office must express concern about the fate of Building 1903 and especially Building 282. Building 282 is a major feature of the old BPNAS because of its size. The EA itself notes that Building 282, built in 1958, is an outstanding example of a type, period, and method of construction particular to the Navy during the Cold War. No information is available in the EA to quantify any additional distance-induced expense should alternative 2 be chosen; any information comparing renovation costs for Building 282 compared to construction of new building; or discussion as to what modifications might be possible to expand the building in a historically appropriate manner.

We look forward to more information from your office. Please contact Ross W. Stephenson at 692-8028 or ross.w.stephenson@hawaii.gov if you have questions.

Aloha,

Pua Aiu, Administrator, Hawaii Historic Preservation Division, DLNR

BOARD OF WATER SUPPLY

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

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JEOFFREY S. CUDIAMAT, Ex-Officio
BRENNON T. MORIOKA, Ex-Officio

WAYNE M. HASHIRO, P.E.
Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager and Chief Engineer

September 3, 2009

Ms. Marjean Stubbert, Lieutenant Colonel
State of Hawaii
Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Ms. Stubbert:

Subject: Your Letter Received August 28, 2009 Requesting Comments on the Draft Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa, Oahu, Hawaii

Thank you for the opportunity to comment on the proposed project

This site is served by a private water system. Water service for this development should be coordinated with the U.S. Navy who is providing water to this area.

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

Very truly yours,

KEITH S. SHIDA
Program Administrator
Customer Care Division

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME LEINAALA 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: EHA/HEER Office
2009-620 RP

September 24, 2009

Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street, Suite 1400, American Savings Bank Tower
Honolulu, HI 96813

Facility/Site: Kalaeloa, Hawaii, former Barbers Point NAS

Subject: Review of "The Hawaii Army National Guard Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa, Hawaii"

Dear Mr. Metzler:

The Hawaii Department of Health Hazard Evaluation and Emergency Response Office has reviewed the document "The Hawaii Army National Guard Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa, Hawaii".

The proposed construction/renovation will take place predominantly on developed land that is currently paved, or capped by building foundations. The Covered Parking area, Maintenance Bays, and Vehicle Wash Rack will cover what is now an open vegetated lot and former fuel storage area.

As noted in the narrative of the EA, this area is not known to be habitat for the noted endangered plants of the Kalaeloa area, the akoko shrub (*Chamaesyce skottsbergii var. skottsbergii*), and the O`ahu Chaff Flower (Achyranthes splendens). Also, the Federally listed and State listed endangered Hawaiian Black-necked Stilt, or **Ae`o** (*Himantopus mexicanus knudseni*), inhabits the wetland areas at the perimeter of the NAS. There is no evidence that it is found at this open vegetated parcel.

However, since the Preferred Alternative could have construction-related impacts on coastal waters where the Federally listed and State listed threatened green sea turtle (*Chelonia mydas*) is found, impacts from surface water runoff generated by construction should be avoided or reduced by the use of storm-water control measures required by existing laws and regulations.

In addition, there is no indication that the former fuel storage area has been investigated for historical soil contamination. Please be aware that, should any soil contamination be encountered during the redevelopment of the former Barbers Point Naval Air Station at Kalaeloa, Oahu, Hawaii, the HEER Office must be notified. Proper measures must then be taken to alleviate possible exposure pathways to construction workers, HIARNG employees, and the environment. A cap provided by the buildings scheduled for construction at the fuel storage area will serve as a protective measure should contamination be uncovered.

Should there be any questions, please do not hesitate to contact me at (586-0957). Thank you very much for your time and consideration in this matter.

Sincerely

Richard Palmer

Richard Palmer
Environmental Health Specialist
Hazard Evaluation and Emergency Response Office
State of Hawaii Department of Health

LINDA LINGLE
GOVERNOR

RECEIVED OCT 0 2 2009

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

IN REPLY REFER TO:

STP 8.3417

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

September 29, 2009

Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street, Suite 1400
American Savings Bank Tower
Honolulu, Hawaii 96813

Dear Mr. Metzler:

Subject: Hawaii Army National Guard (HIARNG); Notice of Preparation of an Environmental Assessment (EAPN) for the Relocation of Units and Construction Projects at Kalaeloa, Oahu, Hawaii

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project, which proposes a four-phased construction project, including the renovation of several existing structures and new construction at the current HIARNG facility. This project supports the relocation of HIARNG aircraft and operations from Fort Ruger and Wheeler Army Air Field and the consolidation at Kalaeloa Airport. The subject project also proposes the acquisition of adjacent parcels, which include the U.S. Navy former fuel farm site and DOT Airports Division's paved and grassy areas adjacent to Kalaeloa Airport for use as runway access.

Given the project location, DOT transportation facilities will be impacted. The Draft EA should address the following issues relating to the State airport, Kalaeloa Airport.

1. The Draft EA should address possible increases in aircraft noise from possible night training operations and change of flight operations that may impact the surrounding community.

2. In Section 2.1.4 on page 2-9, the EAPN proposes acquisition of:

   a. The Former Navy Fuel Storage Facility. The applicant is advised that the DOT Airports Division (DOT-A) currently has an application with the Navy to have this former fuel farm storage facility transferred to DOT-A. The Navy has informed DOT that this transfer is being processed as requested. Therefore, DOT does not concur with HIARNG's proposal to acquire this particular parcel.

   b. Access to the Kalaeloa Airport Runway. DOT does not concur with HIARNG acquiring this parcel. However, DOT is agreeable to providing HIARNG with access to the runway.

The DOT Highways Division is concluding its review of the subject project for impacts to DOT highway facilities. Upon completion of this review, DOT will provide additional comments as necessary.

DOT appreciates the opportunity to provide comments. If there are any questions, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 587-2356.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

c: Marjean R. Stubbert, The Hawaii Army National Guard (HIARNG)
Ms. Katherine Kealoha, Office of Environmental Quality Control

Original

LINDA LINGLE
GOVERNOR

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

STP 8.0011

January 11, 2010

Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street, Suite 1400
American Savings Bank Tower
Honolulu, Hawaii 96813

Dear Mr. Metzler:

Subject: Hawaii Army National Guard (HIARNG); Notice of Preparation of an Environmental Assessment (EAPN) for the Relocation of Units and Construction Projects at Kalaeloa, Oahu, Hawaii

The State Department of Transportation (DOT) previously provided interim comments regarding the subject project in its letter STP 8.3417 dated September 9, 2009 (attached). Based on DOT Highways Division's review of the subject project, DOT now offers the following additional comments to be addressed in the Draft Environmental Assessment (DEA).

1. The subject project should be coordinated with DOT's project, Fort Barrette Road Widening, Farrington Highway to Barbers Point Gate. The highway will be widened from two lanes to a four-lane divided highway with raised median, auxiliary lanes, bike lanes, curb and gutter, sidewalks, street lights, traffic signals, utilities and an underground drainage system. The design should be completed in 2011 and construction may start as early as 2014, depending on the availability of funds and DOT priorities. The project manager, Li Nah Okita, Engineer, may be contacted at the DOT Highways Division Design Branch at telephone number (808) 692-7581.

2. A Traffic Impact Analysis Report (TIAR) is required for DOT Highways Division's review and approval. The report should include, address and analyze the following items.

    a. Projected completion dates for the relocation and consolidation (full build out) should be noted.

    b. A description of the type and amount of traffic expected for movement of military supplies and munitions during normal operations and during disasters and other emergencies should be included.

c. Alternative routes for access in and out of Barbers Point during construction of the Fort Barrette Road widening project and during other times of emergencies or disasters should be identified.

d. Methods and routes to deploy combat troops from Kalaeloa to crucial government facilities during emergencies in the vicinity of downtown Honolulu should also be identified.

e. The number of HIARNG full-time personnel and reserve personnel currently at Kalaeloa and the anticipated total numbers when the four phases of the relocation are complete should be included.

f. The number of neighbor island troops on site for training activities and frequency of training activities should be provided.

g. Any planned changes to Barbers Point Gate between Enterprise Avenue and Fort Barrett Road should be addressed.

h. Recommendations for mitigation of the traffic impacts should be made and they should be at no cost to DOT.

3. The project location should be further described by TMK numbers.

4. A permit is required from DOT Highways Division, Oahu District Office for movement of overweight and oversize vehicles over the State highways.

5. A permit is required for all work within the State highway right-of-way. Construction plans must be prepared in compliance with current State requirements and submitted to DOT Highways Division for review and approval. No additional storm water runoff is permitted in the State highway right-of-way.

6. A National Pollutant Discharge Elimination System (NPDES) permit is required for work affecting more than one acre.

DOT appreciates the opportunity to provide these additional comments. If there are any questions, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 587-2356.

Very truly yours,

Francis Paul Keeno

for BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

Attach.

c: Marjean R. Stubbert, The Hawaii Army National Guard (HIARNG)
Katherine Kealoha, Office of Environmental Quality Control

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

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

MUFI HANNEMANN
MAYOR

LESTER K. C. CHANG
DIRECTOR

RICHARD HARU
DEPUTY DIRECTOR

September 4, 2009

Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street, Suite 1400
American Savings Bank Tower
Honolulu, Hawaii 96813

Dear Mr. Metzler:

Subject: Notice of Preparation of an Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa, Oahu, Hawaii

Thank you for the opportunity to review and comment on the Notice of Preparation of the Hawaii Army National Guard's Environmental Assessment for relocation of units and construction projects at Kalaeloa, Oahu, Hawaii.

The Department of Parks and Recreation has no comment at this time.

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

Sincerely,

LESTER K. C. CHANG
Director

LKCC:jr
(330089)

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

MUFI HANNEMANN
MAYOR

PAUL D. PUTZULU
ACTING CHIEF

KARL A. GODSEY
DEPUTY CHIEF

OUR REFERENCE BS-DK

September 15, 2009

Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street, Suite 1400
Honolulu, Hawaii 96813

Dear Mr. Metzler:

This is in response to a letter from the Hawaii Army National Guard, State Department of Defense, requesting comments on a Notice of Preparation of an Environmental Assessment for the Relocation of Units and Construction Projects at Kalaeloa.

This project should have no adverse impact on the facilities or operations of the Honolulu Police Department.

If there are any questions, please call Mr. Brandon Stone of the Executive Bureau at 529-3644.

Sincerely,

PAUL PUTZULU
Acting Chief of Police

By
DEBORA A. TANDAL
Assistant Chief of Police
Support Services Bureau

LINDA LINGLE
GOVERNOR
STATE OF HAWAI'I

KAULANA H. R. PARK
CHAIRMAN
HAWAIIAN HOMES COMMISSION

ANITA S. WONG
DEPUTY TO THE CHAIRMAN

ROBERT J. HALL
EXECUTIVE ASSISTANT

STATE OF HAWAI'I
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAI'I 96805

October 8, 2009

RECEIVED OCT 1 2 2009

Mr. Glenn Metzler
TEC Inc.
1001 Bishop Street
Suite 1400. ASB tower
Honolulu, Hawaii 96813

Dear Mr. Metzler:

Subject: Draft DOPAA - Hawaii National Guard at Kalaeloa

This letter is in response to the Draft Description of Proposed Action and Alternatives (DOPAA) regarding the relocation and consolidation of Hawaii Army National Guard operations to Kalaeloa, Oahu, Hawaii.

The Department of Hawaiian Home Lands (DHHL) has made a cursory review of the Draft DOPAA and at this time we have no comments regarding its content.

We trust that the Environmental Assessment (DEA) will address the issue of helicopter noise levels that could have some impact on businesses and residents in the Kapolei area and reserve any comments DHHL may have upon review of the EA.

Thank you for the opportunity to review the DOPAA. If you need further clarification, you may contact Mr. Noel Akamu, DHHL Property Development Manager, at (808) 620-9453.

Aloha and mahalo,

Linda Chinn, Administrator
Land Management Division

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

MUFI HANNEMANN
MAYOR

DAVID K. TANOUE
ACTING DIRECTOR

ROBERT M. SUMITOMO
DEPUTY DIRECTOR

2009/ELOG-2095(RY)

October 15, 2009

RECEIVED OCT 19 2009

Mr. Glenn Metzler
TEC Inc.
American Savings Bank Tower
1001 Bishop Street, Suite 1400
Honolulu, Hawaii 96813

Dear Mr. Metzler:

Subject: Notice of Preparation of an Environmental Assessment
Hawaii Army National Guard (HIARNG) - Relocation of Units
and Construction Projects at Kalaeloa, Oahu
Tax Map Key: 9-1-13:45

We have reviewed the subject preparation notice and have the following comments:

1. The Draft Environmental Assessment (DEA) should address the project's consistency with local plans and zoning and building permit requirements. The DEA should discuss the project's consistency with the Ewa Development Plan dated August 1997 and the Kalaeloa Redevelopment Plan, *A Special Area Plan of the Ewa Development Plan* dated December 2000. For your information, the Ewa Development Plan is undergoing a comprehensive update and a copy of the draft revised plan can be reviewed at:

   http://honoluludpp.org/Planning/ewa/ewa5yr/PublicReviewDraft/EwaDPDraftPage.pdf.

2. The DEA should describe what portion of the project fronts on, or is accessed by State and/or City and County of Honolulu (City) roadways and whether any proposed improvements would affect City roadways.

3. The City and County of Honolulu Department of Environmental Services (ENV), under license with the U.S. Navy, has assumed the responsibility of reviewing all projects requiring sewer connections to the area's sewage system. We recommend that ENV be consulted regarding this project.

Thank you for the opportunity to comment. If you have any questions, please contact Raymond Young of our staff at 768-8049.

Very truly yours,

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

DKT:lh
Doc 725884